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Exploring antimicrobial potential of *Azadirachta indica* plant extract against pathogenic isolates

Mamta Devi, Shikha Devi, Kalpana Thakur,
Deeksha Kumari and Arvind Kumar Bhatt

Abstract

THE PRESENT study was aimed to evaluate the antimicrobial potential of *Azadirachta indica* leaf and bark extract against certified pathogenic microbes *E. coli*, *B. cereus*, *S. typhi*, *S. aureus*, *Shigella* sp., *P. aeruginosa* and *Yersinia* sp. by agar well diffusion method. Highest antimicrobial activity of aqueous (leaf and bark) extract was recorded against *Staphylococcus aureus* (16.5 ± 0.75 mm and $18.5 \text{ mm} \pm 0.79$) as compared to other plant extracts. Minimum inhibitory concentration of aqueous extracts of *A. indica* (leaves and bark extract) was determined against different pathogenic strains. 0.0781 mg/100 μ l aqueous extract of *A. indica* leaf, was enough to inhibit the growth of *Bacillus cereus*. Whereas, in case of aqueous extract of *A. indica* bark extract, the growth of *pseudomonas aeruginosa* was inhibited at 0.01975 mg/100 μ l. Based on the results reported above it can be concluded that minimum concentrations of plant extracts were quite effective in inhibiting the growth of pathogenic microbes even under crude stage which is quite promising finding which needs further work to utilize their potential fully. The results obtained in the present investigation especially those related to antimicrobial potential of plant extracts against various certified pathogenic strains used is an indication of usefulness of these important plant species in drug development.

Keywords: *Azadirachta indica*, Medicinal plants, minimum inhibitory concentration

Introduction

Plants have been used for thousands of years by several communities to flavour

and preserve food, to treat health ailments and to prevent several diseases. The use of plant and plant products could be traced back to the beginning of human civilization (Rathish *et al.*, 2005). Many pharmaceutical industries utilize plant and plant parts as raw material to produce various plant derived drugs including antibiotics (Pasha and Uddin, 2013). Secondary metabolites present in the plants which possess diverse health benefits like antimutagenic, antioxidative, anticarcinogenic, antimicrobials and many other activities (Davidson, 2000).

India has 2.4% of world's area with 8% of global bio-diversity, becomes a major global player in screening and developing herb-based preparations. The worldwide market of herbal medicines is US\$60 billion to US\$80 billion (Wakdikar, 2004). The use of plant extracts or chemicals derived from plants has become the base for the development of a medicine, a natural blue print for the development of new drugs (Khan *et al.*, 2011; Thakur *et al.*, 2018).

In Himalayan region the great wealth of medicinal plants has played an important role in primary health care system among the local people and this practice is continuing till date even when the ultramodern facilities of healthcare exist. The strategy of applying nanotechnology to plant extracts could potentiate action of plant extracts, sustained release of active constituents, decrease side effects and improve efficacy (Ghosh *et al.*, 2013; Rajendern *et al.*, 2013).

In view of the above potential of medicinal plants *A. indica* have been used in traditional system of medicine for curing of several diseases was selected for present investigation based on the previous results in our laboratory. *A. indica* (Neem) belongs to family Meliaceae, is evergreen tree found in most tropical countries (Girish and Shankra, 2008). Azadirachtin is the most important bioactive compound, it exists in all parts of the neem tree, but is concentrated in the seed kernel (Taha *et al.*, 2016). Traditionally used for diabetes, leprosy, cough, eye problem, skin ulcer etc. Efforts were made in the present investigation to evaluate the antimicrobial potential of *A. indica* against the selected pathogenic microbes.

Material and methods

Fresh plant material i.e. leaves and bark of *A. indica* were collected from its natural habitat, from the forest of district Bilaspur, Himachal Pradesh India and brought to the laboratory for further processing. The collected plant material were rinsed with distilled water, dried between the layers of blotting paper under shade at room temperature for 10-15 days. After drying the plant material was milled into fine by grinding using a pestle and then stored in the pre-sterilized air tight containers/bottles for further use.

Test organism

Clinical isolates used in this study were procured from the culture collection of our laboratory at the Department of Biotechnology, Himachal Pradesh University, Shimla which were earlier procured from Indira Gandhi Medical College and Hospital (IGMC), Shimla, Himachal Pradesh.

Resazurin Dye Solution:

Resazurin dye was prepared by dissolving 300 mg of resazurin in 40 ml of distilled water and followed by homogenization using a vortex mixer. The prepared dye was then stored in a reagent bottle and covered with aluminium foil until further use.

Preparation of plant extracts

The powdered sample of selected medicinal plant was used for the solvent extraction. Cold percolation method was used for the preparation of plant extracts (Rosenthaler, 1930) in different solvents i.e. petroleum ether, chloroform, ethyl acetate, acetone, methanol and distilled water.

Stock solution

The stock solution of different plant extracts were prepared in such a way that the final concentration comes to be 100 mg/ml by using 10% dimethyl sulfoxide (DMSO) a universal solvent as it dissolves both polar and nonpolar compounds. The extracts were properly mixed and stored at 4 °C in refrigerator for further use.

Antimicrobial activity

The effect of different plant extracts on various clinical isolates was observed by agar well diffusion method and minimum inhibitory concentration (MIC) was determined by Resazurin based microtitre dilution method. Agar well diffusion method was used to assess the antimicrobial activity of various plant extracts. The antimicrobial compound present in the plant extract diffuse out in to the medium interact in a plate freshly seeded with the test organism. Resazurin is an oxidation-reduction indicator used for the evaluation of cell growth, particularly in various cytotoxicity assays. It is a non-fluorescent and non-toxic blue colored that becomes pink and fluorescent when reduced to resorufin by oxidoreductases within viable cells. Resorufin is further reduced to colorless and non-fluorescent hydroresorufin.

Results

Petroleum ether extract

The data revealed that the petroleum ether extract of *A. indica* leaf was effective against almost all the pathogenic isolates whereas no inhibitory effect was recorded against *S. aureus*. The extract was highly effective against *B.cereus*

(13.25±0.67 mm at the conc. of 40 µl) it was followed by *P.aeruginosa* (13±0.18 mm at 40 µl conc.). The extract recorded lowest inhibitory activity in case of *E.coli* (7.22±0.39 mm). In case of *S. typhi* and *Yersinia* sp. the extract was effective even at lowest concentration i.e. 5 µl.

Chloroform extract

A comparison of the result showed that different concentrations of chloroform extract of *A. indica* leaf exhibited good activity against almost all the pathogenic strains. The chloroform extract recorded highest inhibitory effect on *S.typhi* (14.5±0.75 mm at 40 µl) whereas the effect was comparatively less w.r.t. positive control i.e. Chloramphenicol (21±0.62 mm) followed by *B.cereus* (13.25±0.40 mm at 40 µl). Interestingly, the inhibitory effect was quite good even at lower concentration.

Acetone extract

Acetone extract of *A. indica* leaf exhibited maximum activity against *E. coli* followed by *P. aeruginosa*, *S. aureus*, *Shigella* sp. and *B.cereus*. The results with *E. coli* (13.5±0.32 mm at 40 µl conc.) were almost similar to positive control i.e. Tetracyclin (16.25±0.53 mm) followed by *B. cereus* (10±0.43 mm at 40 µl conc.) and inhibitory effect was quite good even at lower concentrations. The least inhibitory effect was observed on *Shigella* sp. (8±0.64 mm).

Methanolic extract

The methanolic extract of *A. indica* leaf exhibited maximum inhibitory activity against almost all the pathogenic strains whereas no inhibitory effect was observed on *B. cereus*. The inhibitory effect was highest in *S.typhi* at all concentrations including 15±0.43 mm at 40 µl conc. which was comparable to positive control i.e. Chloramphenicol (19.25±0.53 mm). Interestingly, the growth of *Yersinia* sp. was also inhibited at even lower concentrations (12.75±0.77 mm at 40 µl and 7.5±0.75 mm at 5 µl).

Aqueous extract

The highest activity was recorded in *S. aureus* (16.5±0.75 mm at 40 µl conc.) including lower concentrations, followed by *P. aeruginosa* (15±0.55 mm at 40 µl) but no inhibitory effect was observed while using 5 µl extract. Least effect was observed on *Shigella* (14.5±0.45 mm at 40 µl). The data revealed that the aqueous extract showed comparatively good activity against all pathogenic strains at conc. higher than 10 µl.

***Azadirachta Indica* bark extract**

Acetone extract

The result of inhibitory effect of acetone extract of *A. indica* bark exhibited as

zone of inhibition at different concentration showed good antimicrobial potential against almost all the pathogenic strains. The highest inhibitory effect was observed on *S. aureus* (18.5 ± 0.79 mm) which was nearly equal to positive control i.e. Gentamycin (20.25 ± 0.67 mm), followed by *S. typhi* (16.5 ± 0.65 mm at 40 μ l conc.) and least effect was observed on *B. cereus*, *Shigella* sp., *E. coli*, *P. aeruginosa* and *Yersinia* sp. (16.5 ± 0.68 mm, 14.5 ± 0.32 mm, 13.5 ± 0.75 mm, 13.5 ± 0.88 mm and 12.5 ± 0.32 mm at 40 μ l conc.).

Methanol extract

The methanolic extract of *A. indica* bark showed maximum antimicrobial potential against the *E. coli*, *S. aureus*, *P. aeruginosa* and *S. typhi* whereas no inhibitory activity was observed against other pathogenic strains. The data showed that methanolic extract of *A. indica* was highly effective against *S. aureus* (15 ± 0.49 mm) and was almost equal to the positive control where the inhibition zone was 17.5 ± 0.37 mm. The extract effectively inhibited growth of *E. coli* and *P. aeruginosa* but in case of *P. aeruginosa* the inhibition was nearly equal to the positive control and in both cases, the lower concentrations were least effective for inhibiting the growth of these microbes. In case of *S. typhi* the inhibition was least (10.5 ± 0.70 mm at 40 μ l conc.).

Aqueous extract

The aqueous extract of *A. indica* bark although showed much higher antimicrobial potential against all the pathogenic strains, but it showed best and almost equal activity on *P. aeruginosa* and *Yersinia* (14.5 ± 0.65 mm) followed by *B. cereus* and *E. coli* (12.5 ± 0.45 mm at 40 μ l conc.) whereas it was not bad when compared to the positive control i.e. 16.25 ± 0.82 mm and 18 ± 0.55 mm. The extract also exhibited good activity against other pathogenic strains.

MIC Minimum inhibitory concentration

The minimum quantity/vol. needed to inhibit or to kill the pathogenic strains. MIC was carried out and lowest concentration required to inhibit the growth was 0.0395 mg/100 μ l and only 0.0781 mg/100 μ l aqueous extract of *A. indica* leaf, was enough to inhibit the growth of *B. cereus*. Whereas, in case of aqueous extract of *A. indica* bark extract, the growth of *P. aeruginosa* was inhibited at 0.01975 mg/100 μ l. Based on the results reported above it can be concluded that minimum concentrations of plant extracts were quite effective in inhibiting the growth of pathogenic microbes even under crude stage which is quite promising finding which needs further work to utilize their potential fully.

Discussion

The present investigation was aimed to evaluate the antimicrobial potential of solvent extracts of *A. indica* leaves and bark against Gram-positive and Gram-

negative pathogenic bacterial strains *Escherichia coli*, *Staphylococcus aureus*, *Salmonella typhi*, *Shigella sp.*, *Yersinia sp.*, *Pseudomonas aeruginosa* and *Bacillus cereus*. Many plants have been used because of their antimicrobial traits, which are due to the secondary metabolites manufactured by the plants. These products are known by their bioactive constituents. Use of herbal medicines in the developed world continues to rise because they are rich source of novel drugs and their bioactive principles form the basis in medicine besides the other advantages associated (Ncube *et al.*, 2008).

In the present study maximum inhibitory effect of aqueous leaf extract of *A. indica* was observed against *Staphylococcus aureus* (16.5 ± 0.75 mm) at the concentration of 4mg/ml of extract). The acetone extract of *A. indica* bark also showed good inhibitory effect against *Salmonella typhi* (18.5 ± 0.79 mm), *Bacillus cereus* (16.5 ± 0.68 mm at 4mg/ml conc.). The antibacterial activity of Methanol extract of *A. indica* showed maximum zone of inhibition (20mm) against *Salmonella typhi*. The ethanol, acetone and methanolic extracts of *Azadirachta indica* have also been screened earlier for their effectiveness against bacterial strains i.e. *Escherichia coli*, *Bacillus subtilis*, *Salmonella typhi*, *Pseudomonas*, *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Staphylococcus epidermitis* (Brahmachari, 2004).

Antibacterial activity of ethanol extract of *Azadirachta indica* have been reported to show maximum zone of inhibition (30mm) against *Salmonella typhi*, followed by *Escherichia coli* (24mm), *Pseudomonas aeruginosa* (20mm) and *Staphylococcus aureus* (19mm). The *Azadirachta indica* bark has also been reported to inhibit the growth of *Streptococcus mutans* and *S. sorbinus* 16mm (Jerobin *et al.*, 2015). Study conducted by Mistry *et al.*, (2014) showed that antibacterial activity of acetone extract of *A. indica* exhibited maximum inhibitory effect against *Staphylococcus aureus*, followed by *Escherichia coli*, *Salmonella typhi* (16mm) and *Pseudomonas aeruginosa* (15mm).

In case of aqueous extract of *A. indica* leaves, minimum inhibitory concentration required to inhibit the growth of *Bacillus cereus* was (0.0781 mg/100 μ l). Whereas in case of aqueous extract of *A. indica* bark, 0.01975 mg/100 μ l was required to inhibit the growth of *Pseudomonas aeruginosa*. Reddy *et al.*, (2013) showed that MIC for leaf and bark extract against bacteria was found to be at 500 μ g/ml. Phytochemical analysis of plant extracts of *Azadirachta indica* confirmed the presence of tannins, Saponins, alkaloids and flavonoids. The Ethanol extract of *Azadirachta indica* showed the presence of flavonoids, saponins, tannin, reducing sugar were found in presence of Ethanol extract. Reducing sugar, glycosides were observed only in Acetone extract of *Azadirachta indica* Saponins were observed in the Acetone and Ethanol extract

of *Azadirachta indica*. Terpenoides were observed only Methanol extract of *Azadirachta indica* (Vinoth *et al.*, 2012).

Conclusion

Azadirachta indica is an important medicinal plant which has been extensively used in traditional medicinal systems of medicine and is also being used successfully in rural areas by several herbal practitioners especially in the developing countries. *A. indica* contains a number of phytoconstituents, which provide medicinal value to the plant. The results obtained showed that the solvent extracts of the leaf and bark possess strong antimicrobial potential and can serve as source of new therapeutic agents. On comparison with other plants it was found that a very less quantity of crude extract of *A. indica* was enough to inhibit growth of pathogenic microbes which was also quite comparable to the positive control used in many cases. The efficacy can be improved by phytochemical analysis and purification of the bioactive compounds and using these in disease cure with the blend of modern scientific interventions.

Acknowledgement

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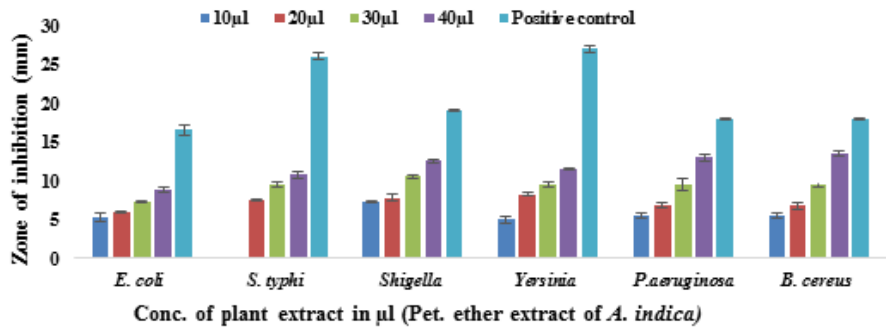


Fig. 1 Antimicrobial activity of petroleum ether extract of *A. indica* leaf extract

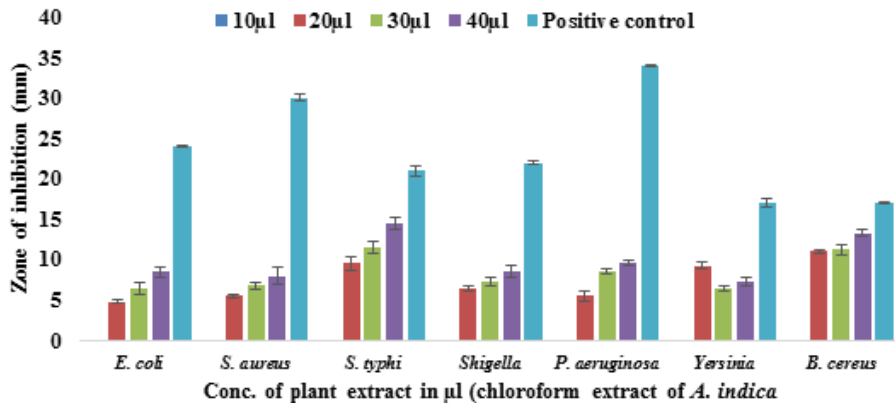


Fig. 2 Antimicrobial activity of chloroform extract of *A. indica* leaf extract

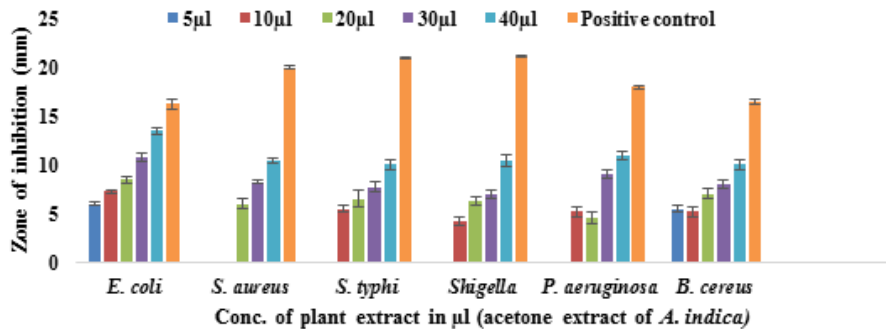


Fig. 3 Antimicrobial activity of acetone extract of *A. indica* leaf extract

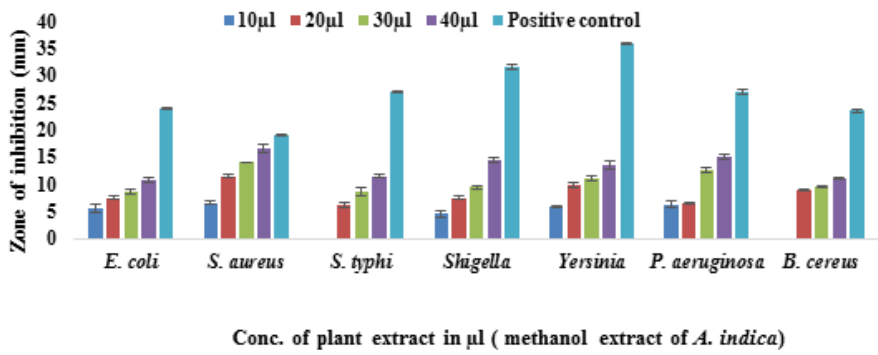


Fig. 4Antimicrobial activity of methanol extract of *A. indica* leaf extract

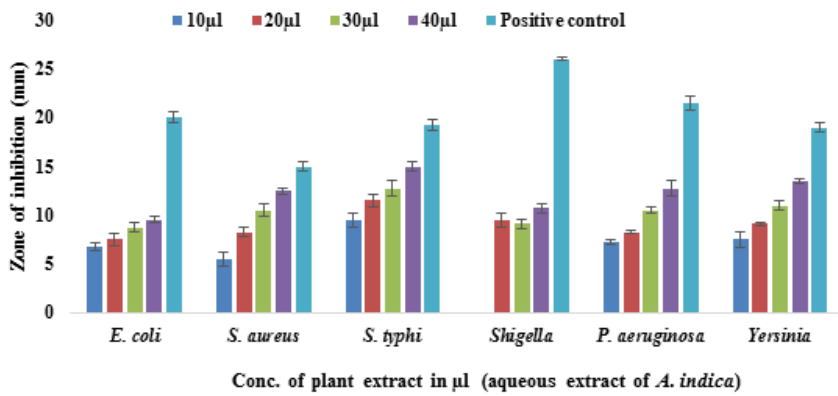


Fig. 5 Antimicrobial activity of methanol extract of *A. indica* leaf extract

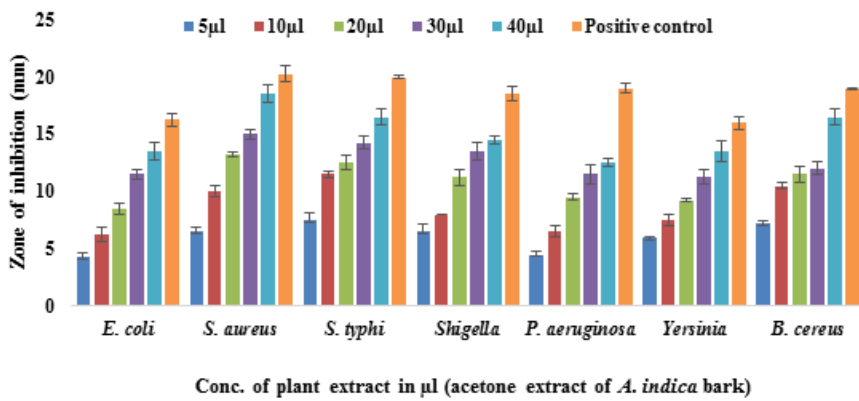


Fig. 6 Antimicrobial activity of acetone extract of *A. indica* bark extract

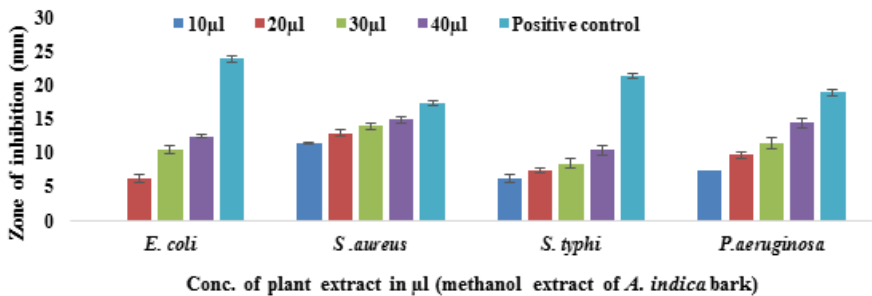


Fig. 7 Antimicrobial activity of methanol extract of *A. indica* bark extract

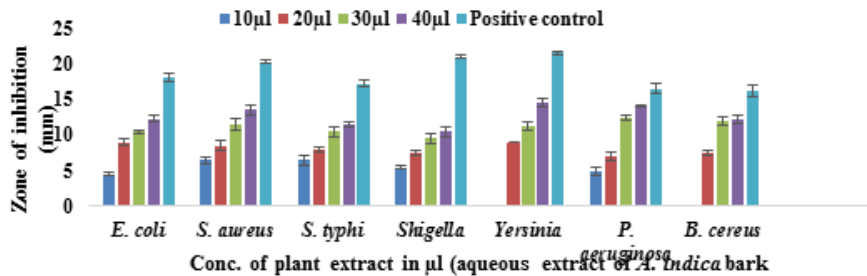


Fig. 8 Antimicrobial activity of *A. indica* bark against various pathogenic strains



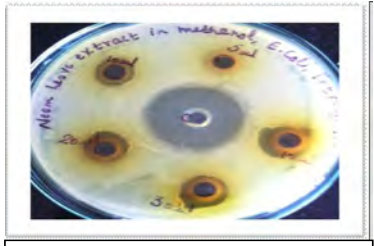
Petroleum ether extract against *B. cereus*



Chloroform against *B. cereus*



Acetone extract against *S. aureus*



Methanol extract against *S. aureus*

Fig. 9 Antimicrobial activity of various extracts of *A. indica*

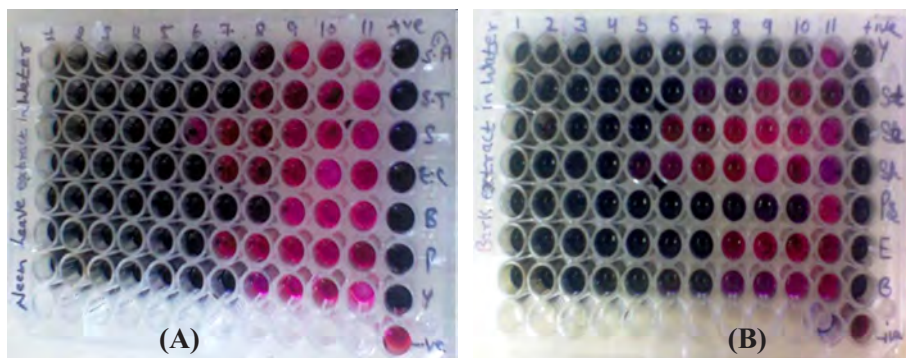


Fig. 10 MIC of *Azadirachta indica* (A: Aqueous extract of *A. indica* leaves) (B: Aqueous extract of *A. indica* bark)

Table 1: The details of antibiotics were used as positive control in case of various clinical isolates is as under:

Bacteria	Antibiotics used (Positive control)
<i>Escherichia coli</i>	Tetracycline
<i>Bacillus cereus</i>	Tetracycline
<i>Salmonella typhi</i>	Chloramphenicol
<i>Yersinia sp.</i>	Chloramphenicol
<i>Staphylococcus aureus</i>	Gentamycin
<i>Pseudomonas aeruginosa</i>	Gentamycin
<i>Shigella sp.</i>	Ciprofloxacin

Table 2 Minimum Inhibitory Concentration (MIC) of *A. indica* leaf extract in water against various pathogenic strains

Sr.no	Concentration of plant extract	<i>E. coli</i>	<i>S. aureus</i>	<i>S. typhi</i>	<i>Shigella</i>	<i>Yersinia</i>	<i>P. aeruginosa</i>	<i>B. cereus</i>
1	10	-	-	-	-	-	-	-
2	5	-	-	-	-	-	-	-
3	2.5	-	-	-	-	-	-	-
4	1.25	-	-	-	-	-	-	-
5	0.625	-	-	-	-	-	-	-
6	0.3125	-	-	-	+	-	-	-
7	0.1562	+	-	-	+	-	+	-
8	0.0781	+	-	+	+	+	+	-
9	0.0395	+	+	+	+	+	+	+
10	0.01975	+	+	+	+	+	+	+
11	0.009875	+	+	+	+	+	+	+
MIC (mg/100µl)		0.3125	0.0781	0.1562	0.625	0.156	0.3125	0.781

Table 3 Minimum Inhibitory Concentration (MIC) of *A. indica* bark extract in water against various pathogenic strains

Sr.no	Concentration of plant extract (mg/100µl)	<i>E. coli</i>	<i>S. aureus</i>	<i>S. typhi</i>	<i>Shigella</i>	<i>Yersinia</i>	<i>P. aeruginosa</i>	<i>B. cereus</i>
1	10	-	-	-	-	-	-	-
2	5	-	-	-	-	-	-	-
3	2.5	-	-	-	-	-	-	-
4	1.25	-	-	-	-	-	-	-
5	0.625	-	-	-	-	-	-	-
6	0.3125	-	-	-	+	-	-	-
7	0.1562	-	-	-	+	-	-	-
8	0.0781	+	-	+	+	-	-	-
9	0.0395	+	+	+	+	-	-	-
10	0.01975	+	+	+	+	-	-	+
11	0.009875	+	+	+	+	+	+	+
MIC (mg/100µl)		0.1562	0.0781	0.1562	0.625	0.01975	0.01975	0.0395

Effects of an organophosphate Dichlorvos on biochemical and histological studies in gills of Indian major carp *Cirrhinus mrigala*

Sushma Sharma and Seepika Thapar

Abstract

THE ENVIRONMENTAL conditions are not static and human influence has greatly stimulated the flow of environmentally deleterious chemicals to the aquatic system. Water is an indispensable resource, essential component of life and necessary for the survival of diverse aquatic ecosystem. The pesticides are the class of compounds that despite of their benefits may produce range of toxic effects that pose potential hazards to our environment. Dichlorvos is one of the most commonly used organophosphate in developing countries. It is an synthetic organic material used as an insecticide. It is also used in fish farming to eradicate the crustacean ectoparasites. Fishes are the most important inhabitants of the aquatic ecosystem which are most frequently exposed to and affected by the poisonous pesticides. The present study was carried on the toxicological effects of organophosphate Dichlorvos on gills of Indian major carp viz. *Cirrhinus mrigala*. An organophosphate dichlorvos was dissolved in water tank at the regular interval of 10 days each with concentrations of 1.0 ppm, 1.4ppm, 1.7ppm and 2ppm. The fishes were dissected after 10 days. Various histological and bioenzymological changes were observed after exposure of dichlorvos. Increase in superoxide dismutase (SOD), catalase (CAT) and lipid peroxidation level (LPO) and decrease in total protein content were observed in gills after each concentrations of dichlorvos. In gills, hyperplasia, loss of structural integrity, necrosis of epithelial tissue, epithelial lifting, edema, lamellar fusion, curling of secondary lamella, necrosis, hemorrhage, congestion and vacuolation was noticed after dichlorvos treatment.

Keywords: Dichlorvos, Indian major carp, fish gill, biochemical parameters, histology.

Introduction

Pollution in the aquatic ecosystem has become important problem all over the world by an excessive use of many toxic chemicals by drainage, drift and leaching (Cerejeira *et al.*, 2003). India is totally agro based country and more than 60 to 70 % of its population depends upon agriculture. 30% of its agriculture produce is lost owing to pest infestation. Utilization of pesticides in India is 3% of its total worldwide consumption and these pesticides are increasing at the rate of 2-5% per year (Bhadhbhade *et al.*, 2002). The pesticides are present in hundreds or millions of areas of aerable land by various routes and volatilizing into the atmosphere. The heavy metals and pesticides contamination of aquatic ecosystem has attracted the attention of various researchers all over the world (Javed and Usmani, 2011). The vast chemical groups of pesticides that are usually being applied in the fields are organophosphate, organochlorine, pyrethroids, carbamates, neocotenoids, and triazole (Srivastva and Singh, 2014; Sarba and Mehana, 2015). Among many pesticides the organophosphate pesticides have become most widely used insecticides which replace many organochlorine compounds. The cause of this replacement is the low persistence activity in the environment (Oruc *et al.*, 2004), and the biodegradability (Ye *et al.*, 2010). In spite of its advantages, it has some disadvantages also like aquatic toxicology (Igbedioh, 1991; Forget, 1993; Aktar *et al.*, 2009). The organophosphate residues can concentrate and diffuse by the effects of biological enrichment and food chains therefore might appear in food products and pose a potential risk for human health also (Sun *et al.*, 2011). Pesticides are also being practiced for the control of many pests in agricultural fields and from the fields pesticides easily find their way into the water bodies (Jyothi and Narayan, 1999). Fishes served as an important bio indicator of aquatic contaminants. Recent studies indicated that fishes are quickly becoming scarce owing to the increasing use of chemical pesticides in fields, since fishes are important source of proteins and lipids and health of fish is very important for human beings (Srivastva and Singh, 2013). Dichlorvos (dimethyl -2,2-dichlorovinyl phosphate) having molecular formula ($C_4H_7Cl_2O_4P$) is one of the most common organophosphate insecticides in the control of pests. It is also used to control several tropical diseases (Assis *et al.*, 2007). Fishes are the most important inhabitants of the aquatic ecosystem which are most frequently exposed to and affected by the poisonous pesticides (Scott and Sloman, 2004). The fishes have the ability to metabolize xenobiotics and exhibit a very high bioaccumulation rate. Dichlorvos had effects on gills, heart, spleen, liver and kidney.

Materials and methods

The present study was carried on the gills of *Cirrhinus mrigala* and was brought

from Seed and breeding fish farm Deoli, District Bilaspur, Himachal Pradesh. All the fishes were kept in the water tank of approximately 1800 L. under the natural conditions. The physiochemical properties of water were according to the environmental conditions of the fish farm. The experimental procedures were conducted after the approval of Fisheries Department of Himachal Pradesh.

Experimental Procedure

Fish was divided into five groups. Group- 1 served as control. Group- 2, 3, 4 and 5 were kept in 1.0, 1.4, 1.7 and 2ppm concentrations of dichlorvos respectively for 10 days. Dichlorvos was administered by mixing it in water for ten days. The gills and heart of dichlorvos treated and control fishes were excised and then transported from Deoli to the Animal physiology laboratory of Department of Biosciences, Himachal Pradesh University, Shimla in ice box. The desired tissues were then kept in -70°C (Lab cool) and then processed for different investigations.

Histological study

Gills of *Cirrhinus mrigala* was excised immediately after sacrificing the fishes. Tissues were fixed in Bouin's fixative for 24 hours. After that tissues were washed in running tap water until the entire yellow colour disappeared. Tissues were dehydrated serially in different grades of alcohol (30%, 50%, 70%, 90%, 100%) and cleared in xylene. Tissues were then embedded in paraffin wax ($58-60^{\circ}\text{C}$). Sections of about $5-6\mu\text{m}$ thickness were cut on the rotary microtome and subjected to hematoxylin - eosin staining.

Biochemical parameters

Protein estimation

Protein content was estimated as per the method of Lowry *et al.*, (1951) using Folin-ciocalteu's reagent.

Determination of antioxidant system

Superoxide dismutase (SOD) activity was determined by the method of Mishra and Fridovich (1972). SOD activity was calculated in units/mg proteins/min. Catalase assay was done as per method of Aebi, (1984). Enzyme specific activity was finally measured and calculated in units/mg protein/min. Level of malondialdehyde index of lipid peroxidation was estimated according to the method of Dhindsa *et al.*, (1981) using thiobarbituric acid (TBA). The MDA content was calculated in $\mu\text{moles/mg}$ of fresh tissue weight.

Statistical analysis - Data was presented as statistical mean $\pm$ SEM. Comparison amongst group was performed using one way anova test. Statistical significance was set at $P^{**} < 0.01$.

Results and discussion

Biochemical measurement

Gills Protein estimation

Protein content was estimated (90.20 ± 0.68 units mg/g fresh tissue weight) in normal gills of *Cirrhinus mrigala*. At concentration of dichlorvos (1ppm, 1.4ppm, 1.7ppm, and 2ppm), the protein contents decreased to 87.25 ± 0.33 , 84.75 ± 1.72 , 80.84 ± 0.51 , and 79.26 ± 1.16 respectively. Fish gills witnessed decrease in protein content with a percent decline of -3.27%, -6.04%, -10.37%, and -12.19% in comparison to control (Table 1).

Gills: SOD

The SOD activity seen in normal gills of *Cirrhinus mrigala* was 4.15 ± 0.03 units/mg protein. Increase in specific activity of SOD at 1 ppm concentration of dichlorvos in gills was 5.52 ± 0.01 units/mg protein. The values for SOD were 6.35 ± 0.02 , 7.62 ± 0.05 , and 8.85 ± 0.04 units/mg protein with concentration ranging from 1.4- 2.0 ppm concentrations. Percentage increase of SOD activity 26.60%, 53.01%, 83.61%, and 113.25% was seen as compared to control (Table 2).

CAT activity

The control gills of *Cirrhinus mrigala* showed specific activity 1.92 ± 0.03 units/mg protein. Catalase activity increased to 2.05 ± 0.01 units/mg protein with administration of 1ppm dichlorvos. Further concentration of 1.4ppm of dichlorvos, the catalase activity showed increase up to 2.17 ± 0.02 . The gills exhibited catalase activity 2.18 ± 0.04 and 2.23 ± 0.05 units/ mg protein at 1.7ppm and 2ppm concentration of dichlorvos. The percentage increase in enzyme activity was 6.77%, 13.02%, 13.54% and 16.14% with various concentrations of dichlorvos. (Table 3).

MDA Content

MDA production was 2.67 ± 0.01 n moles/g fresh tissue weight in control gills of *Cirrhinus mrigala*. An increase in peroxidation level was noticed in comparison to control at all concentrations. It was 3.44 ± 0.02 , 4.12 ± 0.04 , 5.24 ± 0.03 , 6.31 ± 0.05 n moles/g of fresh tissue weight at different concentrations of dichlorvos (1ppm, 1.4ppm, 1.7ppm and 2ppm). Gills showed increase in MDA when concentration increased and percentage increase of 28.83%, 54.30%, 96.25%, and 136.32% was recorded (Table 4).

Histopathological results

A gill is a respiratory organ found in many aquatic organisms that extracts dissolved oxygen from water and releases carbondioxide. Various changes were shown in the architecture of gills after exposure to dichlorvos. Gill tissue in

control group possessed normal structure with regular array of many gill filaments, primary gill lamellae and secondary gill lamellae. Pillar cells, gill arches, gill rakers, gill rakers epithelium and normal epithelium with large blood spaces were observed (Fig.1). The gills structure showed some alternations like aneurism in secondary gill lamellae. Necrosis and complete destruction of epithelium and edema was also observed after administration of 1ppm concentration of dichlorvos for 10 days (Fig. 2). Swelling in gill lamellae was observed with more vacuolation after 1.4ppm concentration of dichlorvos. Dilation and congestion of blood vessels and hyperplasia was also noticed at some places in *Cirrhinus mrigala* (Fig. 3). Necrosis, detachment of secondary lamellae along with thickening of gill arches was also depicted in gills of *Cirrhinus mrigala*. Loss of structural integrity of gills, excessive hemorrhage and loss of lamellae can also be seen after 1.7ppm dichlorvos concentration (Fig. 4). Epithelial lifting, fusion of lamellae, curling of secondary lamellae was also depicted after administration of dichlorvos at 2ppm concentration (Fig. 5).

Discussion

The biological magnification leads to the presence of residues of pesticides in human food and their subsequent consumption by humans. As the fishes are directly exposed to contaminants in water, so these can act as good bio indicators for the state of pollution in the water bodies (Manna and Biswas, 1986). Since the gills are the primary route for the entry of pesticides. Many investigators have reported the changes in gills of different fish exposed to different pesticides. Histopathological changes observed were hemorrhage in primary and secondary gill lamellae, degeneration and necrosis of epithelial cells, distortion of the secondary lamellae, curling of secondary lamellae, and fusion were observed in guppy *Poecilia reticulata* exposed to Chlorpyrifos (De Silva and Samayardhena, 2002). Whereas Rao *et al.*, (2005) observed similar result as per our present study such as hyperplasia, necrosis of epithelial cells, epithelial lifting, aneurism and hemorrhage in the gills of fish exposed to profenofos. Hyperplasia in some situation represented an adaptation by the organisms to protect underlying tissues from an irritant. Our result were supported by Velmurugan *et al.*, (2009) and presented histological changes that characterized the dichlorvos administration in the gills of *Cirrhinus mrigala* at 0.91 and 1.82ppm concentration of dichlorvos. Some degenerative structural changes in the gills have been reported like hyperplasia, necrosis of epithelium, epithelial lifting, edema, lamellar fusion, collapsed secondary lamellae, and curling of secondary lamellae. At 0.9ppm aneurism in secondary lamellae was also seen similar to our results.

Our study has revealed increased SOD activity in gills and heart after exposure to dichlorvos which is supported by Oruc and Usta (2007), and reported the

toxicity of diazinon mediated free radical induced oxidative cell injury that tends to elevate lipid peroxidation in the gills and muscle tissues of *Cyprinus carpio*. Additionally SOD and CAT activity increased in the tissues of *Cyprinus carpio* after diazinon exposure, and the increase was more distinct in the gills. The TBARS assay quantifies oxidative stress by measuring the lipid peroxidation that occurs with free radical generation and is used to quantify oxidative damage in fish tissue (Oakes and Van der Kraak, 2003). Similar to MDA, aldehydes occur during lipid peroxidation and are commonly used as an indicator of oxidative damage (Wang *et al.*, 2012).). Similar results were seen in endosulfan exposure which resulted in significant decrease in protein content in *Cyprinus carpio* (Muthukumaravel *et al.*, 2013), cypermethrin and malathion also decreased protein contents in *Labeo rohita* (Thenmozhi *et al.*, 2011).

Dichlorvos is present in the environment with other similar organophosphate compounds, and these organophosphate compounds may induce many lethal and sublethal effects in fishes. The exposure of dichlorvos may also lead to biomagnification which is a serious environment issue and lead to destruction of biodiversity. It is therefore matter of public health issue to regularly monitor the pesticidal residues in human and foods in order to assess the population exposure to harmful pesticides. But as a safe use of dichlorvos more experimental work is required to determine the time of exposure and concentration of this insecticide.

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CONCENTRATION FISH ↓	Protein Content (units mg/g tissue)				
	Control	1.0 ppm	1.4 ppm	1.7 ppm	2.0 ppm
<i>Cirrhinus mrigala</i>	90.20±0.68	87.25±0.33**	84.75±1.72**	80.84±0.51**	79.26±1.16**
% Decrease		-3.27%	-6.04%	-10.37%	-12.19%

Table 1: Changes in protein content (units mg/g of fresh tissue weight) in gills of normal and dichlorvos treated *Cirrhinus mrigala* for the period of 10 days at each concentrations. Values are mean ± SEM; n=3 (p** < 0.01).

CONCENTRATION FISH ↓ →	SOD (Units/mg protein/min)				
	Control	1.0 ppm	1.4 ppm	1.7 ppm	2.0 ppm
<i>Cirrhinus mrigala</i>	4.15± 0.03	5.52± 0.01**	6.35 ±0.02**	7.62± 0.05**	8.85± 0.04**
% increase		26.60%	53.01%	83.61%	113.25%

Table 2: Changes in SOD activity (units/mg protein/min) in gills of normal and dichlorvos treated *Cirrhinus mrigala* for the period of 10 days at each concentrations. (1-2ppm) Values are mean ± SEM; n=3 (p** < 0.01).

CONCENTRATION FISH ↓ →	Catalase (units/mg protein/min)				
	Control	1.0 ppm	1.4 ppm	1.7 ppm	2.0 ppm
<i>Cirrhinus mrigala</i>	1.92± 0.03	2.05± 0.01**	2.17± 0.02**	2.18± 0.04**	2.23± 0.05**
% increase		6.77%	13.02%	13.54%	16.14%

Table 3: Changes in catalase specific activity (units/mg protein/min) in gills of normal and dichlorvos treated *Cirrhinus mrigala* for the periods of 10 days at each concentrations. Values are mean± SEM; n=3 (p** < 0.01).

CONCENTRATION FISHs ↓	Lipid Peroxidation (n moles of TBARS formed/g of fresh tissue weight)				
	Control	1.0 ppm	1.4.0 ppm	1.7ppm	2ppm
<i>Cirrhinus mrigala</i>	2.67± 0.01	3.44± 0.02**	4.12± 0.04**	5.24± 0.03**	6.31± 0.05**
% Increase		28.83%	54.30%	96.25%	136.32%

Table 4: Lipid peroxides (n moles of TBARS formed/g of fresh tissue weight) in gills of normal and dichlorvos treated *Cirrhinus mrigala* for the periods of 10 days at each concentrations. Values are mean ± SEM; n= 3 (p** <0.01).

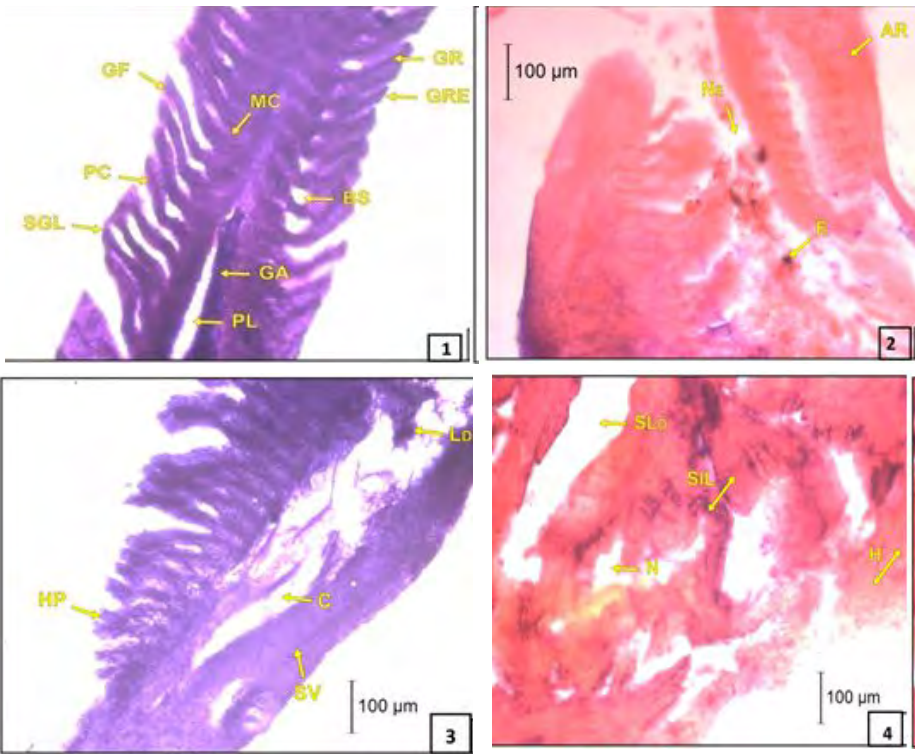


Fig 1: T.S of Normal gills of *Cirrhinus mrigala* demonstrating primary gill lamellae (PL), Secondary gill lamellae (SGL), gill arches (GA), gill rakers (GR), gill rakers epithelium (GRE), pillar cells (PC), mucus cells (MC), and blood space (BS) is also seen in this sections X100.

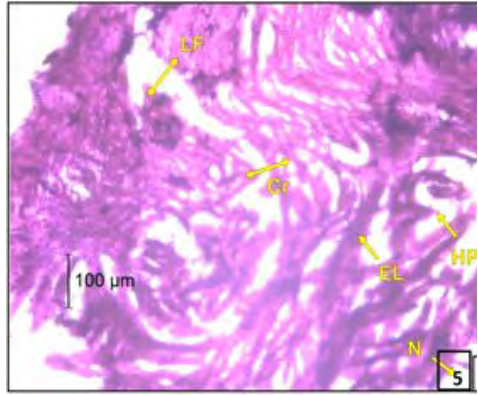


Fig 2: T.S of gills of *Cirrhinus mrigala* after 1ppm dichlorvos administration witnessing aneurism in gills (AR) Necrotic changes in epithelium (N_E), and edema in gills (E) is also observed X100.

Fig 3: T.S. of dichlorvos administered gills of *Cirrhinus mrigala* (1.4ppm) depicting congestion of blood vessels (C), hyperplasia (H), swelling of gill lamellae with some vacuolation (SV), Complete degeneration of lamellae (L_D) is also seen X100.

Fig 4: T.S of *Cirrhinus mrigala* gill treated with dichlorvos concentration (1.7ppm) showing hemorrhage (H) at some places along with necrotic changes in gill filaments (N) Detachment of secondary gill lamellae (SL_D) and loss of structural integrity of gill lamellae (SIL) is also seen X100.

Fig 5: T.S of dichlorvos treated *Cirrhinus mrigala* gills (2ppm) showing completely curling of secondary gill lamellae (Cr), necrosis of epithelium (N) Lamellar fusion (LF), epithelial lifting (EL), and hyperplasia is also seen (H) X100.

Evaluation of lipid fractions in *chick pectoralis* muscle under exercise stress

Sushma Sharma

Abstract

CHANGES in total lipids, triglycerides, cholesterol and phospholipid content of chick pectoralis muscle have been studied during 56 days post embryonic growth and exercise stress. Various lipid fractions in chick pectoralis reveal almost an identical pattern of variation during 42 days of post natal growth. Between 49-56 days, the muscle tends to regain its all lipid fractions. The rise in these lipid fractions is noticed in exercised pectoralis muscle, which may be due to exercise induced fiber hypertrophy.

Key words: chick muscle/*pectoralis* /sciactectomy

The importance of lipids in the skeletal muscle is not only limited to their role as energy sources for mechanical functioning of the tissue but also provide operational energy required for protein synthetic activity, resulting in the growth and maintenance of the tissue (Burleigh, 1974; Tomanek, 1975). Further, the transfer of steroid hormones to the sites of lipolysis is mediated by cholesterol and vitamin A compounds, which are lipo-soluble (Goldstein and Brown, 1977).

As a result of continuous exercise, the skeletal muscle fibers are known to alter their nature with respect to their lipid content (Cosmos, 1970). Various studies on extirpation of neutral control and drugs revealed acute membrane breakdown in muscle cell components, therefore, it is logical to expect acute changes in phospholipids in skeletal muscle under work overload conditions as well (Sharma and Malhotra, 1991). Effects of functional overload on muscle growth have been studied by numerous workers and hypertrophy of both the fiber types results from work induced stress (Goldberg *et al.*, 1975). Evidently, more energy has to be diverted for the proteosynthetic activity in muscle under work induced conditions and it is logical to expect greater utilization of lipids during this

period. Abnormal accumulation of neutral fats associated with unusually large mitochondria have also been reported in lipid storage disease (Bullock *et al.*, 1971). Similarly, during various diseased states in skeletal muscle, changes in serum phospholipid and serum cholesterol have been reported (Wakamatsu *et al.*, 1970).

The studies of numerous workers (Kugelberg, 1976; Henriksson, 1977) and refer to changes in the physiological characteristics as a result of exercise leading to alterations in oxidative and glycolytic capabilities of skeletal muscle. As a result of continuous exercise, the skeletal muscle fibers are known to alter their nature with respect to their lipid content. The aim of the study is that *pectoralis* muscle is the exercised muscle and how this distantly muscle is affected by effects of denervation as sciatic nerve is cut which is supplying the *gastrocnemius* muscle of chick.

MATERIALS AND METHODS

One day old chicks of *Gallus domesticus* (White leghorn variety) were procured from the Government poultry farm, Sunder Nagar (H.P.) and reared under normal hygienic conditions. Poultry feed (Hindustan Lever) and water were provided *ad libitum*. The animals were divided into two groups. One group served as normal controls, whereas, the animals of 2nd group were subjected to unilateral sciectomy resulting in the clawed condition of the sciectomised limb (without denervation) and animals become monopodal. The procedure followed has been described earlier (Malhotra *et al.*, 1978). The muscles of the contralateral limb (without denervation) carrying the entire bodyweight were subjected to continual work overload stress.

The animals were sacrificed by cervical dislocation at 1, 3, 5, 7, 14, 21, 28, 35, 42, 49 and 56 days after denervation. The *pectoralis* muscle was excised immediately. At each stage, at least 4 chicks were used. Lipids were extracted by the method of Folsch *et al.*, 1957. Quantitative estimations of total lipids, triglycerides, cholesterol and phospholipids was done according to Pandey *et al.*, (1963), Vanhandal and Zilversmith (1957), Stadman (1957) and Ames (1966) respectively. The optical density was read at 590 nm for total lipid, 570 nm for triglyglycerides, 680 nm for cholesterol and 800 nm for phospholipids on a Bausch and Lomb Spectronic-20. Standard curve was plotted using different concentrations of palmitic acid, tripalmitin, cholesterol and KH_2PO_4 (200 $\mu\text{g}/\text{ml}$.) for total lipids, triglycerides, cholesterol and phospholipids respectively.

RESULTS AND DISCUSSION

The results showing alteration in total lipids, triglycerides, cholesterol and phospholipids of *pectoralis* under normal and work stress conditions are

presented in Fig. 1. A sharp rise was noticed in normal and exercised *pectoralis* at 3-day stage in total lipids, with sharp fall at 7 days, then gradual increase upto 35 days stage and increasing trend towards the 6-8 weeks of postnatal growth. The muscle maintained the increase in total lipids during first 3 weeks and moderate increase between 42-56 days in normal and exercised *pectoralis*. The results clearly showed that exercise stimulates not only the lipogenetic processes but also elevates the rate of mobilization in the muscle (Krishan and Malhotra, 1981). These lipids are diluted as a result of fiber growth but lipid mobilization also appears to be retarded thereby resulting in low lipid levels of muscles after prolonged exercise.

Triglycerides are depot fats and are used as fuel as and when necessary. Some workers have reported age-related increase in serum triglycerides of rat while others, found a decline in the same parameter in rats, human and male rhesus monkeys (Kessler and Rawlins, 1983; Summerfield *et al.*, 1984). It is opined that continuous work overload stress induces metabolic aberrations in the muscle mitochondria resulting in their abnormal functioning at different times and which further leads to fluctuations in triglyceride levels of tissue. The skeletal muscle is apparently adapted for increased uptake of circulating triglycerides, which are utilized immediately or are used for restoration of muscle lipid stores, after the end of exercise (Taskiran *et al.*, 1980).

Normally, growing tissue has a higher cholesterol content in the beginning and during the growth and differentiation, gradual decline in cholesterol levels is experienced. The changes in cholesterol correspond to work induced growth during early period, thereby declining trend and pathological state induced in the muscle after 6-8 weeks of exercise stress. Initially, exercise acts as a stimulant for higher cholesterol synthesis and or its uptake in the muscle cells thereby facilitating the work-induced growth of muscle fibers. As a result of increased mechanical work of the tissue, wear and tear of cells involving breakdown of membrane system would be expected (Sharma and Malhotra, 1994; 1995). Most of the literature pertains to changes in serum levels of lipids of patients suffering from muscular diseases. As such further investigation on the subject are necessary to substantiate the above views.

The fluctuations in the phospholipid contents of *pectoralis* may be an account of the differences in the degree of phospholipids up-take and may be related to varied growth patterns. The increase in phospholipids in case of *pectoralis* under exercise stress was more pronounced. Lipids in muscle are in dynamic state and exhibit wide fluctuations under normal and exercise stress. The minor differences may be on account of state of fiber differentiation in a *pectoralis* –a phenomenon already reported (Malhotra *et al.*, 1978). It is clear from the results

that increase in lipid fractions in *pectoralis* may be dependent upon their greater capacity for the uptake of these fractions from the blood. Hypertrophy of muscle fibers results in the growth of membrane system incorporating larger amount of total lipids, triglycerides, cholesterol and phospholipids under work overload stress. Since, exercise induces some amount of fibrolysis, the contribution on account of membrane breakdown appears to be partly nullified by the overall hypertrophy of muscle fibers (Sharma and Malhotra, 1994).

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Isolation and screening of xylan degrading bacteria and optimization of xylanase enzyme produced by XPS-4 under submerged fermentation

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Ravi Kant Bhatia and Arvind Kumar Bhatt

Abstract

XYLAN is the second most abundant polymer after cellulose in nature, mainly found in the primary and secondary layers of the plant cell wall. It is hydrolyzed by xylanase, finding application in various industrial processes including bioconversion of lignocellulosic material and agro-wastes to fermentative products, single cell protein, ethanol based fuel and clarification of juices etc. Thus, keeping in mind the potential utility of xylanases in various industrial applications, xylanolytic microorganisms were isolated, screened and various culture conditions for hyperxylanase production were optimized. Out of the 22 bacterial strains isolated and screened for xylanase production, XPS-4 (0.85 U/mg protein) was emerged as the best xylanase producer. Further standardization of culture conditions resulted into 1.3 fold increase in the overall enzyme activity. The properties of xylanase producing isolate XPS-4 especially the stability of the organism in a wider range of pH, further strengthen its possible utility in industrial processes and make it an interesting source of xylanase.

Keywords: Xylanase, xylan, c₅Fermentation

Introduction

Plant cell wall contains up to 40% of hemicellulose formed by pentose sugars (mainly xylan). This heterogeneous carbohydrate consists of a backbone of β -1, 4-D-xylopyranosyl units and short chain branches consisting of O-acetyl, α -L arabinofuranosyl and α -D-glucuronoyl units. It is the most efficient renewable resource with a high potential for degradation into useful end products. The

energy output from this reservoir of biomass can be derived with the help of enzyme systems which consists of two main families of hydrolytic enzymes, the β -1, 4 endoxylanases (E.C 3.2.1.8), which attack the main chain, and β -xylosidases (E.C 3.2.1.37), which hydrolyze xylooligosaccharides to xylose (Polizeli *et al.*, 2005).

A variety of bacteria, filamentous fungi, actinomycetes and plants have been reported to produce xylanolytic enzymes including pathogenic microorganisms which break open the plant cell wall. Among these the microbial xylanases (1,4- β -D-xylan xylanohydrolase, EC 3.2.1.8) have attracted attention of the scientists during the past few decades for xylan hydrolysis due to their high specificity, mild reaction conditions, negligible substrate loss, and side product generation in addition to their potential biotechnological applications in various industries.

However, the cost of the enzymatic hydrolysis of a biomass is one of the main factors limiting the economic feasibility of this process and also the fact that industrial applications require cheaper enzymes, the elevation of expression levels and the efficient yield of xylanases are crucial to ensure the viability of the process. Therefore xylanase production capability of microbial isolates is required to be enhanced manifold. Consequently, search for novel sources of bacterial xylanase producing strains which display high xylanase activity and stability in more drastic conditions is continuously increasing. *Although xylanases have been isolated from various sources and extensive study has already been done in this field but there is always a scope for improvement, especially novel organism from nature.*

Materials and methods

Collection of samples

The soil samples were collected from various forest sites around Shimla, India were pooled and the mixed soil sample was taken for isolating xylanase producing bacteria.

Isolation and screening of xylanolytic bacteria

Preliminary screening was done by following serial dilution technique. A total of 22 bacterial strains were isolated from the pooled soil sample and were grown on plates containing xylan as sole carbon source. The isolates which showed separate whitish creamy distinct layered colonies with clearing zones around were selected and examined for further study.

Bacterial strains isolated from the preliminary screening were cultured in liquid Media (xylan broth) in Erlenmeyer flasks. After incubation on a rotary shaker

(30 °C, 150 rpm) for 48 hrs, the culture broth was centrifuged at 10000 xg for 10 minutes and the supernatant was collected for enzyme assay for xylanase production.

Xylanase assay

Xylanase activity was assayed according to the method given by Reese and Mandels (1963) using birchwood xylan (sigma) as enzyme substrate. The reaction mixture containing 500 µl of 1.0 % xylan (w/v) in 0.1 M citrate buffer (pH 5) and 20 µl of enzyme solution was incubated for 15 min at 30 °C. Released reducing sugar was measured using 3, 5-dinitrosalicylic acid (Miller, 1959) and xylose as standard. Colour was developed by boiling in water bath for 30 min and analyzed spectrophotometrically at 540 nm. One unit of activity was defined as amount of enzyme required to liberate 1 µmol of xylose per minute under the assay conditions.

Characterization of hyper-producer bacterial isolate XPS-4

Morphological and biochemical characteristics of the isolate were studied for the purpose of identification, according to Bergey's Manual of systematic bacteriology. Gram's staining was performed and results were recorded. The cultures were maintained on xylan agar medium and stored under refrigerated conditions for further use.

Optimization of culture conditions for xylanase production

In order to achieve maximum production of xylanase from selected bacterial isolate, attempts were made to optimize various production parameters *viz.*- media, nitrogen sources, pH, incubation temperature, inoculum size, inoculum age and production profile *etc.* using the selected bacterial isolate XPS-4.

Results

Isolation and screening of xylanase producing bacteria

Twenty two bacterial isolates exhibiting xylanase activity were isolated from soil samples collected from various sites around Shimla. Pure line cultures were established by repeated streaking of a single bacterial colony on xylan agar medium. Among these 22 isolates, isolate XPS-4 gave maximum



Fig. 1: Gram staining of XPS-4

production of xylanase. Morphological and biochemical study showed that XPS-4 is gram negative, rod shaped and catalase positive.

Optimization of culture conditions for xylanase production by isolate XPS-4

Optimization of culture conditions for the microbial xylanase is of great importance since culture conditions influence the level of the enzyme produced as well as its characteristics. The amount of xylanase produced is dependent on several physio-chemical factors such as cultivation temperature, pH, nitrogen sources (inorganic and organic sources), presence of surfactants *etc.* In order to improve enzyme production, method based on the “change-one-factor-at-a-time” was used in which one independent variable is studied while fixing all others at a specific level.

Selection of medium

The isolate XPS-4 was cultured in different growth media reported earlier by various workers. Maximum xylanase activity of 0.85 U/mg protein was observed in John and Schmidt's medium followed by 0.74 U/mg protein Robsons and Cham bliss's medium and lowest was recorded in Riviere's medium i.e. 0.49 U/mg as shown in Fig. 2 John and Schimdt's medium contains tryptone (0.15 % w/v) which may be responsible for better growth of the isolate XPS-4.

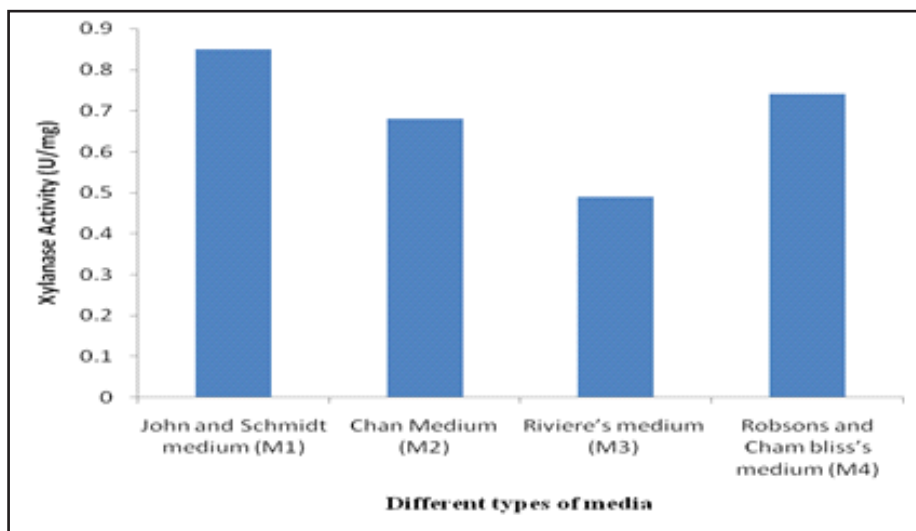


Fig. 2: Screening of media for xylanase production by bacterial isolate XPS-4

Effect of inoculum age

Among all the factors which influence the enzyme production by microorganisms, the age of inoculum plays very significant role. The production medium was seeded with inoculum of different ages ranging from 12-36 h and it was found that 27 h old inoculum resulted in maximum xylanase activity of 0.88 U/mg protein (Fig. 3). Activity of extracellular xylanase increased with increase in inoculum age upto 27 hrs with quite comparable activity from 21-30 h but thereafter, the activity declined.

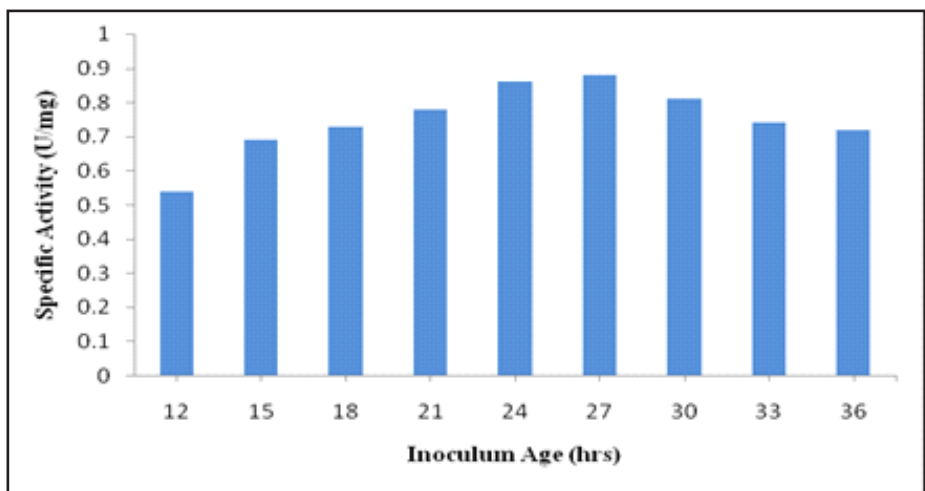


Fig. 3: Effect of inoculum age on the xylanase production by isolate XPS-4.

Effect of inoculum size

Data on the effect of different inoculum sizes on xylanase production by bacterium (Fig. 4) revealed an increase in enzyme production with increase in inoculum size from 0.1 % to 0.7 % with maximum xylanase activity (0.91 U/mg protein) with 0.7% inoculum. However, further increase in the inoculum size above 0.7% resulted in decline in the enzyme production, which may be due to the enhanced biomass that results in early depletion of nutrients. In contrast to the present study Okazaki *et al.*, (1984) used 1% inoculum size for the production of xylanase from actinomycetes.

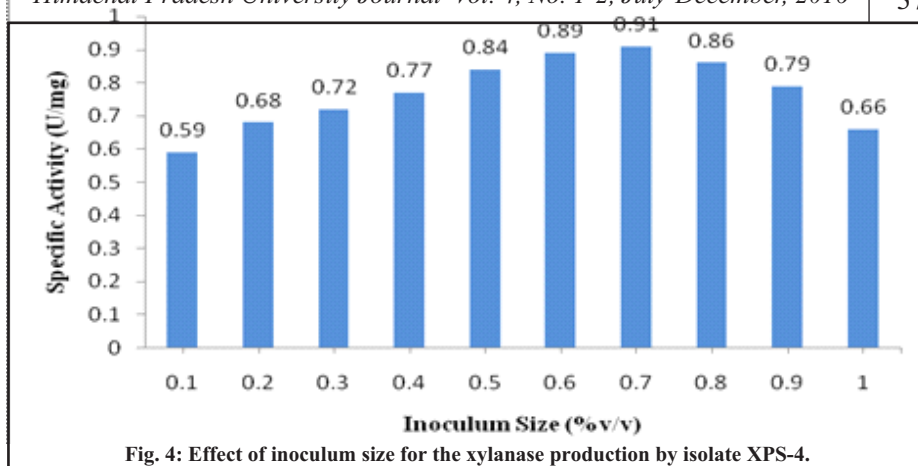


Fig. 4: Effect of inoculum size for the xylanase production by isolate XPS-4.

Effect of temperature

Temperature is a vital environmental factor which influence the growth and production of metabolites by the microorganism. To study the effect of temperature on the production of xylanase by isolate XPS-4 the bacterial isolate was grown at varied temperatures ranging from 25-50 °C and xylanase activity was recorded in the each case (Fig. 5). Maximum xylanase activity (0.90 U/mg protein) was observed at 30 °C. The temperature range of 35-45 °C had little influence on enzyme activity. The optimum temperature range of 28 °C for xylanase production has been reported earlier for various microbial isolates *e.g.* *Aspergillus niger*, *Flavobacterium sp.* (Bhatt *et al.*, 1991, Assamoi *et. al.*, 2010).

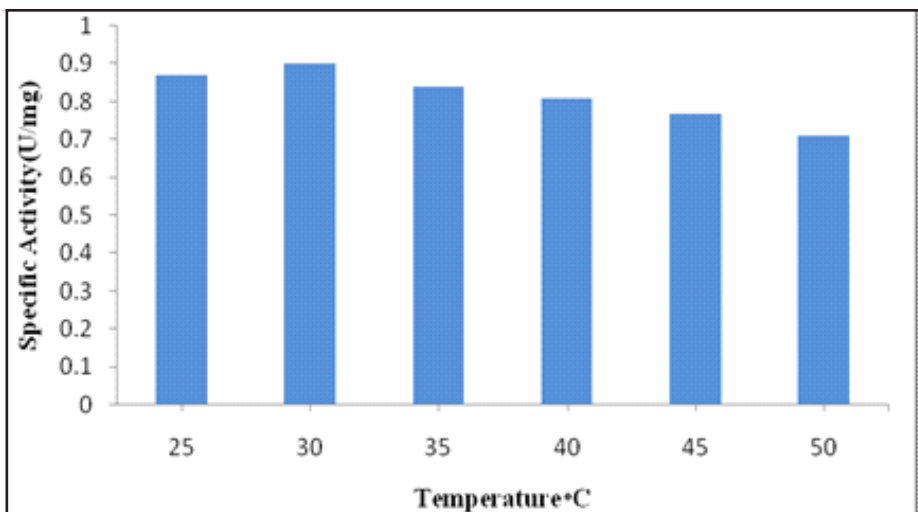


Fig. 5: Effect of temperature on the xylanase production by isolate XPS-4.

Effect of pH

Change in pH can protonate or deprotonate a side group, thereby changing the chemical features of enzyme. Effect of pH on the production of xylanase was studied by growing the bacterium in selected medium at various pH ranging from 5.5-9. Maximum activity of enzyme (0.93 U/mg protein) was recorded at pH 8 (Fig. 6). This enzyme was equally effective at pH 6 to 9 with intermittent increase at pH 7.5 and optimum pH of 8.0, indicating the ability of the bacterium to grow and produce enzyme in a wide range of pH.

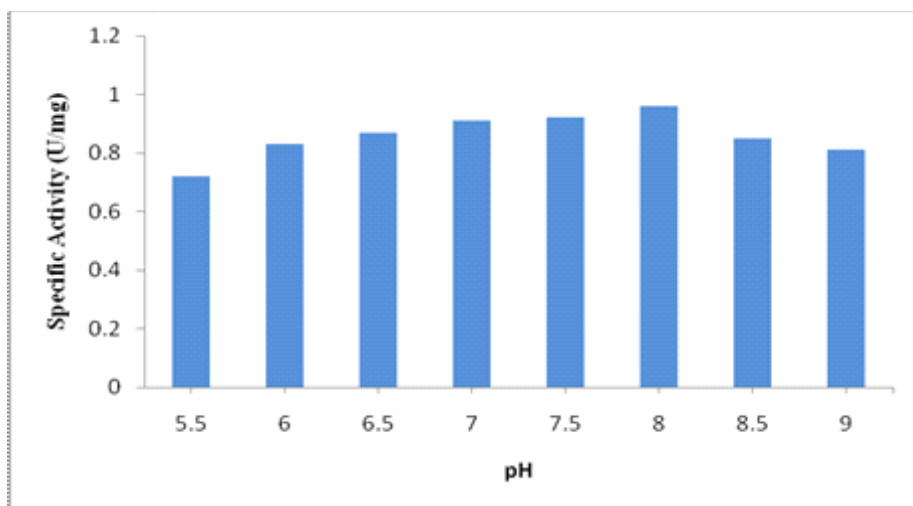


Fig. 6: Effect of pH on the xylanase production by isolate XPS-4.

Nitrogen sources

To study the effect of nitrogen source on xylanase production by selected bacterial isolate XPS-4, it was grown in medium containing different nitrogen sources *viz.* inorganic and organic and enzyme activity was analyzed in each case.

Inorganic nitrogen source

Out of five inorganic nitrogen sources used in the present study, urea was found to be the best nitrogen source where its addition in the culture medium maximized the xylanase activity upto 0.95 U/mg protein (Fig. 7). As shown in the Fig 7, there was not much significant impact of inorganic nitrogen sources on relative performances of the bacterium with almost negligible difference in xylanase yield.

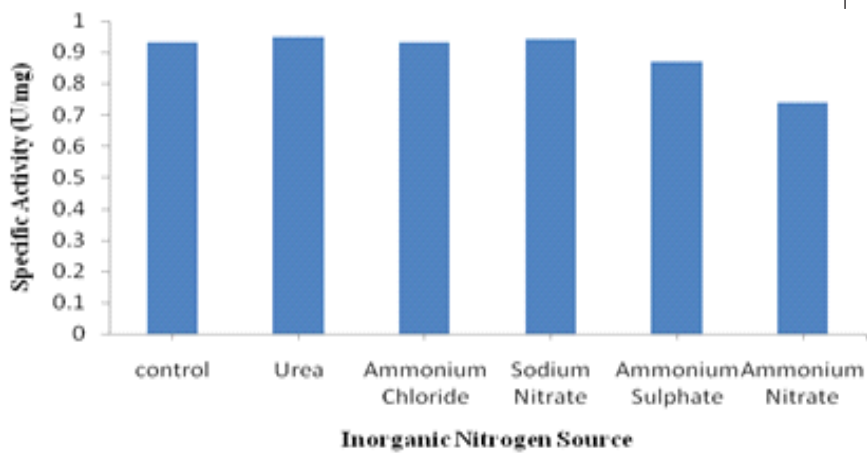


Fig. 7: Effect of inorganic nitrogen sources (0.2%) on xylanase production by bacterial isolate XPS-4.

Organic nitrogen source

Among all the organic nitrogen sources screened to enhance the production of xylanase by isolate XPS-4, peptone resulted in maximum xylanase activity 1.07 U/mg protein as compared to control as shown in Fig. 8. There was no significant difference in enzyme yield while using tryptone, beef extract, malt extract or soyabean as nitrogen sources when compared with control.

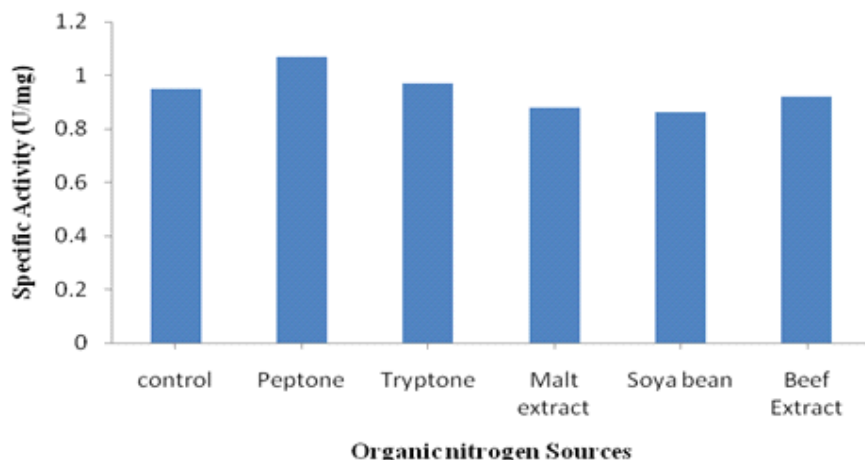


Fig. 8: Effect of organic nitrogen sources (0.3%) on xylanase production by bacterial isolate XPS-4

Effect of surfactant

Surfactants in the production medium are known to increase the secretion of proteins by increasing cell membrane permeability leading to enhance enzyme production. Therefore, the effect of various surfactants on xylanase production was also studied and it was observed that enzyme production was marginally increased by the addition of triton X-100, tween-80 surfactant in the growth medium (Fig. 9) where it resulted in the maximum enzyme activity of 1.09 U/mg protein. Addition of SDS and Nonidet P -40, however resulted in decrease in xylanase activity (0.84 U/mg protein and 0.94 U/mg protein respectively), which may probably be due to the denaturing of enzyme by these surfactants.

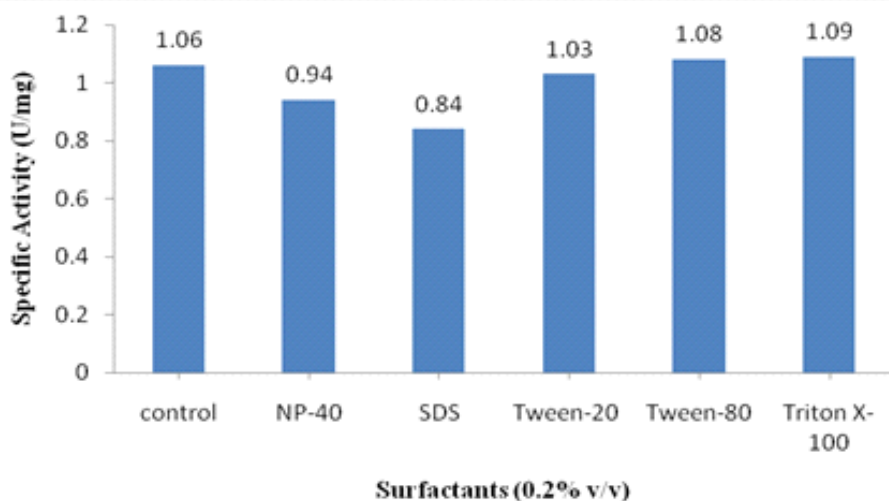


Fig. 9: Effect of surfactants (0.2%) on the xylanase production by XPS-4.

Time course of enzyme production

Growth profile of an organism gives an idea about its potential utility by finding optimum time at which maximum enzyme can be produced. To study optimal time of enzyme production, isolate XPS-4 was grown under pre-optimized conditions and enzyme activity was recorded after every 3 h of incubation at 30 °C upto 72 h. Maximum enzyme activity was observed after 45 hrs of incubation. Xylanase production increased exponentially up to 55 h and thereafter and a decline in enzyme production was recorded with further increase in incubation time which may be due to the fact that the cells enter decline phase.

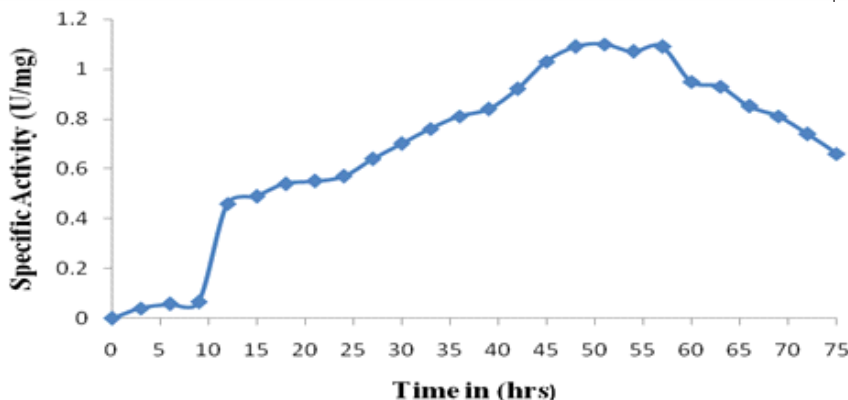


Fig. 10: Time course of xylanase production by XPS-4.

Discussion

Xylanases are important enzymes which find their use in various processes including for bioconversion of lignocellulosic material and agro-wastes to fermentative products; single cell protein, ethanol based fuel, clarification of juices, improvement in consistency of beer and the digestibility of animal feed stock etc. **Although a number of microbes has been extensively studied till date but there is always a need of a novel isolate with novel properties which could be much beneficial from industrial point of view.** Thus, keeping in mind the potential utility of xylanases in various industrial applications, the present work isolation, screening and optimization of hyper xylanase producing bacteria for future industrial applications was undertaken. Altogether 22 bacterial species were isolated from different forest sites around Shimla. XPS-4 emerged as best of all 22 isolates screened for xylanolytic activity and therefore it was used for the optimization of various **fermentation conditions** to enhance the enzyme yield.

Studies for standardization of different growth media for xylanase production revealed that maximum xylanase activity of 0.85 U/mg protein was obtained in John and Schmidt's medium followed by 0.74 U/mg protein in Robsons and Chambliss's medium and lowest was recorded in Riviere's medium i.e. 0.49 U/mg protein. Bhatt,(1990) have also reported John and Schmidt's media as very efficient for growth and production of xylanase from *Flavobacterium sp.* The relative production of enzyme at varied pH and temperature ranges levels showed that this enzyme was equally effective at pH 6.0 and pH 8.5 with intermittent increase at pH 7.5 and optimum pH of 8.0 with enzyme activity of 0.93 U/mg protein. Earlier studies by Nakamura *et. al.*,

(1993), Khansin *et al.*, (1993), Chatterjee, (2012) and Bhatt *et. al.*, (1992) have suggested pH 9.0 as optimal pH for the maximum production of xylanase. Mahatman *et. al.*, (2010) also reported optimum pH 9.0 for xylanase from *Bacillus halodurans* strain KR-1. The influence of temperature on isolate XPS-4 was also studied over a wide temperature range (25 to 55 °C). Although maximum xylanase activity (0.90 U/mg protein) was observed at 30 °C, the temperature range of 35-45 °C had little influence on enzyme activity. Similar observations were also made by some other workers in the past. Maximum enzyme activity was achieved from xylanase producing *Cellulosimicrobium* sp. MTCC 10645 grown in the temperature range of 30 - 40 °C (Kamble and Jadhav, 2012). **Among the different nitrogen sources tested to enhance the xylanase activity peptone was found to be the best supporter among all with highest production of enzyme units (1.07 U/mg protein).** Similar to the present study, Shete and Khobragde, (2014) has also reported peptone as a best nitrogen source for maximum xylanase production.

Conclusion

The results of the present study indicates significant increase in xylanase production from XPS-4 using selective growth and culture conditions. The xylanase produced by the test organism **can be exploited in various important industries especially in paper and pulp and fuel industry** owing to its broad activity over a wide range of pH. **Xylanase from bacterial isolate XPS-4 can be studied further to explore its industrial potential keeping in view the results obtained from the various experiments conducted during the present investigations.**

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Antimicrobial potential and phytochemical analysis of *Mentha arvensis* leaf against pathogenic bacterial isolates

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and Arvind Kumar Bhatt

Abstract

IN THE PRESENT study the antimicrobial potential of leaf extract of *Mentha arvensis* against certified pathogenic microorganisms i.e. *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Staphylococcus aureus*, *Shigella* sp., *Yersinia* sp. and *Bacillus cereus* using agar well diffusion method was observed. Aqueous extract of *Mentha arvensis* leaf was most effective among others and maximum inhibition was observed against *B. cereus* (21.2 ± 0.2 mm) followed by *P. aeruginosa* (17.3 ± 0.15 mm). Further phytochemical analysis of aqueous extract revealed the presence of alkaloids, carbohydrates, flavonoids, saponins, steroids, soluble starch, terpenoids and tannins. The minimum concentration of 0.0292 mg/100 μ l of water extract of *Mentha arvensis* was required for the inhibition of *Yersinia* sp. Based on the preliminary screening it can be concluded that the plant has a potential to be used as alternate to synthetic medicines but only after intensive research and development and clinical trials.

Key words: *Mentha arvensis*, Antimicrobial potential, MIC, antimicrobial activity, herbal medicine.

Introduction:

Infectious diseases are the main cause of morbidity and mortality among the general population, particularly in developing countries. Generally bacterial species are sensitive to routinely used drugs initially but later on they became resistant due to long term use of synthetic drugs and antibiotics. In view of this, the pharmaceutical companies around the globe have been making sincere

efforts to combat the problem of microbial drugs resistance to conventional antimicrobial agents (Nascimento *et al.*, 2000). Also the development of herbal medicines based on ethnomedical leads is relatively easier in contrast to synthetic drugs (Thakur *et al.*, 2018)

The use of plants in disease cure is as old as 4000-5000 B.C. and China is considered the first country to use natural herbs in preparation of medicine (Petrovvska, 2012). Due to several remedial properties of medicinal plants they are frequently prescribed by local herbal practitioners even though their chemical constituents are not always completely known. In India the earliest reference of plants derived medicines is found in “*Rig-Veda*” (Maciel *et al.*, 2002). Herbs possess unique properties capable of influencing several organ systems simultaneously and also have the ability to inhibit the growth of various microbes due the presence of bioactive compounds (Kiritikar and Basu, 1999). These chemicals although produced by plants to protect themselves but many of these phyto-chemicals can also protect humans from various diseases (Thakur *et al.*, 2017).

Important Indian medicinal plants that possess significant anti-microbial activity are neem (*Azadirachta indica*), long pepper fruit (*Piper longum*), heart-leaved moonseed stem (*Tinospora cordifolia*) and amla fruit (*Emblica officinalis*) etc. that have been widely investigated among others.

Mentha arvensis has various medicinal uses and grow in abundance and have been used by local inhabitants for years together, therefore selected in present work for screening of antimicrobial activity against selected clinical isolates. *Mentha arvensis* (Labiatae) is herbaceous plant and its essential oils are commonly used in folk medicine and wide range of biological and pharmacological activities. Several compounds mainly menthol, p-menthone, menthol acetate and other phytochemicals have been isolated from these oils (Duarte *et al.*, 2005; Jana *et al.*, 2006). Medicinal plants contain variable chemical families and huge amounts of antioxidants (Devi *et al.*, 2018). Amino glycosides are potent bactericidal antibiotics targeting the bacterial ribosome, and the increase in cases of bacterial resistance to amino glycosides is widely recognized as a serious health threat (Smith *et al.*, 2007).

In present research the idea was to trace bioactive potential of the plant in curing ailments caused by pathogenic microbes so as to validate the traditional practices and help new drug discovery. Hence efforts were made to investigate the plant extracts for their antimicrobial activity and to carry out its phytochemical analysis.

Material and Methods

Sample collection

Leaves of *M. arvensis* were collected from Summer hill area of Shimla district. Collected plant sample were cleaned, dried under shade and ground to powder and then stored in the glass jar for further use.

Microbial/ test/ indicator cultures:

The bacterial cultures i.e. *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Bacillus cereus*, *Salmonella typhi*, *Shigella* sp. and *Yersinia* sp. were obtained from the Department of Biotechnology, Himachal Pradesh University Shimla which were earlier procured from Indira Gandhi Medical College and Hospital (IGMC), Shimla (H.P.). All the cultures were sub cultured and stored in the agar slants at 4 °C for the further use.

Antimicrobial agent

Antibiotics were used as positive control against pathogens (Table 1).

Preparation of plant extract:

The powdered sample stored in the air tight container was used for the solvent extraction. Cold percolation method was used for the preparation of plant extracts. For this 10g of dried powdered leaves of mint was added in 100 ml of petroleum ether separately (1: 10 ratio) in 250 ml flask and kept on the rotator shaker (150 rpm) for 72 hours at 35°C.

Stock solutions:

The stock solution of different solvent extracts was prepared by using 10% DMSO (Dimethyl sulfoxide) so that the final concentration of plant extract comes to be 100 mg/100 µl of DMSO.

Determination of antimicrobial activity

The effect of plant extracts on the bacterial strains (Clinical isolates) was measured by agar well diffusion method. The minimum concentration of plant extract required to inhibit the growth of microorganism was checked by Resazurin dye method. The MIC value of the most effective extract i.e. aqueous extract was determined against all pathogenic microbes using decreasing concentrations in the range of 0.0048-10 mg/100 µl.

Phytochemical analysis:

In order to get an estimate of the chemical constituents of plant extract, phytochemical screening of crude extracts was done following the method of Kalakoti *et al.*, 2014.

Procedure:

Few mg of plant extract was taken in different-different test tube and required amount of solvent added in each test tube. Then it was subjected to different-different chemical reagents and tests and observation was noted.

1. Test for Carbohydrate:

Molisch's test: Treated the extract with few drop of alcoholic α -naphthol, added 0.2 ml of concentrated sulfuric acid slowly through side surface of test tube, purple to violet color ring appears at the junction (α -naphthol: 10g of α -naphthol in 100ml of 95% alcohol).

Benedict's test: Treat the extract with few drop of Benedict reagent (alkaline solution containing cupric citrate complex) and boil on water bath, reddish brown ppt forms if reducing sugar is present.

Fehling's test: Equal volume of Fehling A (copper sulfate in distilled water) and Fehling B (potassium tartarate and sodium hydroxide in distilled water) reagent are mixed along with few amount of extract, boil on water bath, brick red precipitates of cuprous oxide forms, if reducing sugar are present.

2. Test for Glycoside:

Legal test: Concentrated extract was made alkaline with few drops of 10% sodium hydroxide and then freshly prepared sodium nitroprusside solution was added to the solution. Presence of blue coloration indicated the presence of glycosides in the extract.

3. Test for Tannin and phenols:

Ferric chloride test: Extract give blue- green color with 5% ferric chloride solution indicated presence of tannins.

Lead acetate test: Lead acetate added to 2ml of the extract a black precipitate indicated presence of phenolic.

4. Test for Alkaloids:

Wagner's test (Solution of iodine in potassium iodide): Alkaloids give reddish brown precipitate with Wagner's reagent (mix 1.27g iodine with 2g potassium iodide and make it up to 100ml).

Hager's test (Saturated solution of picric acid): Alkaloids give yellow color precipitate with Hager's reagent. (Add 1g picric acid in 100ml distilled water).

Mayer's test (potassium mercuric iodide): Alkaloids give yellow color precipitate with Mayer's reagent, (1.36g mercuric chloride in 60 ml distilled water and add a solution of 5g potassium iodide in 20ml distilled water and make volume 100ml).

5. Test for Sterols and Terpenoids:

Salkowski test: 2ml of concentrated sulfuric acid was added to the extract, a yellow ring was formed at the junction, which turned red after one minute.

6. Test for Flavonoids:

Shinoda test (Magnesium hydrochloride ribbon test): To the extract add few fragments of magnesium ribbon and add concentrated hydrochloric acid drop wise, pink scarlet, crimson red or occasionally green to blue color appears after few minutes.

Alkaline reagent test: To the extract add few drop of sodium hydroxide solution, formation of an intense yellow color which turns to colorless on addition of few drops of dilute acetic acid indicate the presence of flavonoids.

Effect of different concentrations of various extracts of *M. arvensis* on pathogenic isolates

Different solvent extracts of *M. arvensis* was tested against different pathogenic strains like *Escherichia coli*, *Bacillus cereus*, *Salmonella typhi*, *Staphylococcus aureus*, *Shigella* sp., *Pseudomonas aeruginosa* and *Yersinia* sp. by well diffusion method. Different concentrations of plant extract i.e. 5 μ l -40 μ l was used. The experiment was recorded after 24 hours while incubating the culture at 37°C and effect of plant extract was seen by visualizing the zones of inhibition in each plate. The extracts showed best activity against microbes was selected for the further studies.

Petroleum ether extract: Petroleum ether extract of *M. arvensis* showed no activity against any of the microbial strains.

Chloroform extract: Chloroform extract showed highest activity against *Salmonella typhi* i.e. 18.36 ± 0.15 mm followed by *Escherichia coli* (11.4 ± 0.1 mm) and *Staphylococcus aureus* (9 ± 0.2 mm). The effect is shown in fig. 1 and fig. 2.

Acetone extract: Acetone extract showed activity against *Salmonella typhi* (9.23 ± 0.15 mm) followed by *Escherichia coli* (8.43 ± 0.35 mm) and *Staphylococcus aureus* (7.76 ± 0.15 mm). As shown in fig. 3 and fig. 4.

Methanol extract:

Methanol extract of *M. arvensis* showed a highest activity against *Escherichia coli* (9.5 ± 0.26 mm) followed by *Salmonella typhi* (9.33 ± 0.2 mm) and *Staphylococcus aureus* (7.36 ± 0.25 mm). As it can be observed in fig. 5 and fig 6.

Aqueous extract:

Aqueous extract of *Mentha arvensis* showed a good activity against all bacterial strains highest against *B. cereus* i.e. 23.3 ± 0.2 mm followed by *P. aeruginosa*

(20.16 ± 0.15 mm), *Yersinia* sp. (18.33 ± 0.15 mm), *Shigella* sp. (15.26 ± 0.3 mm), *E. coli* (13.26 ± 0.2 mm), *S. typhi* (9.3 ± 0.3 mm) and *S. aureus* (7.26 ± 0.25 mm). As it can be seen in fig. 7 and fig. 8.

5.3 PHYTOCHEMICAL ANALYSIS:

Qualitative phytochemicals analyses were performed to check the presence of Carbohydrates, Glycosides, Alkaloids, Terpenoids, Flavonoids, Steroids, Saponins, terpenes etc. These all phytochemicals have been known to inhibit the microbial growth. Phytochemicals analysis of aqueous extract of *M. arvensis* showed the presence of terpenoids, tannins, Saponins, alkaloids and flavonoids (fig. 9 and table 2).

Minimum inhibitory concentration:

The minimum inhibitory concentration may be defined as minimum concentration needed to inhibit or kill the pathogenic microorganisms. Minimum inhibitory concentration (MIC) of plant extracts was determined using micro broth dilution assay. Resazurin is an oxidation- reduction indicator used for the evaluation of cell growth, particularly in various cytotoxicity assays (McNicholl *et al.*, 2006). The minimum conc. of aqueous extract of *M. arvensis* required to inhibit the growth of *Yersinia* sp. was 0.0292 mg/100 μ l followed by *Salmonella typhi* (0.0585 mg/100 μ l), *Pseudomonas aeruginosa* (0.46875 mg/100 μ l), *Escherichia coli* (0.46875 mg/100 μ l), *Shigella* sp. (0.46875 mg/100 μ l), *Bacillus cereus* (0.1171 mg/100 μ l) and *Staphylococcus aureus* (0.1171 mg/100 μ l) as shown in fig. 10 and table 3.

Discussion:

Antimicrobial agents are substances that interfere with the growth and metabolism of microbes. These agents may either kill microorganisms or inhibit their growth and those that inhibit growth are called bacteria static. These agents depend on the normal host defenses to kill or eliminate the pathogens after its growth has been inhibited. These antimicrobial agents are particularly useful in situations in which the normal host defenses cannot be relied on to remove or destroy pathogens. A given antimicrobial can be bactericidal in one situation, yet bacteria static in another, depending on the concentration of the drug and the growth stage of the microorganism (Nester *et al.*, 2004). *M. arvensis* serve as a good source of pharmacologically active substances and also improve the therapeutic arsenal. Its properties are exploited in diverse products, including dental root canal sealers, antiseptics, food preservatives, and feed supplements (Scan *et al.*, 2002; Schelz *et al.*, 2006).

The study conducted by Alves *et al.*, (2000) revealed that ethanolic extract of *M. arvensis* inhibited the growth various bacterial strains and the the most

susceptible among all was *Staphylococcus aureus* with inhibition zone diameter of 21 mm. Further classified *M. arvensis* extract as very active against *S. aureus*, active against *E. coli*, *K. pneumoniae* and *S. flexneri* and partially active against *Pseudomonas aeruginosa*. In present work aqueous extract of *Mentha arvensis* showed a good activity against all bacterial strains with highest against *B. cereus* i.e. 23.5 ± 0.2 mm followed by *P. aeruginosa* (20 ± 0.15 mm), *Yersinia* sp. (18.5 ± 0.15 mm), *Shigella* sp. (15 ± 0.3 mm), *E. coli* (13.5 ± 0.2 mm), *S. typhi* (9 ± 0.3 mm) and *S. aureus* (7 ± 0.25 mm).

Phytochemical analysis by Okuda *et al.*, (1993) of *M. arvensis* leaves ethanolic extract indicated the presence of different secondary metabolites classes Tannins, Flavones, Flavonol, Xantones, Flavanonols, Flavanones, Alkaloids and many of them are known to have different therapeutic applications. For example, tannins possess antibacterial, antiviral, molluscicidal and antitumoral properties. While β avonoids is recognized to have anticancer, antiviral and antihemorrhagic properties. In the present research the phytochemical analysis of aqueous extract of *Mentha arvensis* revealed the presence of terpenoids, tannins, Saponins, alkaloids and flavonoids.

Coutinho *et al.*, (2009) observed that minimal bactericidal concentration of *M. arvensis* L. essential oil to inhibit growth of all four bacteria i.e. *E. coli* (5.6 ± 5.6) ($p > 0.05$), *E. faecium* (50.9 ± 17.7) ($p < 0.05$), *S. aureus* (1.19 ± 1.6) ($p > 0.05$), *P. aeruginosa* (38.9 ± 24.5) ($p > 0.05$) was 50.0. In present research minimum conc. of aqueous extract of *M. arvensis* required to inhibit the growth of *Yersinia* sp. was 0.0292 mg/100 μ l followed by *Salmonella typhi* (0.0585 mg/100 μ l), *Pseudomonas aeruginosa* (0.46875 mg/100 μ l), *Escherichia coli* (0.46875 mg/100 μ l), *Shigella* sp. (0.46875 mg/100 μ l), *Bacillus cereus* (0.1171 mg/100 μ l) and *Staphylococcus aureus* (0.1171 mg/100 μ l).

Conclusion

The results obtained from the present investigation indicated that the *Mentha arvensis* leaf extract can be effectively used to control different pathogenic bacterial strains. The bioactive compounds of plant origin may add new dimensions to this area of research which is aimed at the welfare of mankind. The leaves of the plant are being used traditionally to cure the various diseases since ages. The demonstration of activity against gram positive and gram negative bacteria is an indication of broad spectrum of activity of the plant thus can be used as a source of antibiotic substances in drug development for control of various bacterial infections. Further work on identification and purification of chemical constituents and toxicological investigations of plant extracts are required for the development of novel drug for human healthcare.

Acknowledgements

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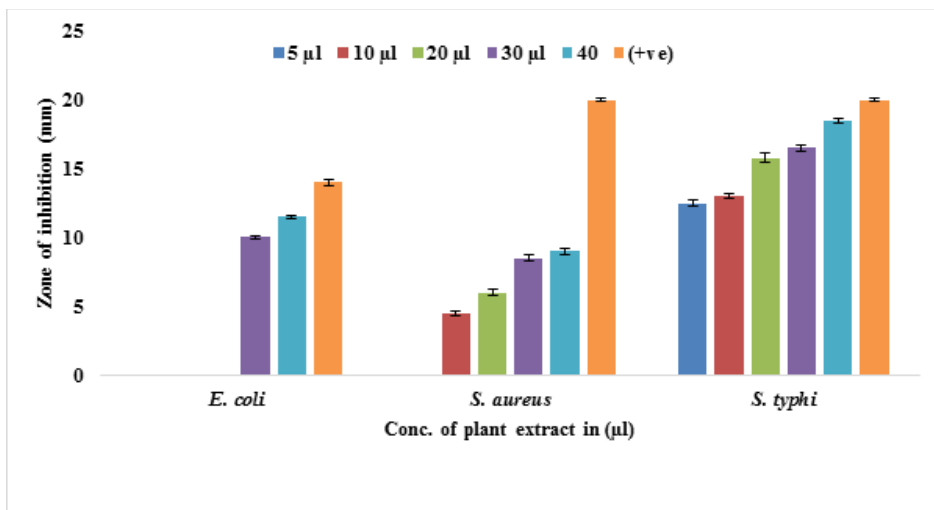
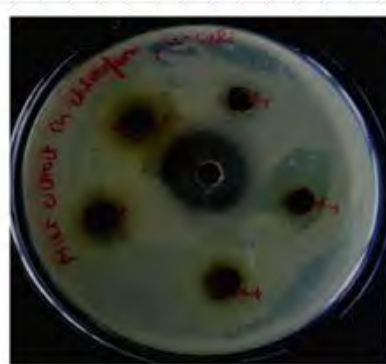


Fig 1: Effect of chloroform extract of *Mentha arvensis* on different pathogenic bacterial strains.



A) *S. typhi*



B) *E. coli*

Fig 2: Zones of inhibition of chloroform extract of *Mentha arvensis* against different pathogenic bacterial strains.

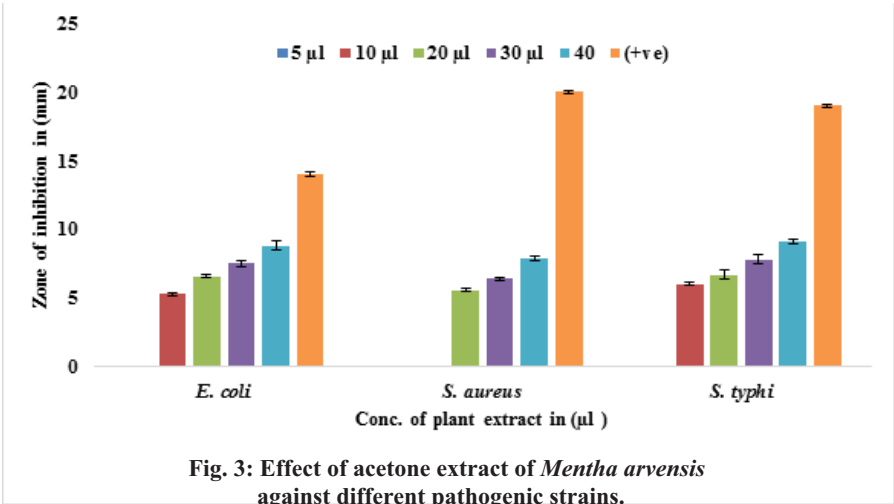


Fig. 3: Effect of acetone extract of *Mentha arvensis* against different pathogenic strains.



A) *Staphylococcus aureus*



B) *Salmonella typhi*

Fig. 4: Zones of inhibition of acetone extract of *Mentha arvensis* against different pathogenic strains.

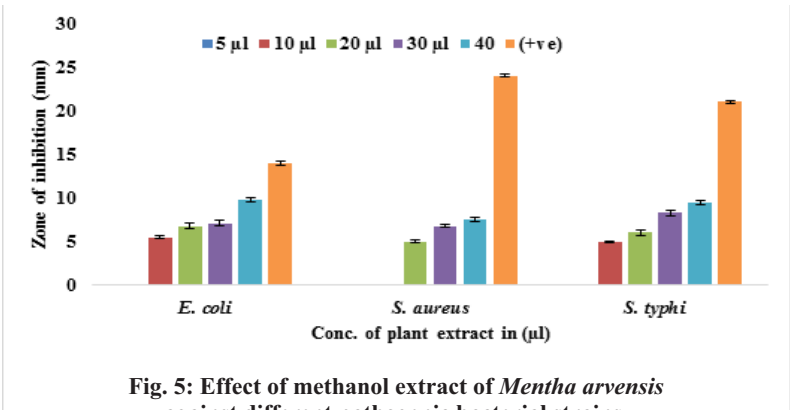
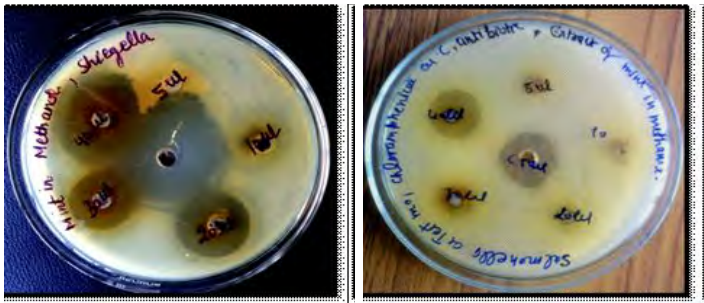


Fig. 5: Effect of methanol extract of *Mentha arvensis* against different pathogenic bacterial strains.



A) *Shigella* sp.

B) *S. typhi*

Fig. 6: Zones of inhibition of methanol extract of *Mentha arvensis* against different pathogenic strains.

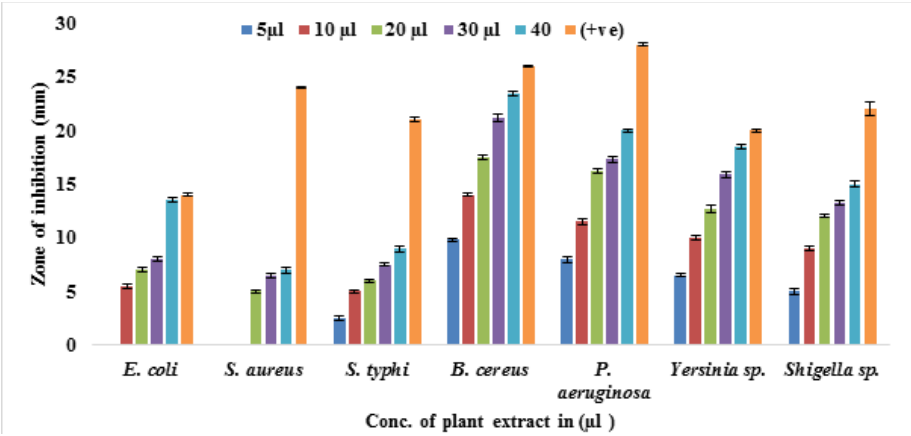
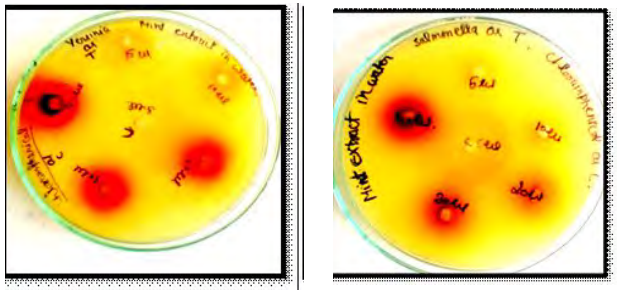


Fig. 7: Effect of aqueous extract of *Mentha arvensis* against different pathogenic bacterial strains.



A) *Yersinia* sp.

B) *S. typhi*

Fig. 8: Zones of inhibition of aqueous extract of *Mentha arvensis* against pathogenic bacterial strains.

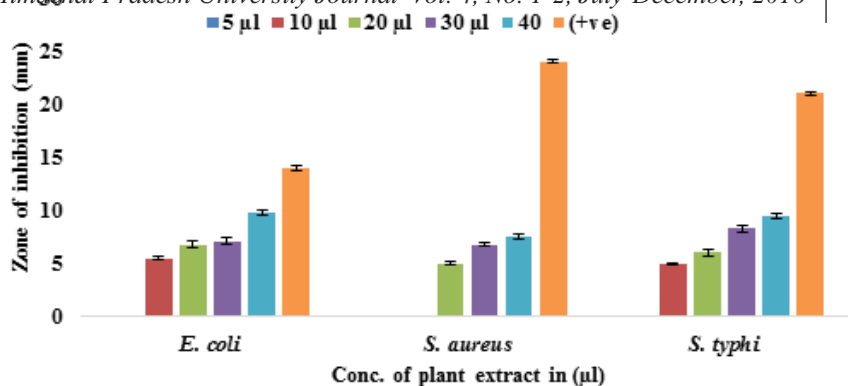


Fig. 5: Effect of methanol extract of *Mentha arvensis* against different pathogenic bacterial strains.



A) *Shigella* sp.



B) *S. typhi*

Fig. 6: Zones of inhibition of methanol extract of *Mentha arvensis* against different pathogenic strains.

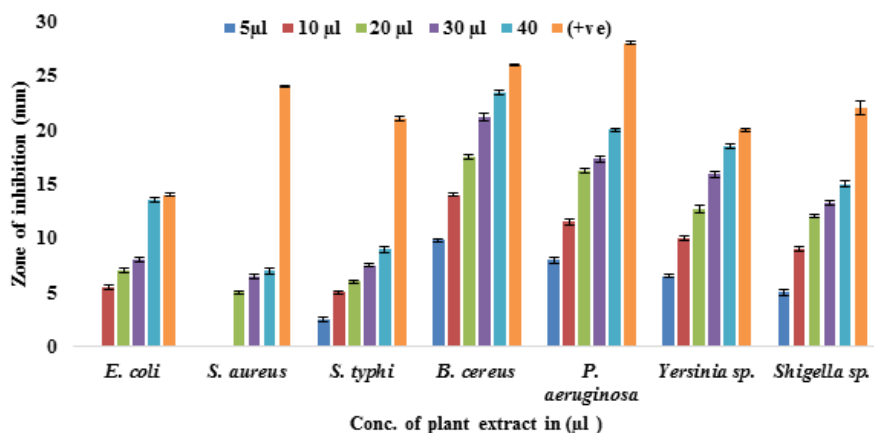


Fig. 7: Effect of aqueous extract of *Mentha arvensis* against different pathogenic bacterial strains.

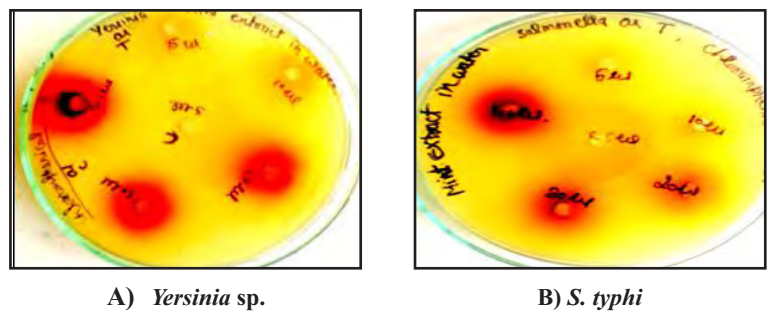


Fig. 8: Zones of inhibition of aqueous extract of *Mentha arvensis* against pathogenic bacterial strains.

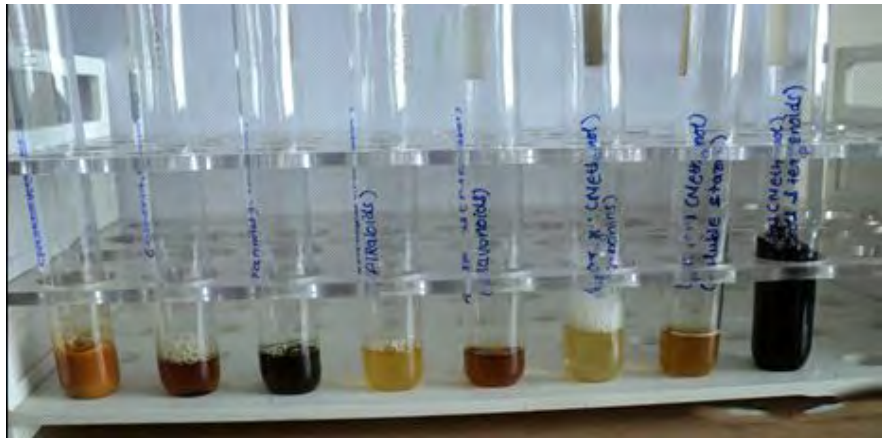


Fig. 9: Phytochemical investigation of aqueous extract of *Mentha arvensis*.
Table 1: Antibiotics were used as positive control against pathogens.

Microorganism used	Antibiotics used
<i>Escherichia coli</i>	Tetracycline
<i>Bacillus cereus</i>	Tetracycline
<i>Salmonella typhi</i>	Chloramphenicol
<i>Staphylococcus aureus</i>	Gentamycin
<i>Shigella sp.</i>	Ciprofloxin
<i>Pseudomonas aeruginosa</i>	Gentamycin
<i>Yersinia</i>	Chloramphenicol

Table 2: Phytochemicals analysis of *Mentha arvensis*:

<i>Mentha arvensis</i>	
Compounds	Aqueous extract
Carbohydrates	-
Glycosides	-
Terpenoids	+
Tannins	+
Steroids	-
Saponins	+
Alkaloids	+
Flavonoids	+

Table 3: MIC of water extract of *Mentha arvensis*.

Conc. of plant extract	<i>Yersinia</i> sp.	<i>P. aeruginosa</i>	<i>B. cereus</i>	<i>E. coli</i>	<i>Shigella</i> sp.	<i>S. typhi</i>	<i>S. aureus</i>
15	-	-	-	-	-	-	-
7.5	-	-	-	-	-	-	-
3.75	-	-	-	-	-	-	-
1.875	-	-	-	-	-	-	-
0.9375	-	-	-	-	-	-	-
0.46875	-	-	-	-	-	-	-
0.2343	-	+	-	+	+	-	-
0.1171	-	+	-	+	+	-	-
0.0585	-	+	+	+	+	-	+
0.0292	-	+	+	+	+	+	+
0.0146	+	+	+	+	+	+	+
MIC(mg/100 µl)	0.0292	0.46875	0.1171	0.46875	0.46875	0.0585	0.1171

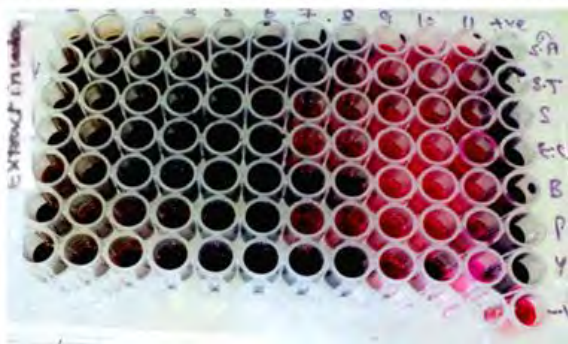


Fig. 10: MIC of aqueous extract of *Mentha arvensis*.

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To study taxonomy and molecular characterization of *Lactarius deliciosus* (L. Fr.) Gray and *Lactarius salmonicolor* R. Heim & Leclair

Kavita Thakur, Usha Sen and Anand Sagar

Abstract

LACTARIUS deliciosus and Lactarius salmonicolor are wild edible mushrooms, members of mushroom family Russulaceae, non-cultivated edible macrofungus and collected from natural habitats as a food source in many villages of H.P. Observations are recorded on its taxonomy with molecular characterization and reported in this communication.

KEYWORDS: Lactarius deliciosus, Lactarius salmonicolor, Russulaceae, macrofungus, molecular characterization.

INTRODUCTION

The family Russulaceae is one of the largest ectomycorrhizal families in the order Agaricales. The family was established by Roze (1876) as the Russulariees (*non. nud.*) to include the two Agaric genera *Russula* and *Lactarius*, both of which were described originally by Persoon (1796, 1797). Most studies of the systematics of the family Russulaceae have been carried out in Europe and North America. Maire (1910), Peck (1872, 1884, 1907), Burlingham (1907a, 1907b, 1908, 1910a, 1910b, 1913, 1915, 1918a, 1918b, 1921, 1924, 1932, 1940) and Beardslee (1918) were among the pioneer workers who initiated studies of the genera *Lactarius* and *Russula*.

The taxonomic study of macrofungi in India dates back to Linneaus, who in the 19th century was the first person to name a species from India. Berkeley (1851, 1852, 1854, 1876) made a major contribution by reporting many agarics from India, including nine species of *Russula* and five species of *Lactarius*. Among the pioneer workers who made significant contributions to the study of the

family Russulaceae in the northwestern Himalayas were Saini & Atri (1981, 1982a, b, 1984, 1989a, b, 1990, 1993), Atri & Saini (1986, 1988, 1989, 1990a, b, c), Saini *et al.* (1988, 1989), Atri *et al.* (1991a, b, c, d, 1992, 1993a, b, 1997), Rawla & Sarwal (1983), Rawla (1994, 2001, 2002), Sarwal (1984), Lakhanpal *et al.* (1987), Lakhanpal (1993), Bhatt & Lakhanpal (1988a, b, c, 1990), Bhatt *et al.* (1995, 1999, 2000), Das & Sharma (2001a, b, 2002b, 2003, 2004, 2005a, b), Sharma *et al.* (2005), Sharma & Das (2002, 2003), Das *et al.* (2002c, 2003b, 2004, 2005a, b, c, 2006a, b), Bhatt *et al.* (2007) and Dar *et al.* (2009). Atri *et al.* (1994) catalogued 48 taxa in the genus *Lactarius*. Verbeken & Horak (2000) proposed 19 new taxa for the genus *Lactarius*. Verbeken *et al.* (2000) recorded 35 species of *Lactarius* from relatively xeric Zambezian miombo woodlands in Zimbabwe. Das & Sharma (2002) provided a checklist of the genus *Lactarius* that included 56 species and 12 varieties described from India.

Nuytinck *et al.* (2006) reported nine Asian species belonging to *Lactarius* sect. *Deliciosi*. Representatives of all of these species *Lactarius akahatsu*, *Lactarius deliciosus*, *Lactarius hatsudake*, *Lactarius horakii*, *Lactarius laeticolor*, *Lactarius subindigo*, *Lactarius thakalorum*, were included in a molecular phylogenetic study focusing on the worldwide phylogeny of this section based on ITS and partial glyceraldehyde-3-phosphate dehydrogenase gene sequences. *Lactarius horakii* is described as a new species. Worldwide phylogenetic analysis of *Lactarius* sect. *Deliciosi* was performed by Nuytinck *et al.* (2007) inferred from ITS and glyceraldehyde-3-phosphate dehydrogenase gene sequences. Putte *et al.* (2010) reported *L. acicularis*, *L. crocatus*, *L. distantifolius*, *L. longipilus*, *L. pinguis* and *L. vitellinus* from Thailand. Wisitrassameewong *et al.* (2015) reported *Lactarius chichuensis* for first time from Thailand.

Wisitrassameewong *et al.* (2016) studied evolutionary relationships, divergence time, and origin of the subgenus and six conifer symbionts are described as new to science: *L. atrii*, *L. aurantionitidis*, *L. dombangensis*, *L. flavigalactus*, *L. lachungensis*, and *L. sikkimensis*. The results suggest the origin of *L.* subg. *Russularia* to be in the Mid Miocene period.

H.P. has a diversified and rich flora because of the existence of a variety of climates and a wide range of altitudes. To the best of our knowledge, this is the first report on the taxonomy and molecular characterization of *L. deliciosus* and *L. salmonicolar* from H.P.

MATERIALS AND METHOD

MATERIALS USED

Materials used in the present study were fruiting bodies and pure cultures of *L. deliciosus* and *L. salmonicolar*.

SURVEY AND COLLECTION

The fruiting bodies of mushroom specimens were collected in the month of August and September (2013- 2017). They were dried and preserved for further studies. Collection sites were visited regularly usually after every spell of rain. The fruiting bodies were collected carefully with the help of forceps.

MACROSCOPIC STUDIES

Various characters which help in the identification of specimens e.g. shape, size and colour of the stipe and pileus, colour and position of lamellae were recorded by examining the specimens with naked eye. The specimens were identified by following Singer (1986) and Lincoff (1981).

MICROSCOPIC STUDIES

For microscopic studies both dried as well as wet preserved specimens were used. The dried parts were kept for few minutes in 95% ethyl alcohol (to expel out the air) and then in water. Such parts were revived by soaking in 3% KOH, whereas wet preserved specimens were used directly after washing with water. The anatomical details of the specimens were worked out by cutting free hand sections of the material. Microscopic details of the specimens were worked out in laboratory with the help of research microscope. This included the study of growing mycelium in the petriplates and spores. For clarity the sections were mounted in 1% cotton blue and lactophenol. The sections were observed under the microscope. Photomicrographs (LEICA, DMLS2 with attached digital camera LEICA DFC320) of slides of mycelium and spores were taken and measurements were recorded using micrometer.

ELECTRON MICROSCOPIC STUDIES

Surfaces of basidiospores with ornamentation and mycelium were imaged with the help of scanning electron microscope (SEM) (QUANTUM, 250). For scanning electron microscopy, samples were mounted on carbon tape and were placed on the stub, then in Environmental Scanning Electron Mode (ESEM MODE) under vacuum and desired pressure. The images of the samples were obtained on the screen.

PURE CULTURE ISOLATION

The cultures were raised from the stipe and stroma portion of healthy, sun-dried and fresh specimens. The specimens were first washed with distilled water and then the tissue from the stipe and stroma portion were cut with the help of sterilized blade. The bits of tissue (2-3 mm) were taken by sterilized forceps and dipped in 0.1% Mercuric chloride solution for 5-10 seconds. Now the tissue was placed on filter paper to remove the excess moisture. The small bits of tissues were then transferred aseptically into the petriplates containing Potato-dextrose

agar (PDA) medium with the help of sterilized forceps. These were then incubated at 25°C for at least 8-10 days and observed regularly for appearance of culture. The actively growing mycelial colonies were sub cultured to obtain pure cultures.

MOLECULAR CHARACTERISATION OF *Lactarius* SPECIES

Molecular characterization of *Lactarius* species were carried out involving following steps:

Fungal DNA Isolation by CTAB method

Pure culture for total genomic DNA extraction was maintained on potato dextrose agar (PDA) medium. For DNA extraction mycelial culture of *Lactarius* spp. were raised in 250 ml conical flask containing 100 ml potato dextrose broth medium and kept for 15 days at 25±1°C. The following solutions and reagents were used: Liquid nitrogen; extraction buffer solution, chloroform: Isoamylalcohol (24:1), cold isopropanol and cold 70% ethanol.

1. Precooled a mortar and pestle at 4°C. Grind approx. 2 gm of the mycelial mat to a fine powder in liquid nitrogen and transfer into a sterilize tube, ensuring the tissue does not thaw.
2. Add to it 10 ml prewarmed isolation buffer; Cetyl trimethylammonium bromide (CTAB) and incubate for 60 min with occasional stirring for 1 h at 65°C.
3. Extract for 10 min with equal volume of chloroform: Isoamylalcohol (24:1).
4. Centrifuge at 10,000 rpm for 20 min at room temperature (24°C).
5. Separate the aqueous phase and transfer to a fresh tube.
6. To aqueous phase add 0.6 vol of ice cold isopropanol and 0.1 vol of sodium acetate (3M) and incubate at (-20°C) for 30 min.
7. After incubation, centrifuge at 10,000 rpm for 10 min at 4°C discard the aqueous phase.
8. Wash the DNA pellet obtained with 70% ethanol.
9. Again centrifuge at 10,000 rpm for 10 min at 4°C discard aqueous phase.
10. Dry the DNA pellet and dissolve in 200µl of 1X TE/Molecular grade water. The genomic DNA was stored at -20°C.

Amplification of Genomic DNA

Amplification of genomic DNA was performed by polymerase chain reaction (PCR). Amplification of *18S rRNA* gene for assessing ITS length variation was done using universal primers 1F (CTGGTGCCAGCAGCCGCGGYAA) and

4R (CKRAGGGCATYACWGACCTGTTAT) as described by White *et al.* (1990).

The PCR amplification was carried out in 0.2 µl PCR tubes. The reaction mixture (50 µl total volume) of PCR contained Taq buffer 0.5 µl, dNTP 0.4 µl, primer1 and primer4 1.5 µl, Taq DNA Polymerase 1.5 units, 2.5 µl template DNA and 37.6 µl double distilled water. The tubes were then placed on thermocycler for cyclic amplification. Conditions for amplification were programmed as follows:

Table 1 Conditions for amplification in a PCR

Steps	Temperature (°C)	Duration (min.)
Initial Denaturation	94	3:00
Denaturation	94	0:30
Annealing	48	0:30
Extention	72	1:00
Final Extention	72	7:00

The PCR was carried out for a total of 30 cycles

PCR amplification products were electrophoretically separated on 1.2% agarose gel prepared in TAE (Tris Acetate) buffer (80V) for 1 hour and visualized on gel documentation system (Gel DocTM XR⁺ BIORAD). DNA fragments were purified using PCR purifying kit. The amplified fungal DNA was submitted for sequencing to Applied Biosystems at the Xcelris Genomics (Ahmedabad, India). Obtained sequences were submitted at US National Centre for Biotechnology Information (NCBI) database for BLAST matching and getting submission ID.

RESULTS AND DISCUSSION

TAXONOMIC DETAILS:

Lactarius deliciosus (L.: Fr.) Gray, Nat. Arr. Brit. Pl. 1: 624 (1821) (PLATE 1 A)

a. Macroscopic characters:

Pileus – 3-12 cm in diam., sometimes larger, convex with an inrolled margin and a slightly depressed centre at first, later with a decurved to expanded margin and with a depressed centre to infundibuliform, surface viscid but soon dry, colour pale orange to salmon orange, typically with a whitish aspect, with deeper orange spots of irregular shape, sometimes forming a few broad, concentric zones, dark and light orange coloured concentric rings, discolouring reddish and then

greenish when bruished, but not very extensively. **Latex** – scarce, orange or red coloured, often very slowly changing to red on the context, turning greenish on exposure to air. **Lamellae** – slightly decurrent to smooth, crowded, often forking near the stipe, yellowish orange coloured, turning greenish when brushed, edge entire, brittle, easily separable from the flesh. Stipe- 3-6 cm long, 0.6-1.2 cm in diameter, typically relatively short and chunky, almost cylindrical or slightly tapering downwards, surface dry, orange, solid when young, hollowing with age and turning greenish on exposure to air. **Context**- firm, with an irregular cavity in the stipe, white to pale cream in the central parts, bright orange just above the lamellae. **Spore deposit**- yellowish orange.

b. Microscopic characters:

Spores – $8-10 \times 6.5-8.0\mu\text{m}$, broadly ellipsoid to ellipsoid, rarely subglobose, coarsely netted, amyloid, warty, warts small (PLATE 1 D). **Basidia**- $30-60 \times 8-11.5\ \mu\text{m}$, tetrasporic, strigmate, hyaline and thin walled. **Hyphae** - $2-5\mu\text{m}$ in diameter, thin walled septate, branched as well as unbranched. Clamp connections absent.

c. SEM studies:

The mycelium was observed under Scanning Electron Microscope (SEM) at different magnification at pressure 2.98e-1 Torr. The mycelial hyphae (PLATE 1 E) range in diameter from $3.3-5\mu\text{m}$, surface smooth, branched as well as unbranched. Basidiospores- $6.2-8\mu\text{m} \times 5-7\mu\text{m}$, ellipsoidal, ornamentations were visible (PLATE 1 F).

d. Habit and Habitat:

It grows scattered or gregarious on soil under conifers. On neutral to calcareous soils, forming ectomycorrhizae with *Pinus* species. It is distributed in mixed coniferous forests comprised of *Abies pindrow*, *Picea smithiana*, *Pinus wallichiana*, *Cedrus deodara*, *Quercus incana*, *Q. semicarpifolia* and *Q. dilatata* at an elevation ranging from 2000 to 3100 m. It generally grows under *P. wallichiana*.

e. Edibility:

It is usually considered as an edible mushroom. Christensen (1955), Atkinson (1961), Krieger (1967), Delmas (1978), Phillips (1981). Edible among local rural people of Distt. Shimla.

f. Pure culture of *L. deliciosus*

Pure cultures were raised from the stipe and pileus of healthy fresh specimens on PDA medium. Pure culture was obtained after 7-8 days incubation at 25°C

(PLATE 1 B). Mycelium growth was radial, edge is entire. White buff mycelium becomes cottony matted. Reddish-brownish excretions were noted in the petriplates containing fungal mycelium.

g. Molecular identification

The genomic DNA obtained was of very good quality and yielded expected PCR products using suitable primers. These PCR products were gel purified, run in 1.2% agarose gel, and processed for nucleotide sequencing. The partial nucleotide sequence of sample was obtained and analysed for Basic Local Alignment Search Tool (BLAST) search program National Centre for Biotechnology Information (NCBI) site. Each PCR product was sequenced using forward and reverse primers and both were used for BLAST.

Consensus sequence of 902 bp of 18S rRNA (SSU) was generated from forward and reverse sequence data using aligner software. Quality Check was done on 1.2% Agarose gel (PCR product). Where Lane 1: 100 bp DNA Ladder and Lane 2: 900bp amplicon (SSU region) of 18S rDNA (Fig. 1).

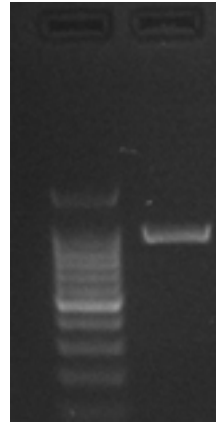


Fig. 1. 1.2% Agarose gel showing 900bp amplicon (SSU region) of 18S rDNA.

From our BLAST results, it is clear that amplified sequence of *Lactarius deliciosus* showed 96% similarity with (KJ411943.1) accession number sample which represent *L. deliciosus* and the sequence has been deposited to the NCBI gene bank with *L. deliciosus* strain K1. Where K stands for Kavita and 1 is for one sequence having accession number MG845513.1. Based on the above results, it is ascertained that this wild edible mushroom could be a member of family Russulaceae of Basidiomycota.

Lactarius deliciosus

GenBank flat file:

LOCUS MG845513 902 bp DNA linear PLN26-JAN-2018
 DEFINITION *Lactarius deliciosus* strain K1 small subunit ribosomal RNA gene, partial sequence.
 ACCESSION MG845513
 VERSION MG845513
 KEYWORDS .
 SOURCE *Lactarius deliciosus*
 ORGANISM *Lactarius deliciosus*
 Eukaryota; Fungi; Dikarya; Basidiomycota; Agaricomycotina;
 Agaricomycetes; Russulales; Russulaceae; *Lactarius*.
 REFERENCE 1 (bases 1 to 902)

AUTHORS Sood,K.
 TITLE Direct Submission
 JOURNAL Submitted (26-JAN-2018) Biosciences, Himachal Pradesh University,
 Summerhill, Shimla, Himachal Pradesh 171005, India
 COMMENT ##Assembly-Data-START##
 Sequencing Technology :: Sanger dideoxy sequencing
 ##Assembly-Data-END##
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ORIGIN

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121  gtgtactgtc tggctgggtc ttacctcttg gtgagccggc atgcccttca ctgggtgtgt
181  cggggaacca ggacttttac cttgagaaaa ttagagtgtt caaagcaggc ctgcgcctga
241  atacattagc atggaataat aaaataggac gtgcggttct atttgttggt ttctagagt
301  cgccgtaatg attaataggg atagttgggg gcattagtat tccgttgcta gaggtgaaat
361  tcttggaatt acggaagact aactactgcg aaagcatttg ccaaggatgt ttccattaat
421  caagaacgaa ggttagggga tcgaaaacga tcagataccg ttgtagtctt aacagtaaac
481  tatgccgact agggatcggg cgaactcaat ttgatgtgtc gctcggcacc ttacgagaaa
541  tcaaagtctt tgggttctgg ggggagtatg gtcgcaaggc tgaacttaa aggaattgac
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661  ccaggtccag acatgactag gattgacaga ttgatagctc ttcatgatt ttatgggtgg
721  tgggtcatgg ccgttcttag ttggtggagt gatttgtctg gtaattccg ataacgaacg
781  agaccttaac ctgctaaata gcccgccggg ctttctgtgg tctatggctt cttaaactga
841  cagtactgtt tctatccgac tgaggatctg aggaatacac cgctgttgag cccccaaaaa
901  aa//
    
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***Lactarius salmonicolor* R. Heim & Leclair, Rev. Mycol. (Paris) 18:221 (1953)
(PLATE 2 G)**

a. Macroscopic characters:

Pileus - 4-14cm in diam., when young convex with a slightly depressed centre, becoming infundibuliform when full-grown with a straight to inrolled margin, sometimes with an irregularly shaped to lobed margin, surface smooth and viscid, colour salmon orange, sometimes paler (light) ochraceous buff, typically clearly and finely zonate near the margin with the darker zones ochraceous orange-coloured. Taste mild, odour not distinctive. **Latex** - scarce to rather abundant, bright orange, drying vinaceous red in 20-30 min. on the context. **Lamellae**- slightly decurrent, with decurrent tooth in older specimens, moderately spaced, often anastomosing near the insertion of the stipe colour orange or slightly paler, turning red when bruised and sometimes very faintly green after some hours, edge entire. **Stipe** - 2-6cm long, 0.8-1.5cm in diameter, cylindrical, rather long and slender to rarely more short and robust, becoming hollow, surface dry to viscid, smooth, usually paler and dull pileus colour. **Context**- firm, whitish, underneath the stipitipellis and in the entire pileus red to vinaceous red. **Spore deposit**- pale yellowish.

b. Microscopic characters:

Spores—7.0-9.5×8-11µm, ellipsoid, rarely broadly ellipsoid, ornamentation high, of rather narrow ridges with abundant short ridges and isolated warts, forming an incomplete reticulum, plage clearly visible and rather big but only slightly amyloid distally (PLATE 2 J). **Basidia**- 40-62 × 10-14 µm, almost cylindrical to subclavate, tetrasporic. **Hyphae** - 1.5- 4.0µm in diameter, septate, branched and interwoven, clamp connections absent.

c. SEM studies:

The mycelium and basidiospores were observed under Scanning Electron Microscope at different magnifications at pressure 2.98e-1Torr. The mycelial hyphae (PLATE 2 K) range in diameter from 2-4µm, branched and septate. Basidiospores-6.9-8.5µm×5-6.9µm, ellipsoidal, widely spaced irregular bands, ornamentations were clearly visible (PLATE 2 L).

d. Habit and Habitat:

It grows scattered as well as gregarious on soil under conifers or mixed woods and found in mixed forests of *A. pindrow*, *Picea smithiana*, *P. wallichiana*, *Cedrus deodara*, *Quercus incana* and *Q. dilatata* at an elevation ranging from 1800 to 3100m. It generally forms ectomycorrhiza with *Abies pindrow*, on calcareous soils.

e. Edibility:

It is excellent edible, usually consumed in H.P. Heim & Leclair (1950), Heilmann-Clausen *et al.* (1998). Edible among local people of Distt. Shimla.

f. Pure culture of *L. salmonicolor*

Pure culture was raised from stipe and pileus of healthy specimens on PDA medium. Pure culture was obtained after 7-8 days incubation at 25°C (PLATE 2 H). Mycelium growth was radial, edge is entire. White hyphae becoming cottony matted. Pinkish excretions were noticed in the petriplates containing fungal mycelium.

g. Molecular identification

The genomic DNA obtained was of very good quality and yielded expected PCR products using suitable primers. These PCR products were gel purified, run in 1.2% agarose gel, and processed for nucleotide sequencing. The partial nucleotide sequence of sample was obtained and analysed for Basic Local Alignment Search Tool (BLAST) search program National Centre for Biotechnology Information (NCBI) site against the whole GenBank data base of nucleotide sequence for identification. Each PCR product was sequenced using forward and reverse primers and both were used for BLAST.

Consensus sequence of 891 bp of *18S rRNA* (SSU) was generated from forward and reverse sequence data using aligner software. Quality Check was done on 1.2% Agarose gel (PCR product). Where Lane 1: 100 bp DNA Ladder and Lane 2: 900bp amplicon (SSU region) of *18S rDNA* (Fig. 2).

Fig. 2. 1.2% Agarose gel showing 900bp amplicon (SSU region) of *18S rDNA*.

From our BLAST results, it is clear that amplified sequence of *Lactarius salmonicolor* showed 94% similarity with (GQ903587.1) accession number sample which represent *L. salmonicolor* and the sequence has been deposited to the NCBI gene bank with *L. salmonicolor* strain K2. Where K stands for Kavita and 2 is for one sequence having accession number MG845514.2. Based on the above results, it is ascertained that this wild edible mushroom could be a member of family Russulaceae of Basidiomycota.

Lactarius salmonicolor

GenBank flat file:

LOCUS MG845514 891 bp DNA linear PLN 26-JAN-2018

DEFINITION *Lactarius salmonicolor* strain K2 small subunit ribosomal

RNA gene,

partial sequence.

ACCESSION MG845514

VERSION MG845514

KEYWORDS .

SOURCE *Lactarius salmonicolor*

ORGANISM *Lactarius salmonicolor*

Eukaryota; Fungi; Dikarya; Basidiomycota; Agaricomycotina;

Agaricomycetes; Russulales; Russulaceae; *Lactarius*.

REFERENCE 1 (bases 1 to 891)

AUTHORS Sood,K.

TITLE Direct Submission

JOURNAL Submitted (26-JAN-2018) Biosciences, Himachal Pradesh University,

Summerhill, Shimla, Himachal Pradesh 171005, India

COMMENT ##Assembly-Data-START##

Sequencing Technology :: Sanger dideoxy sequencing

##Assembly-Data-END##

FEATURES Location/Qualifiers

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/mol_type="genomic DNA"

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/db_xref="taxon:93010"

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/product="small subunit ribosomal RNA"

ORIGIN

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121 gtccggctgg gtcttacctc ttggtgagcc ggcatgccct tcaatgggtg tgctggggaa

181 ccaggacttt taccttgaga aaattagagt gttcaaagca ggcttatgcc cgaatacatt
 241 agcatggaat aataaaatag gacgtgcggt tctattttgt tggttctag agtcgccgta
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 481 actagggatc gggcgaaact aatttgatgt gtcgctcggc accttacgag aatcaaaagt
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 781 aacctgtaa atagccaggc cggtctttgc tggtcgccgg cttcttagt gactgtctgc
 841 gtctatcaga cggaggtgtg aggcaatcac aggtgtgtag gccccaaag a

//

Earlier, taxonomic studies on the studied mushroom *L. deliciosus* was carried out by Kaisth, 1985; Bhatt, 1986; Chauhan, 2003 and Kumar, 2010. Basidia and basidiospores worked out in the present study are similar in shape and size as described by the earlier workers mentioned above. *L. salmonicolor* was reported for the first time from H.P. and all the taxonomic details are similar as described by Nuytinck & Verbeke 2005. Chauhan 2003 reported *Lactarius* spp. From District Kinnaur. Kumar, 2010 reported *Lactarius* spp. From District Shimla, Kullu, Chamba and Kinnaur. Pure cultures of the mushrooms were raised on the Potato Dextrose Agar medium in the dark. Kaisth (1985) observed the maximum growth of *Lactarius deliciosus* on maize grain extract and reported best mycelial growth in darkness than light.

Using genomic DNA isolated from the mycelial culture of *L. deliciosus* and *L. salmonicolor*, an approximately 902 and 891 basepair fragments of the rDNA-ITS region was amplified using IF and 4R primers and subjected to nucleotide sequencing. In NCBI BLAST submitted sequence found 96% similarity with *L. deliciosus* and 94% similarity with *L. salmonicolor*. The aligned sequence was deposited in GenBank named as *L. deliciosus* strain K1 having submission ID MG845513.1 and *L. salmonicolor* strain K2 having accession number MG845514.2. Thus, providing the confirmation for the taxonomic identification of these two edible mushroom species.

Molecular techniques have been successfully used for identifying fungi. However, molecular analysis alone has limitations. The use of ITS sequences also has limitations because the noncoding ITS sequence is fast evolving with many variable characters, it is usually difficult to achieve a perfect sequence

alignment at high taxonomic levels. Moreover, it has been shown that 20-30% of sequence downloaded from GenBank for comparative analysis may not be accurate in the identification (Nilsson *et al.*, 2006; Hyde and Soyong, 2007). But as per the matching of the descriptions of morphological, macro and microscopic characters of fruiting body, basidia and basidiospores with the details given by Nuytinck and Verbeken (2005) the specimens are of *L. deliciosus* and *L. salmonicolor* species. In the present study, rDNA-ITS (18S rRNA SSU) fragment sequencing was attempted to identify the biological identity of the wild edible mushrooms, which is the first report from Himachal Pradesh as far as wild edible mushrooms are concerned.

ACKNOWLEDGEMENT

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PLATE 1

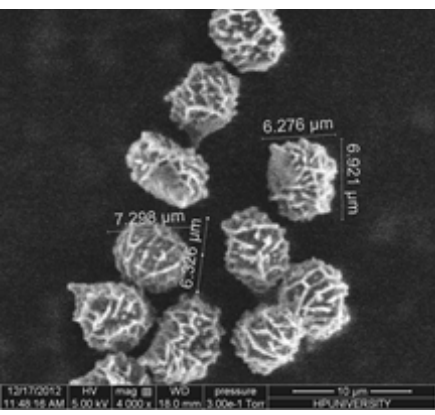
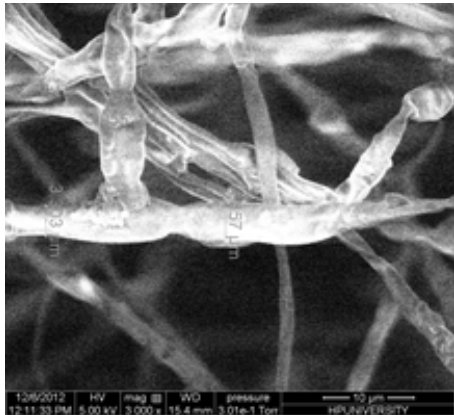
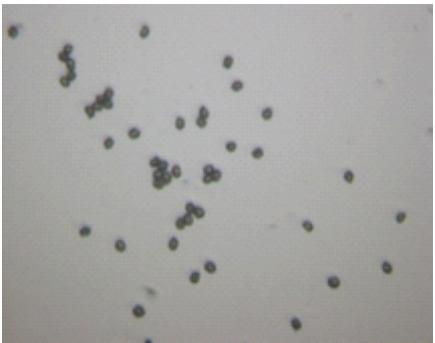
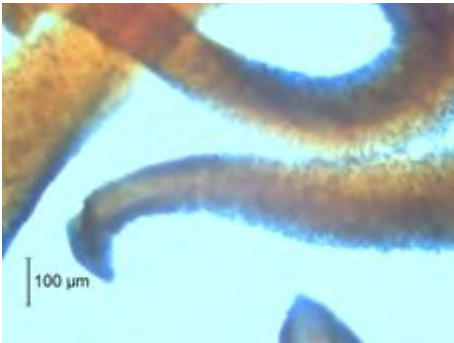
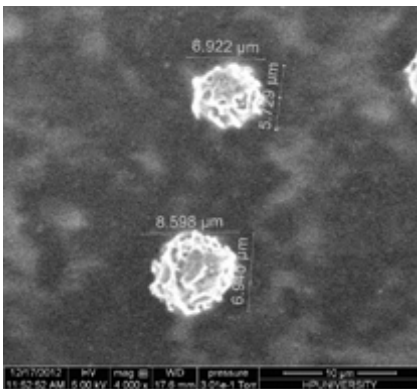
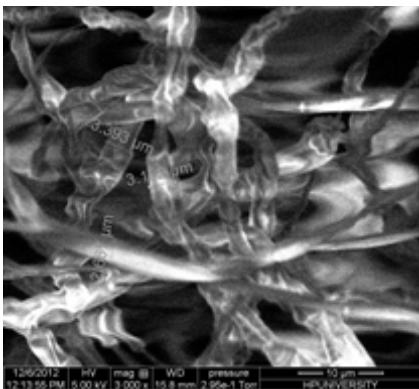
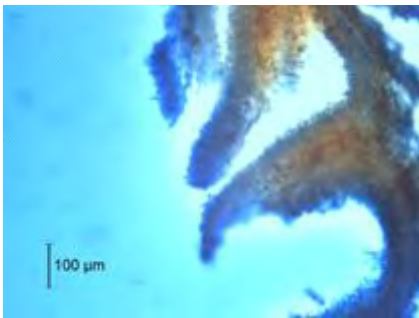


PLATE 2



Insight into the structure and antibacterial activity of newly synthesized oxidovanadium (IV) drug compound $[\text{VO}(\text{acac})_2\text{Aspirin}]_2$

Neeraj Sharma and Abhishek Kumar

ABSTRACT

THE BULK of literature has shown that metal based drug compounds have drawn considerable attention owing to their chemotherapeutic properties as metal ions play an important role in action mechanism of different drugs. The coordination chemists and biochemists have thus been inspired to explore the potential of various drugs in general and aspirin in particular, as ligand towards various metal ions whereby aspirin is known to exhibit varied bonding possibilities. In this context, oxidovanadium (IV) drug compound of composition $[\text{VO}(\text{acac})_2(\text{Aspirin})]_2$ [where $\text{acac}=(\text{CH}_3\text{COCHCOCH}_3^-)$; Aspirin = acetyl salicylic acid (ASA)/ 2-acetyloxy benzoic acid= 2- $\text{CH}_3\text{COOC}_6\text{H}_4\text{COOH}$] has been synthesized by the reaction of $[\text{VO}(\text{acac})_2]$ with acetylsalicylic acid in absolute alcohol and characterized by elemental analyses, molar conductivity, magnetic moment measurement and IR, UV-VIS spectroscopy and mass spectrometry. The IR spectrum has shown bonding through carboxyl oxygen only of aspirin suggesting its monodentate nature. The retention of absorption bands due to $\nu(\text{OH})$ and $\nu(\text{CH}_3\text{COO})$ modes of carboxylic acid and acetyloxy groups are suggestive of their non-participation in bonding. The observance of $\nu(\text{V}=\text{O} \cdots \cdots \text{V}=\text{O})$ mode in IR spectra has suggested binuclear nature of drug compound and an octahedral geometry around vanadium has been proposed. The electrochemical behaviour of compound studied by cyclic voltammetry has shown two irreversible reduction waves suggesting $\text{VO}^{2+}/\text{V}^{3+}$ and $\text{V}^{3+}/\text{V}^{2+}$ reduction changes. *In vitro* antibacterial activity of drug compound has been assayed against four bacterial strains viz. *E.coli*, *S.aureus*, *S.epidermidis* and *K.pneumoniae* by MIC method and an enhanced inhibitory

effect than aspirin has been depicted.

Keywords: Oxidovanadium (IV) drug compound. Aspirin. Spectral studies. Antibacterial activity

Introduction

Aspirin an acetyl derivative of salicylic acid was first synthesized by Bayer in 1897. The crystal structure of aspirin determined first by Wheatley (Wheatley 1964) was later refined by Kim et al (Kim 1985). Aspirin either by itself or in combined form has been used worldwide as an effective anti-pyretic, analgesic and non-steroidal anti-inflammatory pharmacological drug (NSAID) (Glaser 2001; Gu et al. 2005; Wang et al. 2003) and a main source of protein acetylation which can alter enzymatic activity and protein functions (Neault et al. 2000). It is known to inhibit irreversibly prostaglandin synthase (PG)H₂ via acetylation of an active site of serine 530 on prostaglandin H₂ synthase (Loll *et al.* 1995); COX-1 and COX-2 (Loll and Garavito 1994; Picot et al. 1994; DeWitt 1999) where COX-1 is employed for normal, physiological prostaglandin synthesis and COX-2 makes prostaglandins in inflammatory cells and antiplatelet effect by inhibiting the production of thromboxane (DeWitt 1999). A copper complex of aspirin has been found to show more potent antiplatelet activity through elevating 6-prostaglandin level while decreasing thromboxane B₂ generation in plasma (Shen et al. 2004 and Yang et al. 2001). Aspirin induced apoptosis is one of the important mechanisms for its antitumor effect against gastric cancer (Wong *et al.* 1999). The regular use of aspirin has been found to reduce the long term risk of colorectal cancer. The important study of interference of aspirin with the biosynthesis of prostaglandins by Vane in 1971 got the Nobel prize in medicine in 1982 (Glaser 2001). Aspirin binds DNA, RNA and proteins and alters their secondary structures (Neault et al. 1996; Neault and Tajmir-Riahi 1997). Antiproliferative signaling of combinations of the nonsteroidal anti-inflammatory drug acetylsalicylic acid (aspirin) and indole-3-carbinol (I3C), a natural compound derived from cruciferous vegetables have been found in human melanoma cells (Poindexter et al. 2016). Very recently, the role of aspirin in patients with septic shock has been reported (Falcone et al. 2016). The molecular complex of aspirin with humic acid extracted from shilajit has been reported (Anwer et al. 2010).

Over the years, vanadium has presented a wealthy and fascinating coordination chemistry and seen tremendous advancements owing to rich structural chemistry, interesting pharmacological properties and pronounced biological activities (Crans et al. 2004; Etcheverry et al. 2009). Owing to the exceptional

position of vanadium among bio-elements as both cationic, VO^{2+} in particular, and anionic form vanadate (V) are involved in biological processes (Baran 2000). Vanadium deficiency causes impaired growth and skeletal deformation. The multiplicity of oxidation states and coordination environments offer unique behaviour of this biometal. The promising insulin-mimetic, appetite suppressing and antihypertensive effects, cholesterol biosynthesis, effective inhibitors of human sperm mobility, anticancer, antimicrobial and antiamoebic activities exhibited by vanadium complexes have further generated a great deal of interest in vanadium chemistry (Molineuvo et al. 2004; Karmaker et al. 2010; Kawabe et al. 2006; Nejo 2009; Sanna et al. 2010).

The biochemical properties and mechanism of action of a vanadyl (IV) aspirin complex of composition $[\text{VO}(\text{aspirin})\text{ClH}_2\text{O}]$ synthesized by the reaction of VOCl_2 with aspirin wherein deprotonated carboxylate group behaves as bidentate bridging ligand has been reported (Etcheverry et al. 2000). In the present work, in continuation of our research interest on the coordination chemistry of vanadium (Sharma et al. 2011; Sharma et al. 2012; Sharma and Sharma 2012; Sharma et al. 2012; Sharma and Sharma 2013). $[\text{VO}(\text{acac})_2]$ has been chosen as precursor of VO^{2+} wherein one or both acetylacetonate groups may be substituted by organic ligands having different donor atoms depending upon metal:ligand ratio and electronic as well as steric effects. A new mixed ligand oxidovanadium(IV) compound with aspirin has been synthesized with an aim to study the bonding behaviour of aspirin as it may coordinate through carboxylate anion exhibiting its monodentate (O coordination) or bidentate nature (O,O coordination). The newly synthesized drug compound has also been tested for its potential antibacterial activity against some microorganisms as it is quite noteworthy that the development of effective antibacterial drug compounds has been the focus of much attention.

Materials and methods

The reagent-grade chemicals and solvents were dried and distilled prior to use. $[\text{VO}(\text{acac})_2]$ (Rowe and Jones 1957) and aspirin (A.I. Vogel 1971) were prepared by reported methods and characterized by IR spectra. The vanadium content in compound was determined as V_2O_5 . The carbon and hydrogen analyses were obtained on Eager 300 NCH System Elemental Analyzer. The molar conductance (10^{-3}M solution in methanol) was obtained on an Elico Conductivity Bridge type CM-82T at $25 \pm 0.1^\circ\text{C}$. The room-temperature magnetic susceptibility was measured by Gouy's method using $\text{Hg}[\text{Co}(\text{NCS})_4]$ as calibrant. The voltammetric experiment was performed in single compartmental cell of volume 10-15mL containing a three-electrode system comprising of a Pt-disk working electrode, Pt-wire as auxiliary electrode and an Ag/AgCl electrode

as reference electrode. The supporting electrolyte was 0.4 M KNO₃ in milli-Q water. The redox behaviour was studied in methanol-H₂O (5:95) electrolyte system on Autolab Potentiostat 128 N electrochemical analyzer. IR spectra of compound was recorded as KBr pellet on Nicolet-5700 FTIR spectrophotometer. Electronic spectra of compound was recorded on a Varian Cary-100 Bio UV-Vis. spectrophotometer using methanol as solvent. The electrospray ionization mass spectrum was recorded on Waters Micromass Quattro-TOF having mass range of 4000 amu in quadrupole and 20000 amu in TOF.

Synthesis

To a solution of vanadyl acetylacetonate (1g, 3.77 mmol) in absolute alcohol (5ml) was added two equivalents of aspirin (1.34g, 7.5 mmol) in the same solvent. The reaction mixture was initially stirred for 1h and then refluxed for 16h to ensure the completion of the reaction whereupon a change in color of reaction mixture from blue to greenish black was observed. It was filtered and the excess of solvent was distilled off. To the concentrate, petroleum ether was added and dried under vacuum. A greenish-black solid was obtained. It was recrystallized from absolute alcohol. [C₃₈H₄₄O₁₈V₂][VO(acac)₂(Aspirin)]₂ (890), Yield: (70%), Anal. Calcd (%) C, 51.23; H, 4.94; V, 11.46 Found (%) C, 51.09; H, 4.48; V, 11.05 Λ_m (Methanol) : 4.12 Scm²mol⁻¹; μ_{eff} (293K): 1.76 B.M. IR (KBr matrix) (cm⁻¹): 3236, 3068, 2999, 2860, 2698, 2663, 2594, 2536, 1836, 1754, 1698, 1657, 1611, 1559, 1547, 1484, 1449, 1420, 1408, 1400, 1350, 1246, 1177, 1148, 1090, 1021, 992, 796, 755, 697, 651, 604, 564, 529, 477.

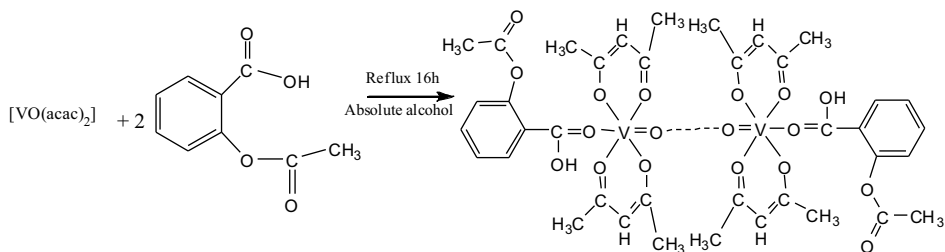
In vitro antibacterial assay

The antibacterial activity of aspirin and compound was assayed against two Gram+ve and two Gram-ve bacterial strains viz. *E.coli*, *S.epidermidis* and *S.aureus*, *K.pneumoniae* respectively at different concentration in DMSO employing the Minimum Inhibitory Concentration (MIC) method as recommended by National Committee for Clinical Laboratory Standards (NCCLS) (Greenwood et al. 2007; Mackie et al. 1989). MIC is the lowest concentration of the antimicrobial agent that prevents the development of visible growth after overnight incubation. The samples were tested in triplicate. The results were compared with standard antibacterial drug tetracycline hydrochloride (THC). The MIC assay was performed in a 96-well micro-titre plate. For MIC assay of the test drug compound; a row of twelve wells was used out of which last two wells were taken as control (no drug compound). Each of the ten wells received 100 μ L of the Muller-Hinton broth except the first well that received 200 μ L of broth containing 500 μ g / mL concentration of the test drug.

From the first well (containing test drug), 100 μ L broth was withdrawn with a sterile tip, and same was added to the 100 μ L of the broth in the 2nd well; contents were mixed four times. Then 100 μ L was withdrawn from 2nd well and was added to the third well. This way a range of two-fold serial dilution were prepared (500 – 0.98 μ g / mL) by performing two-fold serial dilution. The broth in each of the wells was inoculated with 2 μ L of the bacterial culture and the contents were mixed by ten clockwise and ten anticlockwise rotations on a flat surface. The plate was incubated at 35°C thereafter. The observations for growth of bacteria were recorded after 24 h. To evaluate the role of solvent in biological screening if any, separate studies were carried out with DMSO. The solvent did not show any activity against bacteria.

Results and discussion

The reaction of vanadyl acetylacetonate with two equivalents of aspirin (in absolute alcohol) under reflux afforded the formation of greenish-black compound of composition $[\text{VO}(\text{acac})_2(\text{Aspirin})]_2$ (**Scheme 1**) in conformity with elemental analyses as



Scheme 1

The compound is soluble in most of the common organic solvents. The molar conductance

(4.1 S cm² mol⁻¹) value of millimolar solution of compound in methanol has indicated its non electrolytic nature (Geary 1971).

IR spectra

The formation of drug compound $[\text{VO}(\text{acac})_2(\text{Aspirin})]_2$ and bonding behavior of aspirin has been ascertained from a comparison of its IR spectra with those of free aspirin and $[\text{VO}(\text{acac})_2]$. It is pertinent to mention here that aspirin has been reported to display diverse coordination modes. Cobalt (II), nickel (II) and iron(II) complexes of aspirin have shown it to act as bidentate chelating agent coordinating through carboxylate oxygens [Lawal A and Obalieye

2007]. Bonding through both carboxylate and acetyl groups has been reported in UO_2^{2+} , Bi^{3+} and Zn^{2+} complexes with aspirin (Balas et al. 1979).

The aspirin has been reported (Figure 1) to display important absorption bands at 3236 cm^{-1} (ν_{OH}); 1754 cm^{-1} (acetyloxy $\nu_{\text{C=O}}$) and 1693 cm^{-1} (carboxy $\nu_{\text{C=O}}$). The absorption bands at 2984 , 2940 and 2910 cm^{-1} in aspirin have been ascribed to $\nu_{\text{as}}\text{CH}_3$ and $\nu_{\text{sym}}\text{CH}_3$ groups respectively. The IR spectrum of $[\text{VO}(\text{acac})_2\text{Aspirin}]_2$ has shown (Figure 2) the retention of absorption band due to $\nu_{\text{O-H}}$ mode suggesting that this group has not been deprotonated and is not bonded to vanadium through its oxygen. The absorption band due to $\nu_{\text{C=O}}$ mode of carboxylic acid group has been observed to shift to lower wavenumber indicating that bonding has occurred through carboxyl oxygen of aspirin. The $\nu_{\text{C=O}}$ mode of acetyloxy group has been observed to remain unchanged upon complexation excluding its involvement in bonding. These observations have indicated the monodentate nature of aspirin bonded through carboxyl oxygen only. The absorption band appeared at 796 cm^{-1} assigned to $\nu_{\text{V=O}} \dots \nu_{\text{V=O}}$ mode has suggested binuclear nature of drug compound. The absorption bands occurring at 999 cm^{-1} and 486 cm^{-1} in $[\text{VO}(\text{acac})_2]$ due to $\nu(\text{V=O})$ and $\nu(\text{V-O})$ modes respectively have been observed to shift slightly to lower wave numbers and appeared at 992 cm^{-1} and 477 cm^{-1} respectively. The characteristic bands of acetylacetonate ion occurring in $1587\text{--}1554\text{ cm}^{-1}$ and $1375\text{--}1344\text{ cm}^{-1}$ regions due to $\nu_{\text{as}}(\text{C=O})$ and $\nu_{\text{s}}(\text{C=O}) + \nu_{\text{sym}}\text{CH}_3$ modes respectively in $[\text{VO}(\text{acac})_2]$ have appeared at nearly same wavenumbers in $[\text{VO}(\text{acac})_2(\text{Aspirin})]_2$.

Electronic Spectra

The UV-Vis spectra of aspirin and newly synthesized oxovanadium(IV) compound has been recorded in methanol. The electronic spectra of aspirin displayed absorption bands at 225 , 255 nm attributed to intra-ligand $\pi \rightarrow \pi^*$ transitions. $[\text{VO}(\text{acac})_2\text{Aspirin}]_2$ exhibited absorption bands at 790 , 580 and 425 nm which may be assigned to LMCT transitions from lone pair of p-orbital of carboxylate oxygen atoms to vanadium and d-d transitions respectively (Gao et al. 1998; Cooper et al. 1982). It is worth mentioning here that the electronic spectrum of $[\text{VO}(\text{Aspirin})\text{ClH}_2\text{O}]$ in a mixture of ethanol /water (1:1) under N_2 atmosphere has been reported to exhibit two typical absorption bands at 778 and 608 nm (Etcheverry et al. 2000). The spectral observations are in agreement with those reported for an octahedral geometry around vanadium centres (Cheng et al. 1990; Stoklosa et al. 1974; Ballhausen and Grey 1962).

Mass Spectra

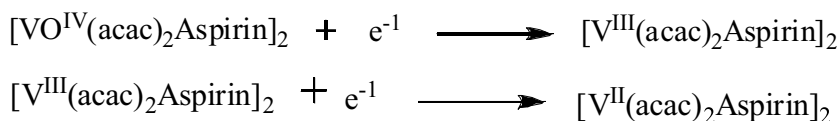
The ESI mass spectra of $[\text{VO}(\text{acac})_2\text{Aspirin}]_2$ (Table 1) did not display any

molecular ion peak but the peaks observed at higher molecular mass suggested the associated structure of the compound involving V=O-V=O bonding as also inferred from IR spectra. The most intense peak at m/z (%) 363 (100) corresponded to $[\text{VO}(\text{acac})\text{Aspirin} + \text{OH}]^+$. The other important fragment ions at m/z (%) 757 (18.94), 700 (14.73), 631 (10.52), 488 (7.99), 466 (3.78), 417 (24.20), 395 (89.46), 288 (8.42) and 266 (63.36) corresponded to $[\text{VO}(\text{acac})_2\text{Aspirin}]_2^- \text{C}_6\text{H}_5\text{COOCCH}_3 + 3\text{H}^+$, $[\text{VO}(\text{acac})_2\text{Aspirin}]_2^- \text{CH}_3\text{COO}-\text{C}_6\text{H}_5\text{COOCCH}_3^-$, $[\text{VO}(\text{acac})_2\text{Aspirin}]_2^- \text{C}_6\text{H}_5\text{COOCH}_3^- \text{acac}-2\text{CH}_3]^+$, $[\text{VO}(\text{acac})_2\text{Aspirin} + 2\text{Na}^+ - 3\text{H}^+]^+$, $[\text{VO}(\text{acac})_2\text{Aspirin} + \text{Na}^+ - 2\text{H}^+]^+$, $[\text{VO}(\text{acac})_2\text{Aspirin} + \text{Na}^+ - 2\text{H}^+]^+$, $[\text{VO}(\text{acac})_2\text{Aspirin} - \text{CO}]^+$, $[\text{VOV}(\text{acac})\text{Aspirin} - 2\text{H}^+]^+$, $[\text{VO}(\text{acac})_2 + \text{Na}^+]^+$, $[\text{VO}(\text{acac})_2 + \text{H}^+]^+$ respectively. The fragment ions at m/z (%) 225 (6.31), 203 (10.52), 163, (36.83), 121 (18.94) and 102 (24.83) corresponded to aspirin and acetylacetone ions.

Based upon physicochemical and IR, UV-Vis and mass spectral studies, a distorted octahedral geometry around vanadium has been proposed for $[\text{VO}(\text{acac})_2\text{Aspirin}]_2$ in Figure 3.

Cyclic voltammetry

$[\text{VO}(\text{acac})_2\text{Aspirin}]_2$ showed two cathodic peaks at -1.38, +0.9 V and no anodic component/oxidative counterpart was displayed (Figure 4). The observed voltammogram is suggestive of the electrochemically irreversible metal centered reductive process. It is quite noteworthy that the reduction of vanadyl complexes to the trivalent state is reported to occur by loss of the vanadyl oxygen and such reductions are usually irreversible. The electronic reaction may be represented as:



Antibacterial activity

The $[\text{VO}(\text{acac})_2]$, Aspirin and $[\text{VO}(\text{acac})_2\text{Aspirin}]_2$ have been tested *in vitro* for their antibacterial activity against Gram +ve bacteria viz. *Staphylococcus aureus*, *Staphylococcus epidermidis* and Gram -ve bacteria *Escherichia coli*, *Klebsiella pneumoniae* employing MIC method (Figure 5). The results have been compared with treated control and commercial antibiotic tetracycline hydrochloride. The $[\text{VO}(\text{acac})_2]$ and aspirin inhibited all the test bacteria at 250 $\mu\text{g/ml}$ and 125 $\mu\text{g/ml}$ respectively. $[\text{VO}(\text{acac})_2\text{aspirin}]_2$ has shown an enhanced inhibitory effect at MIC 15.62 $\mu\text{g/mL}$ against *Staphylococcus epidermidis* and at

MIC 31.25 $\mu\text{g/mL}$ for *Staphylococcus aureus*. *Escherichia coli* and *Klebsiella pneumoniae* have been inhibited at MIC 62.5 $\mu\text{g/mL}$ (**Table 2**) showing low inhibitory effect.

Conclusions

The present work has shown that $[VO(acac)_2]$ has not undergone ligand exchange reaction with acetylsalicylic acid (aspirin) as it has not been able to substitute acetylacetonate ion. The elemental analyses are consistent with the molecular formula of drug compound $[VO(acac)_2Aspirin]_2$. The binuclear nature of the compound has been evidenced from IR and mass spectra. The IR spectra has indicated that coordination of aspirin with $[VO(acac)_2]$ has occurred through carboxyl group only (C=O) indicating its monodentate nature, as carboxylic acid (O-H) group has not been deprotonated and acetyloxy group has also remained unaltered upon complexation. An assay of antibacterial activity of drug compound against test bacteria has shown promising inhibitory effect.

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Table1
Mass spectral data of [VO(acac)₂Aspirin]₂

Complex	m/z	Intensity/ %
[VO(acac) ₂ Aspirin] ₂ - C ₆ H ₅ COOCCH ₃ + 3H ⁺]	757	18.94
[VO(acac) ₂ Aspirin] ₂ - CH ₃ COO- C ₆ H ₅ COOCCH ₃] ⁺	700	14.73
[VO(acac) ₂ Aspirin] ₂ - C ₆ H ₅ COOCH ₃ - acac-2CH ₃] ⁺	631	10.52
[VO(acac) ₂ Aspirin + 2Na ⁺ -3H ⁺] ⁺	488	7.99
[VO(acac) ₂ Aspirin + Na ⁺ -2H ⁺] ⁺	466	3.78
[VO(acac) ₂ Aspirin- CO] ⁺	417	24.20
[VOV(acac)Aspirin -2H ⁺] ⁺	395	89.46
[VO(acac)Aspirin + OH] ⁺	363	100
[VO(acac) ₂ + Na ⁺] ⁺	288	8.42
[VO(acac) ₂ + H ⁺] ⁺	266	63.36
[Aspirin + 2 Na ⁺ + H ⁺] ⁺	225	6.31
[VO(Aspirin)-CH ₃ CO] ⁺ /[Aspirin + Na ⁺] ⁺	203	10.52
[Aspirin – OH] ⁺	163	36.83
[Aspirin-CH ₃ COO] ⁺	121	18.94
[acacH + 2 H ⁺]	102	24.83

Table 2
Antibacterial activity of aspirin and [VO(acac)₂ Aspirin]₂by MIC method (μg/mL)

Ligand/Complex	<i>E.coli</i>	<i>K.pneumoniae</i>	<i>S.aureus</i>	<i>S.epidermidis</i>
[VO(acac) ₂]	250	250	250	250
Aspirin	125	125	125	125
[VO(acac) ₂ Aspirin] ₂	62.5	62.5	31.25	15.62
Tetracycline hydrochloride (THC)	15.62	15.62	7.81	7.81

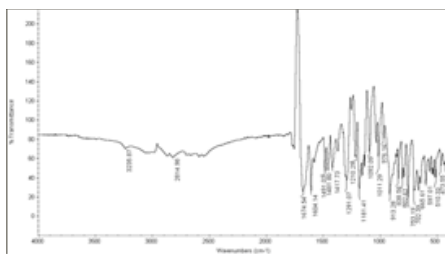


Fig.1 IR Spectrum of Aspirin

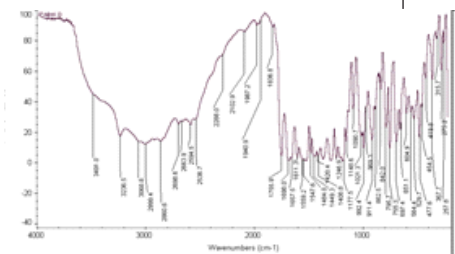
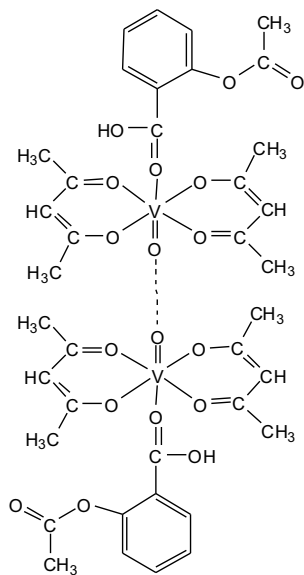
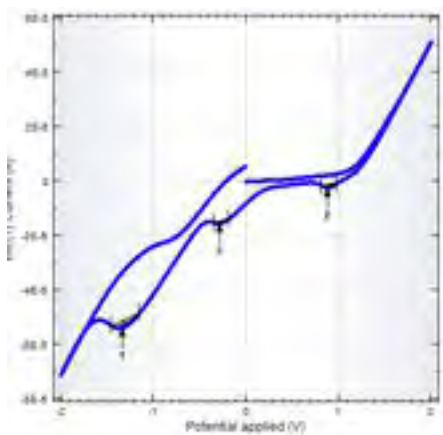
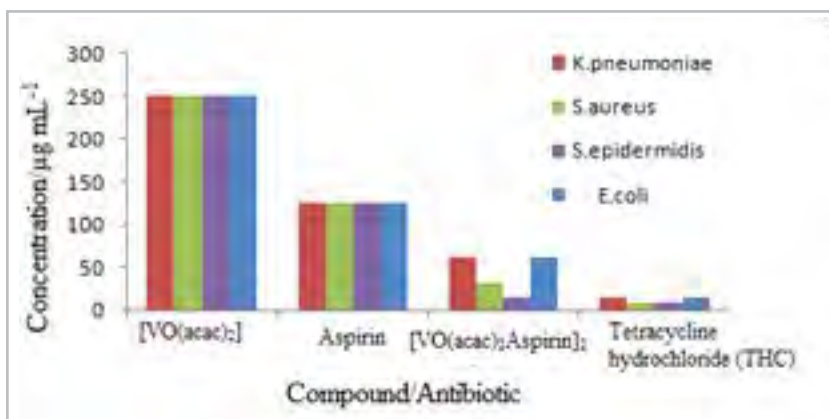
Fig.2 IR Spectrum of $[VO(acac)_2Aspirin]_2$ Fig.3 $[VO(acac)_2Aspirin]_2$ Fig.4 Cyclic voltammogram for $[VO(acac)_2Aspirin]_2$ 

Fig.5 In vitro antibacterial activity of aspirin and compound

E-Governance in India : Issue, Challenges and Future Prospects

L. R. Verma and Sapna Devi

Abstract

E-Governance is generally understood as the use of Information and Communication Technology (ICT) at all the level of the Government in order to provide services to the citizens, interaction with business enterprises and communication and exchange of information between different agencies of the Government in a speedy, convenient efficient and transparent manner and to have good and smart governance. Smart here refers to 'Simple, Moral, Accountable, Responsive and transparent'. E-governance basically aims at improving citizen's access to government information and services. It makes the citizens the focal centre government in terms of service delivery. It is electronic delivery of service by government to the citizens. E-governance has become the key to good-governance in a developing country like India. To be at par with developed countries, the Government of India had made out a plan to use Information Technology extensively in its operation to make more efficient and effective and also to bring transparency and accountability. However, for successful implementation of e-Governance, government officials have to realize that E-Governance is no longer a matter of choice, but an absolute need of the day. Cooperation from government officials and staff will be crucial in realizing the goals of modernizing this nation through e-Governance. While the developed countries have been able to benefit greatly from the wide use of Information Technology, many developing countries are still grasping to make sense of how IT fits into their problems. In every developing country, e-Governance has been talked about a lot; some government offices have even taken innovative steps towards certain e-Government projects. Since this is a new concept for government officials who are used to familiar methods of work, the growth of e-Governance is met with resistance and fear, among other infrastructural problems. This paper deals with the problems and challenges of e-

Governance, e-Governance initiatives and future prospects of E-Governance in India.

Key Words: Accountability, E-Governance, Issue, Challenges, Future Prospectus, Implementation, Information Technology, Resistance, Transparency.

Introduction

E-Government is not just “electronic” government. It is “enabled” government, the government that delivers different and better programs and services. E-Government is about people: new skill sets, mindsets and leadership approaches. It will transform how public servants work, relate to each other, do business, and engage citizens and others. E-government is a process that requires a sustained commitment of political will, resources and engagement among the government, private and public sectors. However, if e-government practitioners ask and answer the following ten questions outlined in the Roadmap, they potentially can develop a system of e-government that not only makes current government practices more efficient, but also transforms the very relationship between the public, the private sector and government. E-government is more about government than about “e”. It enables better policy outcomes, higher quality services and greater engagement with citizens.

Types of Interactions in e-Governance

E-Governance facilitates interaction between different stake holders in governance. These interactions are:

G2G (Government to Government) – In this case, Information and Communications Technology is used not only to restructure the governmental processes involved in the functioning of government entities but also to increase the flow of information and services within and between different entities. This kind of interaction is only within the sphere of government and can be both horizontal i.e. between different government agencies as well as between different functional areas within an organisation, or vertical i.e. between national, provincial and local government agencies as well as between different levels within an organisation. The primary objective is to increase efficiency, performance and output.

G2C (Government to Citizens) – In this case, an interface is created between the government and citizens which enables the citizens to benefit from efficient delivery of a large range of public services. This expands the availability and accessibility of public services on the one hand and improves the quality of services on the other. It gives citizens the choice of when to interact with the government (e.g. 24 hours a day, 7 days a week), from where to interact with the

government (e.g. service centre, unattended kiosk or from one's home/workplace) and how to interact with the government (e.g. through internet, fax, telephone, email, face-to-face, etc). The primary purpose is to make government, citizen-friendly.

G2B (Government to Business) – Here, e-Governance tools are used to aid the business community – providers of goods and services – to seamlessly interact with the government. The objective is to cut red tape, save time, reduce operational costs and to create a more transparent business environment when dealing with the government. The G2B initiatives can be transactional, such as in licensing, permits, procurement and revenue collection. They can also be promotional and facilitative, such as in trade, tourism and investment. These measures help to provide a congenial environment to businesses to enable them to perform more efficiently.

G2E (Government to Employees) – Government is by far the biggest employer and like any organisation, it has to interact with its employees on a regular basis. This interaction is a two-way process between the organisation and the employee. Use of ICT tools helps in making these interactions fast and efficient on the one hand and increase satisfaction levels of employees on the other.

E-Governance in India

In India, the first step towards modern governance was taken by establishing the National Informatics Centre (NIC) in the 1970s. The NIC done a remarkable job of connecting thousands of information's required for planning and execution of numerous developments schemes as also for governance. It has been assigned the task of comprising working different departments of the Union and the State Governments. In the process, NIC has developed varied and exhaustive skill for comprising and networking government offices. The more than to decade's long pioneering work and experience of NIC has enabled it to give a broad view of everything connected with E-governance, to those who are involved in and committed to this challenging task.

National ID and e-Governance initiatives in India

The primary data requirement for effective e-Governance is the National Citizen ID Card. It should be a multipurpose, secured, and authentic ID card. It should be akin to the photocopy of the individual with multifactor authentication such as photograph, biometrics – fingerprint, iris-based systems and digital signature. India with a population of one billion people should be concerned about providing this card to the citizens on a cost effective basis. Hence, there is a need to select the right technology for the preparation of the card and online issue of the card also needs to be determined urgently. This challenge must be taken up by

the consortium of public and private industries, and academic institutions with the government. Presently the government is considering the discussion of a bill for introducing multipurpose Citizen ID card. Several state governments have made significant use of IT in government, integration of IT-based government services and their electronic delivery. Some of the examples are:

Table No. 1
Detail of the initiatives taken by the Different States/UTs under e-governance

State/UT	Initiatives covering departmental automation, user charge collection, delivery of policy/programme information and delivery of entitlements
Andhra Pradesh	e-Seva, CARD, VOICE, MPHS, FAST, e -Cops, AP online — Onestop-shop on the Internet, Saukaryam, Online T ransaction processing
Bihar	Sales Tax Administration Management Information
Chhattisgarh	Chhattisgarh Infotech Promotion Society, Treasury office, e - linking project
Delhi	Automatic Vehicle Tracking System, Computerisation of website of RCS office, Ele ctronic Clearance System, Management Information System for Education etc
Goa	Dharani Project
Gujrat	Mahiti Shakti, request for Government documents online, Form book online, G R book online, census online, tender notice.
Haryana	Nai Disha
Himachal Pradesh	Lok Mitra
Karnataka	Bhoomi, Khajane, Kaveri, Mahiti, Smart Card System
Kerala	e-Srinkhala, RDNet, Fast, Reliable, Instant, Efficient Network for the Disbursement of Services (FRIENDS)
Madhya Pradesh	Gyandoot, Gram Sampark, Smart Card in Transport Department, Computerization MP State Agricultural Marketing Board (Mandi Board) etc
Maharashtra	SETU, Online Complaint Management System—Mumbai
Rajasthan	Jan Mitra, RajSWIFT, Lokmitra, RajNIDHI
Tamil Nadu	Rasi Maiyams—Kanchipuram; Application forms r elated to public utility, tender notices and display
Arunachal Pradesh	Community Information Center. Forms available on
Manipur & Meghalaya	the Meghalaya website under schemes related to
Mizoram & Nagaland	social welfare, food civil supplies and consumer affairs, housing transport etc.

State wise Classification of Population in India

In India only 31.16 percent of the total population lives urban areas and 68.84 percent of the population lives in rural areas. Majority of the people of India live in rural areas. So it becomes difficult to implement the programmes and different schemes easily. Because in rural areas the geographical condition, communication system, transportation and other basic facilities are not enough. Due to lack of such basic facilities the rural areas are not well developed.

Table No. 2 Rural and Urban Classification of Population of India Census 2011

States/UTs	Total Population	Rural Population (%age)	Urban Population (%age)
Jammu & Kashmir	12548926	9134820 (72.79)	4414106 (27.21)
Himachal Pradesh	6856509	6167805 (89.96)	688704 (10.04)
Punjab	27704236	17316800 (62.51)	10387436 (37.49)
Chandigarh	1054686	29004 (2.75)	1025682 (97.25)
Uttra Khand	10116752	7025583 (69.45)	3091169 (30.55)
Haryana	25353081	16531493 (65.21)	8821588 (34.79)
NCT Delhi	16753235	419319 (2.50)	16333916 (97.50)
Rajasthan	68621012	51540236 (75.11)	17080776 (24.89)
Uttar Pradesh	199581477	155111022 (77.72)	44470455 (22.28)
Bihar	103804637	92075028 (88.70)	11729609 (11.30)
Sikkim	607688	4 55962 (75.03)	151726 (24.97)
Arunachal Pradesh	1382611	1069165 (77.33)	313446 (22.67)
Nagaland	1980602	1406861 (71.03)	573741 (28.97)
Manipur	2721756	1899624 (69.79)	822132 (30.21)
Mizoram	1091014	529037 (48.49)	561977 (51.51)
Tripura	3671032	2710051 (73.82)	960981 (26.18)
Meghalaya	2964007	2368971 (79.92)	595036 (20.08)
Assam	31169272	26780516 (85.92)	4388756 (14.08)
West Bengal	91347736	62213676 (68.11)	29134060 (31.89)
Jharkhand	32966238	25036946 (75.95)	7929292 (24.05)
Odisha	41947358	34951234 (83.32)	6996124 (16.68)
Chhattisgarh	25540196	19603658 (76.76)	9936538 (23.24)
Madhaya Pradesh	725597565	52537899 (72.37)	20059666 (27.63)

Gujrat	60383628	34670817 (57.42)	25712811 (42.58)
Daman & Diu	242911	60331 (24.84)	182580 (75.16)
Dadra & Nagar Haveli	342853	183024 (53.38)	159829(46.62)
Maharashtra	112372972	61545441 (54.77)	50827531 (45.23)
Andhra Pradesh	84665533	56311788 (66.51)	28353745 (33.49)

Source: Generated from census 2011, registrar general Government of India

State wise Computer and Internet Users in India

Table No. 3 State wise Computer and Internet Users in India

States/UTs	Households	Computers (% age)	With internet (% age)	Without internet % (age)
Jammu & Kashmir	2015088	169267 (8.4)	58438 (2.9)	110830 (5.5)
Himachal Pradesh	1476581	124033 (8.4)	41344 (2.8)	82689 (5.6)
Punjab	5409699	692441 (12.8)	292124 (5.4)	400318 (7.4)
Chandigarh	235061	78040 (33.2)	44191 (18.8)	33849 (14.4)
Uttra Khand	1997068	219677 (11.0)	60906 (3.2)	155771 (7.8)
Haryana	4717954	622770 (13.2)	250052 (5.3)	372718 (7.9)
NCT Delhi	3340538	972097 (29.1)	887935 (17.6)	384162 (11.5)
Rajasthan	12581303	868110 (6.9)	226463 (1.8)	641646 (5.1)
Uttar Pradesh	32924266	2666866 (8.1)	625561 (1.9)	2041304 (6.2)
Bihar	18940729	1344785 (7.1)	170466 (0.9)	1174319 (6.2)
Sikkim	128131	14735 (11.5)	4228 (3.3)	10507 (8.2)
Arunachal Pradesh	261614	21452 (8.2)	5232 (2.0)	16220 (6.2)
Nagaland	399965	35997 (8.9)	6799 (1.7)	28797 (7.2)
Manipur	507152	45644 (9.0)	10650 (2.1)	34993 (6.9)
Mizoram	221077	33604 (15.2)	5527 (2.5)	28077 (12.7)
Tripura	842781	60680 (7.2)	8428 (1.0)	53095 (6.3)
Meghalaya	538299	40911 (7.6)	8074 (1.5)	32836 (6.1)
Assam	6367295	592158 (9.3)	101877 (1.6)	490282 (7.7)

West Bengal	20067299	1665586 (8.3)	441481 (2.2)	1224105 (6.1)
Jharkhand	6181607	426531 (6.9)	92724 (1.5)	333807 (5.4)
Odisha	9661085	492715 (5.1)	135255 (1.4)	357460 (3.7)
Chhattisgarh	5622850	258651 (4.6)	67474 (1.2)	191177 (3.4)
Madhya Pradesh	14967597	883088 (5.9)	209546 (1.4)	673542 (4.5)
Gujrat	12181718	1071991 (8.8)	377633 (3.1)	694358 (5.7)
Daman & Diu	60381	5615 (9.3)	1691 (2.8)	3925 (6.5)
Dadra & Nagar Haveli	73063	6064 (8.3)	2046 (2.8)	4018 (5.5)

Source: obtained from Ministry of Information and Technology Government of India.

Internet and Mobile Association of India (IAMAI) Report “Internet in India 2015”

Internet and Mobile Association of India (IAMAI) on 17 November 2015 released a report entitled Internet in India 2015 report. The report surveyed usage of internet on different devices (mobile, desktop, etc), in different areas (village and urban) and among different demographic segments. The key finding of the report is India's internet user base will touch 402 million by December 2015 making it the second-largest in the world after China. The number of Internet users in India is expected to reach 402 million by December 2015 registering a growth of 49 percent over last year. With this, India will surpass the USA and will have second largest user base next only to China. Currently, while internet users in India are pegged at 375 million, China leads in the world with more than 600 million internet users. While Internet in India took more than a decade to move from 10 million to 100 million and 3 years from 100 to 200 million, it took only a year to move from 300 to 400 million users. **Overall**, 71 percent male and 29 percent female are Internet users in India. The Internet usage among males has been growing at a rate of 50 percent while it is growing at 46 percent for female users. And, among the female Internet users, the highest growth has been among the Non-Working women.

Table No. 4
Internet Users Growth in India (Rural & Urban Figures in Millions)

Classification	June 2012	June 2013	June 2014	Dec. 2014	June 2015 (est.)
Rural	39	59.6	92	112	138
Urban	99	130	165	190	216
Total	137	189.6	257	302	354

Source: IAMAI-IMRB International-Cube Estimate

According to the report, 52 million new internet users will be added in first six months of 2015. Urban and Rural India is expected to added equal number of users (26 million each). This also means that India will be adding close to 9 million internet users every month. When it comes to frequency of internet usage, the report finds that a good 61 percent of users are daily users. About 18 percent access internet several times a day, 10 percent users at least once a day and 33 percent access on all 7 days.

Table No. 5 Growth of Mobile internet Users in India

Classification	June 2012	June 2013	June 2014	Oct. 2014	Dec.2014
Rural	4	21	36	40	45
Urban	44	70	101	119	128
Total	4821	91	137	159	173

Base: All India Estimates

Source: IAMAI-IMRB International-Cube October 2014

The table shows tremendous growth of internet users in India is surely a great sign for full fill the purpose of E-governance.

MOBILE INTERNET USERS IN INDIA

A major boom in the number of the mobile internet users was also been recorded this year. The number of mobile internet users in India also grew from 173 million in December 2014 to **213 million users by the end of June 2014**. Nearly 128 million mobile internet users belonged to the urban population of India, the rest 45 million reside in rural areas of the country. It is expected that the mobile internet users in India will grow up to 314 million by 2017. India is among the top

three countries by the number of internet users, mobile phone users, and social media users. With 352 million internet users, India is still at the helm of just 27% penetration while China and the USA have clocked 51% and 87% penetration, respectively. The growth will be led by the government's Digital India initiative, collaboration among mobile Internet ecosystem stakeholders and innovative content and service offerings from mobile-based services players. Digital India is an umbrella programme that encompasses providing Internet access to all by creating infrastructure, delivering government services on the Web and mobile phone, promoting digital literacy and increasing electronic manufacturing capability.

E-Governance: Challenges in India

There are a large number of obstacles in implementation of e-Governance in India. These can be categorized under the following titles: Environmental and Social Challenges, Economical Challenges and Technical Challenges. These challenges are:-

A. Environmental and Social Challenges

India is a country where people with different cultures and different religions live. People belonging to different states speak different languages. The diversity of people in context of language is a huge challenge for implementing e-Governance projects as e-Governance applications are written in English language. And also, English may not be understandable by most of the people. Therefore, it becomes a challenge for the government to write e-Governance applications which are to be implemented for the whole nation in more than one language so that these may be acceptable to the users of a particular language. Literacy level of India is very low, which is a huge obstacle in implementation of e-Governance projects. Illiterate people are not able to access the e-Governance applications; hence the projects do not get much success. Much of the Indian people are not literate and those who are literate, they do not have much knowledge about Information Technology (IT). Most of the people in India are not aware about the usage of Information Technology. So, in India, having such low level of IT literacy, how can e-Governance projects be implemented successfully? We can say that IT illiteracy is a major obstacle in implementation of e-Governance in India. So, first of all Indian people must be made aware about the usage of Information Technology. Users of e-Governance applications are often non-expert users who may not be able to use the applications in a right manner. Such users need guidance to find the right way to perform their transactions. Therefore, government websites must be user friendly so that more and more people can use them easily. Hence, these websites can be more

effective. If government websites will be designed in an easier format only then these will be more usable for the users who are not expert users of IT. The concept of e-Governance is claiming for increased efficiency and effectiveness of the government, but these goals will be achieved only if the service will be available to the 100 percent of the citizens. So, every service should be accessible by anybody from anywhere and anytime. Even if the users of Internet are growing but still there is a major part of Indian population which is not able to access e-Governance activities for variety of reasons, e.g. some people may have limited access to Information and Communication Technologies and devices. Therefore, government has to provide internet access through public terminals as a part of their universal access efforts. The struggle to change phenomenon can explain much of the hesitation that occurs on the part of the constituents in moving from a paper-based to a web-based system to interact with government. Citizens, employees and businesses can all have their biases with respect to how transactions should be processed. Government entities and public policy administrators cannot ignore the changes that occur as a result of the implementation of the ICT. Education about the value of new system is one step towards reducing some of this struggle. Population of India is probably the biggest challenge in implementing e-Governance projects. As population is considered to be an asset to the country but it also offers some other challenges e.g. establishing person identities. There is no unique identity of individuals in India although Indian government is making efforts for providing unique identity to its citizens. Apart from this, measuring the population, keeping the database of all Indian nationals and keeping this database updated and then providing the e-governance services to the whole population are major challenges. Most of the e-governance services which are offered by the state or central government are not integrated. Lack of communication between different departments of government may be its major cause. Therefore, the information that resides within one department has no or very little meaning to some other department of the government. Most of the Indian people are not aware of the benefits of e-Governance services. Even the government do not pay much attention to make the people aware about e-Governance activities. Unawareness is a major challenge in the implementation of e-Governance projects.

B. Economical Challenges

In developing countries like India, cost is one of the most important obstacles in the path of implementation of e-Governance where major part of the population is living below poverty line. Even the politicians do not have interest in implementing e-Governance. A huge amount of money is involved in implementation, operational and evolutionary maintenance tasks. These costs

must be low enough so that to guarantee a good cost/benefit ratio. E-governance applications must be independent from hardware or software platforms. Therefore, these applications can be used at any platform irrespective of the hardware or software and from one platform to the other platform. These applications may also help on possible reuse by other administrators. As the Information Technology changes very fast and it is very difficult for us to update our existing systems very fast. Regulations of different devices and their different characteristics may vary and the system in use must be capable to handle all the emerging needs. Maintenance is a key factor for long living systems in a rapidly changing technical environment. Per capita income means how much each individual receives, in the terms of money, of the yearly income generated in a country. This refers to what each individual receives if the yearly national income is divided equally among everyone. Per capita income of India is low as compare to the other countries. Therefore, people cannot afford on-line services provided by the government which is a challenge for implementation of e-governance. The Gross Domestic Product (GDP) is one of the measures of national income and a country's economy. GDP is defined as the total market value of all final goods and services produced within the country in a given period of time. GDP of a country is the measure of its financial strength. India has limited financial resources so as to implement and maintain the e-Government projects properly.

C. Technical challenges

Interoperability is the ability of systems and organizations of different qualities to work together. The e-Governance applications must have this characteristic so that the newly developed and existing applications can be implemented together. E-Governance projects have to be designed to scale from the day one. E-Governance is supposed to affect every citizen of the country, so e-Governance applications must have the scale to interface with every citizen. Multimodal interaction provides the user with multiple modes of interfacing with a system. An e-Government application can be really effective if its users can access it using different devices. A critical obstacle in implementing e-Governance is the privacy and security of an individual's personal data that he/she provides to obtain government services. With the implementation of e-government projects, some effective measures must be taken to protect the sensitive personal information of the people. Lack of security standards can limit the development of e-Government projects that contain personal information such as income, medical history etc. The very first step in creating a good application is to define its scope very well and everything else comes later. The applications which are provided by e-Government, their scope must be known in advance for the accurate implementation of e-Governance projects. Technology tends to get out

of date very fast. Our government may not be in position to buy new servers every year. So, it is better and safer to use technologies and products which are tried and tested for longer periods of times than using the latest ones. Corporate networks reside on reliable and controlled networks. Government networks have to go into all areas which are even unfriendly to live. It is, however, costly to wire up all the villages in the country. So, e-Governance systems must have to use the wireless networks like existing cellular networks to reach the applications into remote areas irrespective of the geographical issues.

Future Prospects of E-Governance in India

Vision and Objectives of the Twelfth Five Year Plan (2012-17)

- a. To deliver all Government services in electronic mode so as to make the Government process transparent, citizen centric, efficient and easily accessible.
- b. To break information silos and create shareable resources for all Government entities
- c. To deliver both informational and transactional government services over mobiles and promote innovation in mobile governance
- d. To build Shared Service Platforms to accelerate the adoption of E-Governance and reduce the cycle time of E-Governance project implementation
- e. To strengthen and improve sustainability of the existing projects through innovative business models and through continuous infusion of advanced technology
- f. To promote ethical use of technology and data and to create a safe and secure E-Governance cyber world
- g. To create an ecosystem that promotes innovation in ICT for Governance and for applications that can benefit the citizens
- h. To better target the delivery of welfare schemes of the Central and State Governments
- i. To reduce asymmetry in information availability, accessibility and ability to utilize the information
- j. To increase the all round awareness and create mechanisms that promotes and encourages citizen engagement.
- k. To make available as much data as possible in the public domain for productive use by the citizens.

Major Recommendations for the Twelfth Five Year Plan

The brick and mortar models of development have limitations with respect to

reaching the last mile of our population. Information Communication Technology offers an efficient and speedier solution to deliver public services in a transparent and reliable manner to every citizen through ICT needs to be leveraged in every aspect of governance. DIT has been able to build the core E-Governance infrastructure (Data Centers, State Wide Area Networks, Common Services Centres (CSCs), Mobile Service Delivery Platform) across the country during the 11th Plan which will continue in the XII Plan so as to bring it to its logical conclusion. Also, the focus of the XII Plan will be on leveraging to catapult India in the top quartile of HDI ranking through quantum improvements in the delivery of Public Services. This will also bring in process efficiency, accountability and transparency.

Targets of the Twelfth Five Year Plan (2012-17) with respect to E-Governance

- a) A National Institute for E-Governance (NIG) would be setup as an autonomous State of the Art National Institute. NIG will also train at least 50 employees from Central Government per year on Project Management Certification.
- b) An E-Governance Innovation and R&D Fund will be created to give adequate impetus to innovation in E-Governance and M-Governance
- c) Electronic Delivery of Services (EDS) Bill will be implemented. Assistance will be given to every Central Government Department in delivering at least one Service in electronic mode and every State Government in delivering at least three Services in electronic mode apart from the services which are already identified in the MMPs under NeGP.
- d) Shared Services Platforms for e-Payment, GIS, call centre, etc. will be created.
- e) An apps store will be created to promote development of large scale E-Governance and M-Governance applications
- f) M-Governance platforms and frameworks will be created to enable delivery of public services through mobile devices
- g) At least one person per family in 50% of the families will be targeted to provide basic IT training in the XII Plan period.
- h) Cyber Security will be a major focus area during the Twelfth Five Year Plan Period.
- i) Existing SWAN, SDC, NSDG/SSDG, India Portal, CSC Schemes will be rolled out and maintained in all States/UTs. These schemes would be further augmented and technologically upgraded.

- j) The e-District MMP will be implemented in all districts.
- k) Training on Basic IT Skills will be introduced systematically for the existing and all new entrants into Government service.

Conclusion

E-Governance enhances the relationships between G2G, G2C, G2B, C2G and B2G using ICT. Thus, E-Governance not only provides information about various activities of a Government but also involves citizens to participate in government's decision making process. During the last few years, many initiatives have been taken by different state governments in India for using IT as a tool in the functioning of Government so as to provide better services to citizens. In spite of poor infrastructure, poverty, illiteracy, language dominance and all the other reasons India has number of award winning e-governance projects. Effective promotion schemes by the Indian government will also a boosting factor to provide quality services to their citizens, which means there is huge potential for the development of e-governance in various sectors. As the usage of Information Technology is growing very fast, Indian government is making many efforts to provide services to its citizens through e-Governance. Although Indian government is spending a lot of money on e-Governance projects but still these projects are not successful in all parts of India. Unawareness in people, local language of the people of a particular area, privacy for the personal data of the people etc. are main challenges which are responsible for the unsuccessful implementation of e-Governance in India. Government must take some actions to make the people aware about the e-Governance activities so that people may take full advantage of these activities and e-Governance projects can be implemented successfully. The participation of people can play a vital role in implementation of e-Governance in India.

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State of Police Administration in Himachal Pradesh

Sewa Singh Chauhan and Naveen Sharma

ABSTRACT

HIMACHAL PRADESH cannot be seen in isolation of the global and national trends of crime and law and order Problems. No Society can Progress amid lawlessness though Himachal Pradesh is a peaceful State, but crime and criminality is changing its nature and trends. Today democratic countries all over the world are haunted by the spectre of crime and lawlessness. There is a sense of crisis about police security and the centre of crisis is the police to enforce laws and maintain order. The present paper focuses on the history of police in Himachal Pradesh and strength of police in Himachal Pradesh.

Keywords: Vigilance, Forensic, Law enforcement and lawlessness

Introduction

Man lives in a society which is a set of orderly arranged institutions related to each other and also inter-dependent mutually over one another. The framework and the apparatus of the society need to protect the life and property of the individuals. Hence, there is a need to establish institutions which would strictly enforce the law and punish people who do not comply with the law of the land (Begum 1996). No society can progress amidst lawlessness. One cannot visualise the existence of society in the absence of police, as maintenance of peace and order is the key to the development of all social, political, religious and economic functions of any democratic set up (Bhandari 2010). Hence it is an essential service. Although policing is a very vital aspect for the existence of the society, yet the police force as a whole is the target of criticism by all and sundry, including intellectuals, jurists, social activists, media, politicians and citizens (Sen 2010). Today democratic countries all over the world are haunted by the spectre of crime and lawlessness. There is a sense of crisis about police security and the centre of crisis is the police to enforce laws and maintain order (Stone 1985). Law enforcement and crime detection and prevention are not only

functions assigned to the police, a third function is the source of endless trouble; the maintenance of social order. Regrettably even after the country gained independence and we adopted a democratic framework of government, with the most laudable concepts of freedom, liberty, equality and justice enshrined into the administrative approach towards the citizen. The need of the hour is to reshape and reorient the old police, so as to fill into the new concept of a democratic and free society (Singh 2002). Oxford dictionary defines police as “the civil force charged with keeping order, civil administration of the city or town and public order”. According to the Royal commission on police powers and procedures 1929, a policeman is a person paid to perform, as a matter of duty, acts, which, if he were so minded, he might have done voluntarily. The term police today designate the executive civil force of a state, which is entrusted the duty of maintaining public order and enforcing regulations for the prevention and detention of crime.

Strength of Police in Himachal Pradesh:

Himachal Pradesh Police is headed by a senior IPS officer called Director General and Inspector General of Police, below the hierarchy there are 4 Addl. Director General of Police belonging to CID, Law & Order, Training & Armed Police and SV&ACB. There are 9 Inspector General of Police, 5 Deputy Inspector General of Police, and 1 Principal PTC and one Assistant Inspector General of Police. There are 16 Superintendent of Police posted at Various places in the State Including one each in every district, apart from these there are 9 commandants of Battalions of armed forces in Himachal Pradesh. These all 49 posts are IPS senior Duty Posts

**Table 1: Strength of District police in Himachal Pradesh
As on 1 March 2015**

S.N.	District	Strength of Policemen	Population	Policemen per lakh Population
1.	Bilaspur	538	3,40,685	157.9
2.	Chamba	660	4,60,499	143.3
3	Hamirpur	383	4,12,009	92.9
4	Kangra	1286	13,38,536	96.07
5	Kinnaur	378	83,950	450.2
6	Kullu	453	3,79,865	119.2
7	LahaulSpiti	231	33,224	695.2
8	Mandi	920	9,00,987	102.1
9	Shimla	1553	7,21,745	215.1
10	Sirmaur	619	4,58,351	135.0
11	Solan	846	4,99,380	169.4
12	Una	456	4,47,967	101.8
	Total	8323	68,56,509	121.3

Source: Reports Of state Police of Himachal Pradesh

It is evident from the table 1 that the police strength in Himachal Pradesh from inspector to constable was 8323, which was about 121.3 policemen per lakh of the population. When it was calculated for different districts then it was, 157.9 in Bilaspur, 143.3 in Chamba, 92.9 in Hamirpur, 96.07 in Kangra, 450.2 in Kinnaur and 119.25, 695.2, 102.1, 215.17, 135.01, 169.4 and 101.18 in Kullu, LahaulSpiti, Mandi, Shimla, Sirmour, Solan and Una respectively.

According to a UN report, for effective law and order maintenance there should be 222 police personnel per lakh of the population. But in Himachal Pradesh it was only 121.3, where as it is below 100 for Kangra and Hamirpur Districts of Himachal Pradesh.

Table 4
Vacancies of Police Personnel in District police in Himachal Pradesh
As on 1 March 2015

S.N.	District	Sanctioned Strength	Posted Strength	Vacancies
1.	Bilaspur	620	538	82
2.	Chamba	689	660	29
3	Hamirpur	414	383	31
4	Kangra	1418	1286	132
5	Kinnaur	409	378	31
6	Kullu	480	453	27
7	LahaulSpiti	241	231	10
8	Mandi	1007	920	87
9	Shimla	1854	1553	301
10	Sirmaur	666	619	47
11	Solan	915	846	69
12	Una	504	456	48
Total		9217	8323	894

Source: Reports Of state Police of Himachal Pradesh

Table 4 is regarding the vacancies of Police Personnel in district police in Himachal Pradesh, it clearly shows in Himachal Pradesh there were 894 vacancies in police among the ranks from police Inspector to police constable which was nearly 10 percent of the total sanctioned posts in Himachal Pradesh. . When calculated district wise vacancies were 82 in Bilaspur, 29 in Chamba, 31 in Hamirpur, 132 in Kangra, 31 in Kinnaur and 27,10,87,301,47,69 and 48 in Kullu, LahaulSpiti, Mandi, Shimla, Sirmour, Solan and Una respectively.

Figure 1
Vacancies of Police Personnel in District police in Himachal Pradesh

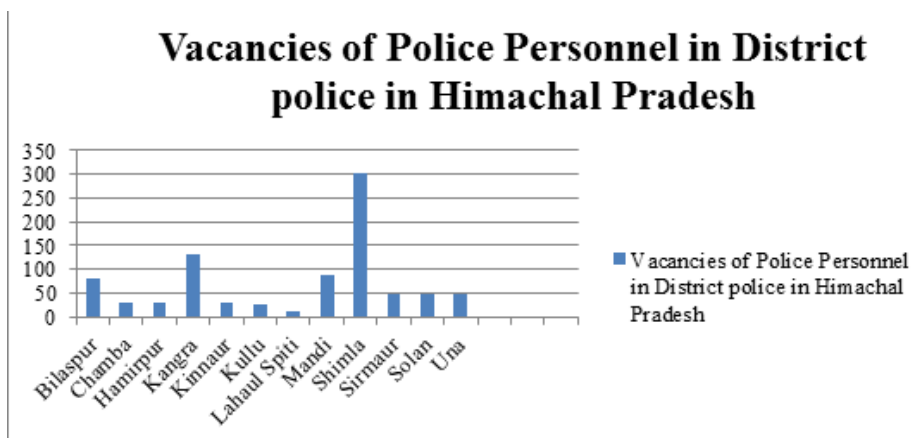


Figure 1 clearly shows the district wise vacancies of police personnel in all the districts of Himachal Pradesh. The highest number of vacancies was in Shimla 301, Kangra 132 and 87 in Mandi district of Himachal Pradesh and lowest in Lahaul Spiti 10

Table 5: Strength and vacancies in Armed Police and other units in Himachal Pradesh
As on 1 March 2015

S.N.	Name of Unit	Sanctioned Strength	Posted Strength	Vacancies
1	1 st Bn. Junga	752	543	209
2	1 st IRBn	916	666	250
3	2 nd IRBn	916	522	394
4	3rd IRBn	916	561	355
5	4 th IRBn	916	656	260
6	5 th IRBn	916	824	92
7	6 th IRBn	916	865	51
8	PTC	97	88	9
9	A&PT	8	6	2
10	HPIPS	76	45	31
11	State CID	533	500	33
12	PHQ	12	10	2
13	S.R.	4	4	0
14	N.R.	4	3	1
15	C.R.	4	3	1
16	FSL	8	7	1
17	SV&Acb	279	254	25
18	TT&R	83	79	4
19	C&TS	405	334	71
Total		7761	5976	1791

Source: Reports Of state Police of Himachal Pradesh

Other than District police there were 19 other wings in Himachal Police, table 5 depicts the vacancies in these branches of Himachal Police. There were 1791 vacancies in all these wings which were nearly 23percent of the sanctioned posts. Maximum of these vacancies were in the armed police of Himachal Pradesh. Highest vacancies are in 2nd Independent Reserve Battalion (394), 3rd Independent Reserve Battalion (355) and 4th Independent Reserve Battalion (260).

Table 6
Rank wise Vacancies in District Police in Himachal Pradesh
As on 1 March 2015

S.N.	Rank	Sanctioned Strength	Posted strength	Vacancies
1	Inspector	98	88	10
2	Sub Inspector	293	232	61
3	ASI	745	538	162
4	Head Constable	1494	1305	189
5	Constable	6587	6115	472
Total		9217	8323	894

Source: Reports Of state Police of Himachal Pradesh

Table 6 clearly shows the rank wise vacancies in Police Administration in Himachal Pradesh. There were total 894 vacancies including 472 of constables, 189 of Head Constables, 162 of Assistant Sub Inspectors, 61 of Sub Inspectors and 10 of Inspectors.

Figure 2
Rank wise Vacancies in District Police in Himachal Pradesh

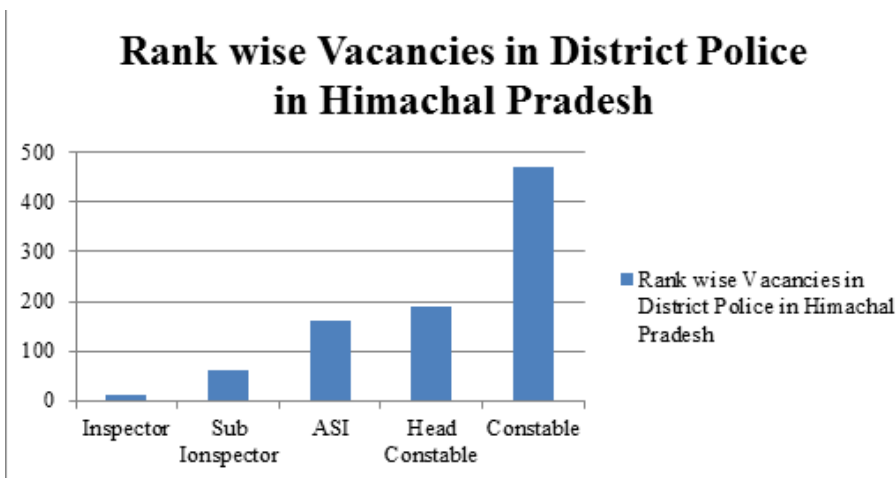


Figure 2 clearly shows that the vacancies go on increasing down the lower ranks. The highest vacancies are of the ranks of constables and were minimum for the ranks of Inspectors. An increasing trend in the vacancies is clearly seen in the figure from the rank of Inspector to that of constable.

Major Findings:

1. It was found that there were 121.3 policemen per lakh of the population in Himachal Pradesh. When it was calculated for different districts it is, 157.9 in Bilaspur, 143.3 in Chamba, 92.9 in Hamirpur, 96.07 in Kangra, 450.2 in Kinnour and 119.25, 695.2, 102.1, 215.17, 135.01, 169.4 and 101.18 in Kullu, LahoulSpiti, Mandi, Shimla, Sirmour, Solan and Una respectively.
2. It was observed that there were 99 Police Stations in Himachal Pradesh, 7 in Bilaspur, 8 in Chamba, 5 in Hamirpur, 16 in Kangra, 4 in Kinnour and 7, 3, 10, 15, 8, 12 and 6 in Kullu, LahoulSpiti, Mandi, Shimla, Sirmour, Solan and Una respectively. When calculated for the police stations Per lakh of the population in Himachal Pradesh it is 1.44, Highest being in LahoulSpiti Where it is 9.02 And lowest in Mandi where it is 1.10.
3. It was found that in Himachal Pradesh there were 894 vacancies in police among the ranks from police Inspector to police constable in the District police, it was nearly 10 percent of the total sanctioned posts in Himachal Pradesh.
4. Other than District police there were 19 other wings in Himachal Police, there were 1791 vacancies in all these wings, it was nearly 23 percent of the sanctioned posts. Maximum of these vacancies were in the armed police of Himachal Pradesh. Highest vacancies are in 2nd Independent Reserve Battalion (394), 3rd Independent Reserve Battalion (355) and 4th Independent Reserve Battalion (260).
5. It was seen that in Himachal Pradesh there were total 894 vacancies including 472 of constables, 189 of Head Constables, 162 of Assistant Sub Inspectors, 61 of Sub Inspectors and 10 of Inspectors. The vacancies go on increasing down the lower ranks. The highest vacancies are of the ranks of constables and are minimum for the ranks of Inspectors. An increasing trend in the vacancies is clearly seen in the figure from the rank of Inspector to that of constable.

Suggestions to make police administration more effective:

1. Initiatives should be taken to strengthen the structural and procedural

aspects of Police Administration in Himachal Pradesh.

2. As the population in Himachal Pradesh is on rise as in the country as a whole, the Strength of Police should also be increased with the same pace. More posts need to be created to tackle the complex nature of crime and law and order problems.
3. Vacancies in the sanctioned posts in various ranks should be filled with the most suitable talent in the state, So that peace and progress in the state can be ensured.
4. Community policing initiatives should be implemented with effective force so that local people can be involved in the law and order maintenance.
5. Social sensitization training should be given to the police officers as there are complaints regarding non cooperative behavior of police personnel.

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Rural Development as an Emerging Discipline in Indian Context

Baldev Singh Negi
Rattan Singh Chauhan

Abstract

INDIA is a rural country with a vast population living in the rural areas and predominantly poor. In comparison to urban, rural poverty is acute and has serious challenges to tackle its problems. There is an urgent need to transform their livelihood security, from the below poverty line to above and traditional pattern of life to modern way of life. In order to tackle such issues, the concept of rural development evolved, in different phases with various dimensions. According to Robert Chambers, rural development is a process of improving the groups of people living in rural areas. Rural Development (RD) involves the development of various sections of people as well as development of rural area. After the liberalisation rural development is the only area where governments seem to be allocating huge budget for checking the rural poverty by implementing numbers of rural development schemes. The variety of rural development schemes needs a well-qualified, committed rural development professionals and awareness among all stakeholders in the country and to fulfil these objectives various academic institutions and institutions of national importance including state and central universities can play and are playing a big role. The present paper is an effort to explore the possibilities to establish Rural Development as an important discipline and scrutinise the institutions already offering the academic courses in RD. Another objective of this paper is also to explore the possibilities of placements for the RD professionals created by these institutions.

Introduction: India is predominantly a rural country with two third population and 70% workforce residing in rural areas. Rural economy constitutes 46 per cent of national income. Despite the rise of urbanisation more than half of India's

population is projected to be rural by 2050. Thus, growth and development of rural economy and population is a key to overall growth and inclusive development of the country. Globally, extreme poverty continues to be overwhelmingly rural: an estimated 79 per cent of those experiencing poverty live in rural areas. In 2011, 21.9 percent Indian population was living below the national poverty line. In 2004–05, the rural poverty was 28.3 percent and the urban poverty was 25.7 percent. Chronic hunger, hunger based on seasonal drought and vulnerability and hidden hunger due to nutritional deficiencies has kept around 225 million people under some form of food insecurity. Since Independence to tackle with the poverty rural development schemes are interventions towards food security, creation of conditions for socio-economic development and enhancing the capacity level of rural poor to enable them to engage in productive activities.

The Community Development Programme was the first organized attempt for the rural development. The programme was launched on 2nd October 1952 this programme focused on all round development of rural areas and touched upon nearly all facets of rural life such as agriculture, animal husbandry, roads, communication facilities, health, education, housing, employment and nutrition. Since then there are numbers of rural development schemes and it occupies significant position not only in central economic planning but also in state's economic planning. No doubt, there are hundreds of rural development schemes with different names but the objectives of all the schemes is to check the rural poverty.

In India Ministry of Rural Development (MoRD) is responsible for development and welfare activities in rural areas. It has two departments: (i) rural development, and (ii) land resources. The Ministry of Rural Development has the third highest ministry-wise allocation in the Union Budget 2018-19, of Rs 1,14,915 crore. This is an increase of Rs 4,041 crore (3.6%) over the revised estimates of 2017-18. The Department of Rural Development under the Ministry is responsible for implementation of all major schemes in rural areas. These schemes are targeted at poverty reduction, employment generation, rural infrastructure, habitation development, and provision of basic services. In 2018-19, the Department has an allocation of Rs 1,12,404 crore, accounting for 97.8% of the Ministry's allocation. The Department of Land Resources is primarily responsible for undertaking land reforms. It supports states in the implementation of the National Land Records Modernization Programme, and aims to increase productivity of land through the process of integrated watershed management. In 2018-19, the Department has an allocation of Rs 2,511 crore, which is 37.1% more than the revised estimates of 2017-18.

There are hundreds of rural development schemes which are dealing with the development of rural population but with this fast changing time, emergence of Information Technology, complex society, regional disparity, linguistic variation and due to many reasons, it is not easy to manage the rural development scheme and attack on the rural poverty. For the want of managing rural development scheme and create the committed rural development professionals, conduct research studies and spread awareness in this regard, institutionalisation of rural development as separate interdisciplinary subject is the need of the hour.

Rural development is the inter-disciplinary subject in nature, which involves various disciplines of science & technology, agriculture, health, social work, economic development, human resource development, natural resources management, participatory technology, demography, statistics, finance, rural industries and so on. Rural development is an important discipline, which may be seen both as an ideology and a practice. It means planned change by public agencies based outside the rural areas such as the national government and International organizations. It may also be the bringing of the countryside into an active state, as well as the transformation of the nature of the country side into something more superior in terms of activities.

According to the World Bank, Rural Development must be clearly designed to increase production. It recognizes that improved food supplies and nutrition, together with basic services, such as health and education, not only directly improve the physical well-being and quality of life of the rural poor, but it can also indirectly enhance their productivity and their ability for their promotion, which they can contribute to the national building process, by empowering the downtrodden. Rural Development ensures the modernization of the rural society and the transition from its traditional isolation to integration with the national economy. It is concerned with increased agricultural production for urban and international markets. This is essential so as to generate foreign exchange, and to attract revenue to finance public and private consumption and investment. In order to encourage increased production, rural development may offer a package of inputs and welfare services for the rural masses. Such inputs and welfare services include physical inputs (such as the provision of feeder roads, water and electrification), social inputs (namely health and educational facilities) and institutional inputs such as credit facilities, agricultural research facilities and rural expansion services among others. Rural development implies economic betterment of people as well as greater social transformation. Increased participation of people in the rural development process, decentralization of planning, better enforcement of land reforms and greater access to credit and inputs go a long way in providing the rural people with better prospects for economic development. Improvements in health, education, drinking water,

energy supply, sanitation and housing coupled with attitudinal changes also facilitate their social development.

Academic Institutions across the Nation offering courses in RD

There are many universities and research institute which already are in fray to establish Rural Development as discipline. Acharya Nagarjuna University, Nagarajunagar, (AP), Alagappa University, Karaikudi, Tamilnadu, Annamalai University, Annamalai Nagar, Tamilnadu, Arul Anandar College Karumathur, Madurai, Tamilnadu, Bangalore University, Trichirapalli, Dr. BR Ambedkar University Srikakulam, Andhra Pradesh, Gandhigram Rural University, Gandhigram, Dindigul district, Tamilnadu, Sri Krishnadevaraya University, Anandhapuram (A.P), Gujrat Vidyapeeth, Ahemdabad, Hemachandracharya North Gujarat University Patan, Gujarat, IIT Delhi, IIT Kharagpur, IIT Mumbai, Indira Gandhi National Open University, (IGNOU) New Delhi, Institute of Rural Management, Management Anand, Gujarat, Mahatma Gandhi Chitrkoot Gramodya Viswavidhyalaya, Satna, Madhya Pradesh, Mahatma Gandhi Kashi Vidyapith, Vidyapith Road, Varanasi (UP), Nalanda Open University Patna, Bihar, National Institute of Rural Management Development & Panchayat Raj Hyderabad, Patna University Patna, Bihar, PMT College Usilampatti, Madurai district, Tamilnadu, Ranchi University, Shahid Chowk, Jharkhand, Rani Durgavathi University Saraswathi Vihar, Jabalpur, Shri Venkateswara Uiversity, Thirupathi, (AP), Solapur University Solapur Maharashtra, Swami Vivekanand University Sagar, Madhya Pradesh, Tata Institute of Social Sciences (TISS), University of Kalyani, Naida West Bengal, University of Lucknow Lucknow, (UP), Vikram University Ujjain, Madhya Pradesh, Xaviour Institute of Rural Management, Jaipur and Department of Interdisciplinary Department of Himachal Pradesh University, Shimla.

Nomenclature of Rural Development courses

These universities and educational institution are offering many academic courses with different nomenclature such as MRS (Master of Rural Studies) (2 Years Programme for Undergraduates) MRS (Master of Rural Studies 5 Years Integrated Programme for +2/HSC Students) M. Phil (Rural Studies—one Year) Ph. D (Rural Studies), One year Diploma Courses i.e. Post-Graduate Diploma in Rural Development, MSW (Rural Development), MBA-Rural Management and MBA-Rural Development.

The rural development and rural development schemes have paramount importance as has discussed in its introductory part in this continuity it is important to have link between the educational institutions and the public. The courses taught in the academic institutions must have link with the society at large and in this direction rural development as an academic programme is

needed. The university and other institution offering courses in rural development have great responsibility to provide exposure to their students and also explore the avenues for placements.

Placement Opportunities for the Rural Development Professionals: Rural Development is an area required interdisciplinary and multidisciplinary approach in planning and implementation with RD oriented human resource. The introduction and strengthening of academic courses of RD can opens new avenues to its professionals for working with ministries including RD, government department, technical institutions, non-government organisation, public sector undertakings, private companies and MNCs and the rural communities. To have the networking with all mentioned entities the responsibilities of the courses offering institutes are immense to establish good academic or professional reputation with these organisations and always making efforts to sign memorandum of undertakings (MOUs). So that theses organisation whether government departments or PSUs, NGOs and private organisation could provide placement opportunities to the outgoing students as RD professionals.

Rural Development Department: There are more 2.5 lakh gram panchayats in the India and each gram panchayat manages crore of rupees projects and programme annually at the gram panchayat levels. A RD professional having MBA/Post Graduate qualification can handle all the developmental schemes at grassroot level.

Rural Development Fellows/Young Professionals: There are 4120 MLAs in 31 State Legislative Assemblies (including Delhi and Pondicherry) and 545 Lok Sabha members, 275 Rajya Sabha members in India which constitutes around 5000 representatives. Out which around 4000 representatives belong to rural India and have their special grants to be allotted for the development of the constituencies they belong to. Apart from this amount they have to plan or ensure development and make timely budgetary expenditure on different projects. Here an RD degree holder can assist the public representative (MLAs/MPs) in the role of Constituencies Development Fellow or Rural Development Fellow at least for five years. Another opportunity for the YP will be at District Rural Development Agency (DRDA) and State Institute for Rural Development (SIRD) levels.

Opportunity to work with the non-government organisation: There number of non-government organisation working in various field of rural development e.g. education, health, sanitation and hygiene, agriculture, horticulture, good governance, general awareness and they are successful to attract national and international funding but they are depended for consultancy on outside expert living in metro cities. The rural development professional or the graduated in

rural development from the academic institution can explore their career in these NGOs by demonstrating their competence in project formulation and implementation.

Opportunity to work with the village community directly: the educational institution offering these courses can give the exposure to their students by inserting field exposure e.g. annually two weeks or for certain period by camping at village level and conducting rural appraisal, research studies and ultimately generating data base. This will have varied impact like students will have rural society feel, institution data base and villagers will have a sense of associations.

Exploring CSR in Rural Development: Due to Company Act-2013 in Section 135 many companies have obligation to invest 2 per cent its annual profit under various corporate social responsibility activities and many activities are rural area prone. The rural development professional of fresh graduates in rural development can explore their career in field of CSR in Rural Development. The students graduating in rural development could get opportunities in CSR, the academic programme offering institute shall have to include 'CSR in Rural Development' a module in its programme. In all state at least one academic institute can take the lead to create a CSR Hub in the pattern of TISS and then keep this hub active by conducting seminars, conferences, workshops and other research activities in which students can have ample exposure.

Opportunities to establish THINK TANK to state Governments: There are immense opportunities to establish a THINK TANK institution to the state rural development and Panchayati Raj. These two departments are very important and available in all the states handling hundreds of types of rural development schemes and could be helpful if there is at least one institute in the state available to work as think tank. These institute can conduct research studies, give expert suggestion, provide competent and quality human resource to these two departments specifically and other likeminded non-government organisations.

Other Scope for expansions: The rural development being an important field, the possibility can be explored to start under graduate courses in the degree colleges and in that Continuity University grant commission can think of introducing NET in Rural Development. Then students undertaking two years of postgraduate degree courses as MBA-Rural Development, MBA-Rural Management, Master in Rural Development and MSW in Rural Development can explore their career in pure academics.

Exploring village/ panchayat adoption programme by the Institution itself: The institutions offering rural development courses can think of village or panchayat adoptions programmes. The village or panchayat adoption programme can provide practical exposures to the students and concerned faculty.

CONCLUSION

The prime motive of the department of rural development is to ensure the implementation of its schemes effectively at the grassroots level and provide its benefits to the true beneficiaries' i.e. rural populations. Other motive of the department is to remove the taboo of poverty by reaching to the poorest of poor of the country and bring out the rural population from the clutches of the poverty. To achieve is daunting objective the effective implementation and management of rural development schemes is important for which it needs qualified and competent rural development professionals. The objective can be fulfilled by the contribution of the academic institutions by offering courses in rural development with multidisciplinary approach as few institutions across the nation are already doing its job. Another challenge is to provide or explore the opportunities of placement to the students undertaking these challenging academic courses. The efforts to work in collaboration must be explored by the academic institutions who are offering these courses. They should make effort to create its institute a think tank in real sense by demonstrating the research and teaching skills but updating their course curriculum as per the requirement in the field.

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Stand Up India: Reengineering Growth of Weaker Sections of Indian Society

Mayank Sharma and Yashwant Gupta

Abstract

THIS RESEARCH paper highlights the importance of the role of the Stand Up India Scheme in enabling the socio-economic liberation & progress of the underprivileged sections of society in India namely SCs, STs & Women. There are a number of social and financial programmes by the government, including reservations, which are meant to help these groups in many ways. They have helped uplift them, improve their capabilities and make them independent. But the impact has been limited in the area of business. The prospective scheme endeavours to create an ecosystem which facilitates and continues to provide a supportive environment for doing business with special emphasis to the deprived sections. This can be seen as a strategic step to generate large scale employment by developing and promoting indigenous entrepreneurial spirit among these societal components. This paper shall also discuss the various organic mechanisms of the Stand Up India initiative via which the access to business networks which is essential for a sound entrepreneurial quality can be institutionalized among these underprivileged elements. Also discussed shall be the areas where further steps for improvement within the framework of the Stand Up India scheme can be undertaken so that an actual visible and qualitative transformation can take place in the business scenario of the country with regards to the above mentioned deprived sections.

Keywords: Stand Up India, Socio-economic progress, Deprived sections, Entrepreneurial independence

1. Introduction

The “Stand up India Scheme” has been launched by the Government of India to

promote entrepreneurship among Scheduled Caste/Schedule Tribe and Women for loans in the range of Rs. 10 Lakhs to Rs. 1 Crore. The Scheme is expected to benefit large number of such entrepreneurs, as it is intended to facilitate at least two such projects per bank branch (Scheduled Commercial Bank) on an average one for each category of entrepreneur. The scheme will cover almost 2.5 lakh young aspiring entrepreneurs from marginalised communities to get easy loans from 1.25 lakh bank branches in different parts of the country within a time frame of the next 36 months.

The Start-up India is different from the Stand-up India campaign. The former is related to new entrepreneurs while the latter is a proposal restricted only to SC, ST, and Women entrepreneurs. The Stand-up India is component of Start-up India, Stand up India slogan was anchored by Department of Financial Services (DFS) to encourage greenfield enterprises by Women and SC/ST entrepreneurs. These are the most underprivileged groups that find it hardest to get financial backing or to raise resources for any venture they want to set up or pursue. This enterprise may be in manufacturing, services or the trading sector. The easy availability of loans will make a big difference to them.

The initiative will also encourage young minds to come up with innovative ideas and create job opportunities in the country. The initiative will allow and enable under-served to utilize the institutional credits in the form of bank loans. The funds allocated under the scheme will help borrowers start their ventures and grow the economy of country. Other than the financial aid, the government will also help eliminate the legal and operational hurdles for entrepreneurs under the scheme. The recipients of the Stand Up India scheme will also be covered under the Pradhan Matri Jan Dhan Yojna, Pradhan Mantri Suraksha Yojana, Pradhan Mantri Jivan Jyoti Yojana, Atal Pension Yojana schemes and eight other Govt. of India schemes.

2. Objectives

According to the Union Ministry of Finance, of the 57.7 million MSMEs in India, 62% belonged to ST, SC and Women entrepreneurs. However, they are mostly confined to manufacturing sectors and many large scale ventures are still closed for them. The Stand Up India scheme seeks to correct these discrepancies through the following aims:-

- The Stand Up India initiative aims to support 2.5 lakh Women and SC/ST entrepreneurs to set up and grow their businesses.
- The government has set a target sanction 2.5 lakh loans in a time frame of 36 months.
- The scheme will provide 100% relaxation in income tax for startups for

first 3 years.

- The loan application process and licensing process is to be automated for quick actions and faster approval.
- The government will launch dedicated website and application to help interested candidates.
- Financial aid amount for the startups will vary between Rs. 10 Lakh to 1 Crore.
- 80% rebate on the patent application fee will be refunded to the entrepreneurs.
- The exit process only takes 90 days to wind up the entire process.
- More than 5 lakh schools across the country will be covered under the program to promote innovation core programs.
- A credit guarantee mechanism would also be set up through the National Credit Guarantee Trustee Company (NCGTC) to support the scheme. While loans are to be extended by banks, a credit guarantee fund of Rs 5,000 crore for providing guarantee cover for such loans has been approved. Provision of initial capital of Rs 500 crores to the corpus in FY 2016-17 has been made.
- Initially, the Government of India has approved Rs. 10,000 Crores for the scheme through the Small Industries Development Bank of India (SIDBI). The funds will be allocated to the under privileged to encourage the innovative ideas.

3. Loans Scheme for Women Entrepreneurs: Support & Knowledge

Women entrepreneurs in India find it difficult to get funding for their startups. Global Entrepreneurship and Development Institute (GEDi) published a global ranking that looked at how female entrepreneurs fare in the world. India was placed in the last five among the 30 countries that were analysed. It stated that about 73% women entrepreneurs failed to get funding from Venture Capitalists (VC) while 68% failed to get bank loans to initialize their business. All that is set to change once the Stand Up India scheme comes into action.

A research done by the Indian Statistical Institute in 2014 indicates that about 54% women have no idea what a startup should work like or how to work on problem solving. About 58% women need to be educated about entrepreneurial resources and techniques. However, provisions under the scheme also include support for both women and SC/ST borrowers, all the way from pre-loan stage to operating stage. Besides familiarising them with bank guidelines and terminology, they will also know about registering online and how to use e-

5. Responsibilities of Stakeholders: Connectivity & Communication Schema

STAKEHOLDERS	SIDBI	NABARD	DLCC	BANK BRANCH	BORROWER	LDMs
FUNCTIONS	To operate and maintain the Stand-Up India web portal	Organize events, as frequently as necessary and at least once in each quarter, for experience sharing etc. amongst stakeholders.	Grievance redressal at district level	Help potential borrowers in accessing the portal	Access the portal or visit a bank branch and answer a short set of questions	Monitor progress of cases
	Arrange for handholding support for Trainee Borrowers	Training of Trainers, LDMs, Bank officers for Stand-Up India	Assist in resolving issues, if any, relating to public utility services and work space for potential borrowers	Process loan applications received online or in person	Arrange/ provide requisite documentation as required by the bank branch	Serve as contact point for SIDBI/NABARD for easing bottlenecks
	Liaise with banks for follow up in potential cases through LDM/SLBC	Arrange for handholding support for trainee borrowers		Banks to put in place an internal mechanism for monitoring of scheme performance	Attend quarterly events on experience sharing, best practices, problem solving etc.	Sensitize bankers on potential borrowers.
	Coordinate with LDM for easing bottlenecks	Liaise with banks for follow up in potential cases through the LDM		Process loans within the timeframe as stipulated in Code of Bank's Commitment to SME borrower	Set up and run the unit with due diligence.	Follow up with concerned regional/zonal office of the respective bank to ensure timely processing/ sanction of loans as per time frame specified in Code of Bank's Commitment to Micro and Small Enterprises.

Participate in Stand-Up events organized by NABARD.	Assist the SLBC and DLCC in reviews and monitoring				
DLCC - District Level Credit Committee LDM - Lead District Manager NABARD - National Bank for Agriculture & Rural Development SLBC - State Level Bank Committee SIDBI - Small Industries Development Bank of India					

6. Benefits for the National Economy

The basic aim of the initiative is to provide expertise and encourage new entrepreneurs so as to minimize unemployment. There are different benefits for angel investor, incubator and consultant. If one is an angel investor then Stand Up India gives them the right platform where they get professional advice, time, and knowledge about laws and also they would be there to aid budding entrepreneurs for two years during the initial phase of startup. If one is an Incubator then the initiative provides them with the right coaching and knowledge. They can guide the budding entrepreneurs with expertise knowledge to shape your ideas and thoughts into a definite shape and structure. They also provide post set up aid to the consultants. For mature stage social ventures they also provide help for them to grow and expand in their domain. Moreover, another benefit for the entrepreneurs is that they do not have to worry much about how to pay back the amount that they have taken for the loan. They need to pay back all that money in a span of seven years, which does not lay any stress of repayment on them. Further, it is the decision of that person to decide what amount needs to be paid back per month. This initiative is to provide financial aid to the SCs/STs and women who are deprived from getting enough financial aid for startup new ventures. As a result of this many innovative ideas are not reaped. Hence for the economy to grow and employment to grow, this initiative is very important. Moreover, a new shape of the consumer market can be obtained with the help of this initiative.

Further, with Start Up India there will be more job opportunities created within the country and the total income will increase. Hence jobs can be provided to all those within the country and also the young talent and ideas can be preserved within the nation. They do not have to seek for jobs outside the country.

7. Future Opportunities & Scope for Stand Up India

Stand Up India is not a standalone government initiative but it shall endeavour to serve as the intricate linkage for the following government schemes while dealing with the institutionalization & disbursement of government funds for the upliftment of the weaker sections in various entrepreneurial sectors:-

- The Department of Social Justice and Empowerment has set up the Scheme of 'Venture Capital Fund for Scheduled Castes' in February 2014 in order to promote entrepreneurship among the Scheduled Castes and to provide concessional finance to them.
- The National Scheduled Castes Finance and Development Corporation (NSFDC) provides concessional finance for setting up of self-employment projects and skill-training grants to unemployed Scheduled Caste persons living far below the poverty Line.
- The Dalit Indian Chamber of Commerce & Industry (DICCI) operates to bring together all SC/ST entrepreneurs under one umbrella, and to promote entrepreneurship among SC/ST as a solution to their socio-economic problems.
- MUDRA Bank gives lending priority to SC/ST for extending credit facility.
- Govt. of India has launched Green Business Scheme 2015, it envisages financial assistance to SCs/STs & women to initiate environmental friendly businesses.
- Procurement policy of PSUs: e.g. sourcing 3% of their procurement from SC/ST enterprises and financial inclusion via Jan Dhan Yojana.

According to a Union Ministry of Commerce Report, the aim of the initiative is to increase the contribution of SCs/STs & women by 1.28% from their current share of 17% in the Indian GDP. This can be achieved realistically by the development of a proper coordination mechanism between the MUDRA Banks & DSJE as they can ensure plugging of leakages & a proper profiling system & progress reporting system of the various beneficiaries.

8. Limitations

There are a few drawbacks to the Stand Up India policy. According to the Nasscom Startup Report 2014, India is aided with more than \$ 2 billion funds for more than 3,000 startups and the count is estimated to go as high as 11,000 in five years. Moreover, in today's world the start-ups surely owe their launch to the success of Indian technology and software. Also only by providing financial aid to the start-ups through the banks will be of no help for the growth of the society as things might fall at the wrong places. This initiative will only benefit fresh ideas or startups, and not business that are already running. Also the business owners need to ensure that they operate in accordance with the guidelines of the scheme and follow the law. Further the scheme also terms that any business idea with an innovative product or services will be encouraged so that a value is created for the customers.

9. Conclusion

Studies have shown that India is way behind most countries in encouraging women entrepreneurs. Society benefits more when the condition of those from the weaker sections improves than when others move up the ladder. SC and ST entrepreneurs are very few, though the numbers are increasing. Stand Up India will hopefully ensure that no aspiring entrepreneur from these sections will be short of funds for their business. Besides finance, the programme will also offer guidance and support services which are important for the success of new ventures undertaken by persons who may be lacking in experience. Effective safeguards have to be put in place if the programme has to succeed and benefit the targeted sections, the economy and the society.

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Impact of Financial Inclusion in the Socio-Economic Development of Women: A Study of Select SHGs

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Abstract

FINANCIAL inclusion has become an indispensable tool to the Indian economy over the past few years. In recent years financial inclusion has been given top priority as financial and economic growth are independent. Financial inclusion aims at providing banking and financial services to all people in fair transparent and equitable manner at affordable cost. All round development and harmonious growth of a nation is possible only when women are considered as equal partners in the developmental process. Since the 1970s, the idea and practice of self help have developed worldwide as a major social phenomenon for poverty alleviation and women empowerment. Self Help Groups (SHGs) are considered as one of the means to empower women by providing easy access to credit. It is believed that easy access to credit would enable women to participate in income generating activities by establishing microenterprises and in the process enhance wellbeing in the households. The ability to generate own income would perhaps help women to derive more power and choices related to household decision making in consumption, education and health related matters, and also open up opportunities to take part in other socio-economic activities. This paper attempts to know the impact of financial inclusion in the socio-economic development of women through SHGs. Both primary and secondary data have been used in the study. It reveals that financial inclusion increases women income, purchasing power, living standard and position in the family. It concludes that financial inclusion through SHGs is very effective tool for the development of women in particular and weaker section of the society in general.

Keyword: financial inclusion, SHGs, women, development

1.1 INTRODUCTION

In developing countries a large section of the women is vulnerable and marginalised due to lack of education, access to resources and employment opportunity. All round development and harmonious growth of a nation is possible only when women are considered as equal partners in the developmental process. Since the 1970s, the idea and practice of self help have developed worldwide as a major social phenomenon for poverty alleviation and women empowerment. Self Help Groups (SHGs) are considered as one of the means to empower women by providing easy access to credit. It is believed that easy access to credit would enable women to participate in income generating activities by establishing microenterprises and in the process enhance wellbeing in the households.

The ability to generate own income would perhaps help women to derive more power and choices related to household decision making in consumption, education and health related matters, and also open up opportunities to take part in other socio-economic activities. Micro-finance is expected to strengthen rural-urban employment through generation of new business opportunities, self-employment and by encouraging wage labour and self-help groups (SHGs) which will reduce migration and accelerate the rural development. The need of micro-finance arises because the rural requires resources of finance for poverty alleviation, procurement of agricultural and farm inputs. Mere high rate of growth in Gross Domestic Products (GDP) would have little meaning to poor unless there is a visible improvement in their income level, standard of living and working conditions.

With the influx of open economy on 24th July, 1991 government of India has given more stress on expanding out reach of the banking sector to the rural poor. Micro-finance has been recognised as a cost effective device for providing financial services to unreached poor propounding not only meeting the financial needs of rural poor women, but also strengthening collective self help capabilities of poor leading to their empowerment.

1.2 REVIEW OF LITERATURE

Sarangi (2003) concluded that SHGs is also a viable organised set up to disburse microcredit to the rural women and encourages them to enter into entrepreneurial activities. **Panday (2006)** observed that microfinance in India has risen due to failure of the formal banking system in meeting the credit needs of millions of rural and urban people like micro entrepreneurs, low income households etc. **Gupta (2008)** observed that SHGs have cent percent repayment of loans to banks, appraising the credit facilities savings to the poor in rural India thereby microfinance continues to the world's largest micro finance programme. It was

suggested that there is need to stress on extensive awareness compaigngain, skill development, training programmes and coordination between banks and SHGs. **Jyoti (2010)** concluded that the self help groups contribute substantially in pushing the conditions of the female population up and poverty eradication as well. **Gaonkar (2010)** concluded that there are many benefits due to micro finance towards poverty alleviation and it was suggested that more effective steps should be taken by the government in the training of SHG members to make the micro-financing more meaningful. **Fredrick and Kannan (2012)** revealed the fact that socially excluded classes (Schedule Caste women) have been reached out successfully by the microfinance SHG-Bank linkage programme to the under privileged women in Mahurais District of Tamil Nadu. **Kumar (2013)** concluded that if the women access to microfinance loans, then they definitely would have been economically independent. **Rasna and Singla (2015)** concluded that SHGs is one of the effective poverty alleviation tool in rural areas as it has its positive impact on the lives of the women both economically and socially. **Selvi and Shanmughun (2016)** suggested that it is necessary to empower more and more women in social, cultural, economic, political and legal matters for the betterment of the nation. **Tamilazhaki and P.K.Amasthi (2018)** observed that foremost problems of SHGs were lack of risk bearing capacity, low income generation and poor infrastructural facilities. **Sandhya and Ranjini (2018)** observed that women through SHGs are increasingly becoming economically independent and thereby bring stability in their personal income.

1.3 NEED OF THE STUDY

Economic development plays an important role in the development and growth of any society. The importance of promoting women to engage in economic activities is being increasingly realised in all developing countries to empower women by bringing them into the mainstream of development and improving their economic status and also to produce new opportunities by way of income generation, self employment and entrepreneurship.

1.4 SCOPE OF THE STUDY

The present study aims to evaluate the realities and challenges of women empowerment through micro finance and self help groups from the period 2004 to 2018. It mainly focussed on development of women through financial inclusion in India. Women development is closely associated with national development. Since women constitute half of the population account for second largest group of potential entrepreneurs in India.

1.5 RESEARCH METHODOLOGY

The present study is descriptive as well as exploratory in nature. Both primary and secondary data have been used to study the objectives. Primary data has been collected from a sample of 540 members of self help groups through multistage sampling. Questionnaire was prepared for the collection of data. To meet the objectives of the study, a five point likert scale has been developed for certain identifying variables. These statements on five point scale are as i.e.,(1) Strongly agree (2) agree (3) neutral (4) disagree (5) strongly disagree. On the basis of responses from members, factor analysis has been applied to extract the factors from observed variables which have been found significant as far as women empowerment through financial inclusion is concerned.

1.6 OBJECTIVES OF THE STUDY

- To study the demographic profile of members of SHGs.
- To analyse the impact of financial inclusion in the socio-economic development of women.

1.7 RESULTS AND DISCUSSIONS

Demographic Profile of Self Help Groups Members:

The various variables that have been taken for analysis of members profile are area, age, education and income.

Age-Wise distribution of SHGs Members

The members of self help groups covered in the sample belong to different age groups. An attempt has been made in the table-1.1and figure-1.1 to present a clear and independent picture of the age wise distribution of the respondents.

Age (years)	Frequency	Percentage
18-35	181	33.5
35-45	172	31.9
Above 45	187	34.6
Total	540	100.0

Figure-1.1:Age-Wise Distribution of SHGs Members

Source: Data collected through Questionnaire.

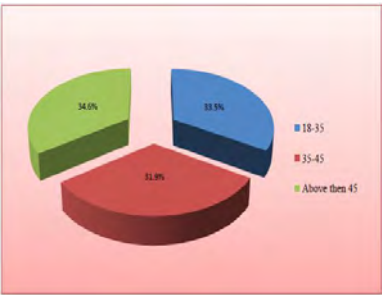


Table-1.1-Age-Wise Distribution of SHGs Members

It is observed that out of 540 members, 187(34.6%) belong to the age group of above 45 years. The respondents falling in the age group of 18-35 years are younger comprise 33.5% followed by 35-45 years of age (31.9%). Hence, it can be said that percentage of members are highest in the case of above 45 years and lowest in the case of 34-45.

Income-Wise Distribution of SHGs

Since the financial status of the family has an important role to play in terms of level of participation in SHG. An attempt has been made to collect the information on yearly income statistics of the respondents selected for the study. They have grouped into three categories based on their annual income ranges from less than 30,000, 30,000-60,000 and above than 60,000.

Table-1.2

Annual Income-Wise Distribution of SHGs Members

Annual Income (Rs)	Frequency	Percentage
Less than 30,000	199	36.9
30,000-60,000	196	36.3
More than 60,000	145	26.9
Total	540	100.0

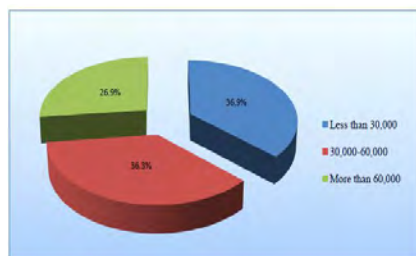


Figure-1.2:

Income-Wise Distribution of SHGs Members.

Source: Data collected through Questionnaire

The table shows that 199 (36.9%) members have less than Rs 30,000 annual incomes, 196(36.3%) members have an annual income between Rs 30,000-60,000 and 145(26.9%) members having annual income more than Rs 60,000. Hence, it can be said that percentage of members of SHGs members who have annual income less than Rs 30,000 is highest, whereas percentage of members having annual income more than Rs 60,000 is lowest.

1.1 Caste-Wise Distribution of SHGs Members

Caste determines social prestige and is also associated with different types of social practices. It cannot be, however, denied that in modern society a greater importance is being given to economic standing.

Table-1.3

Category-Wise Distribution of SHGs Members

Category	Frequency	Percentage
General	205	38.0
SC	233	43.1
OBC	102	18.9
Total	540	100.0



Figure-1.3:

Category-Wise Distribution of SHGs Members.

Source: Data Collected through Questionnaire.

It is observed from the table-1.3 and figure-1.3 that 233(43.1%) of the respondents fall under the schedule caste category and 38.0 percent in general category, while 18.9 percent represents the OBC category who are participating in self help groups. Therefore, it is a matter of great satisfaction that poor people, irrespective of their castes and religions, are coming together and forming self help groups for mutual help.

1.2 Educational Background-Wise Distribution of SHGs Members

Educational background plays a great role in analysing the demographic profile of people. Level of education is another factor that contributes to the growth of SHGs. Generally, persons with higher education search for job and seldom pursue self employed activities. SHG is by nature a self employed activity.

Education	Frequency	Percentage
Primary	156	28.9
Elementary	102	18.9
Matriculate	117	21.7
Intermediate	108	20.0
Graduates and Above	57	10.6
Total	540	100.0

Table: 1.4
Educational Background-
Wise Distribution of SHGs Members

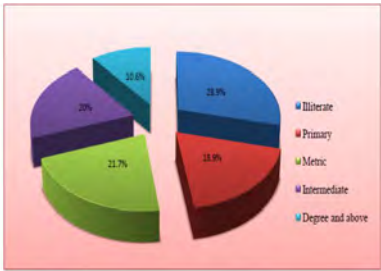


Figure-1.4: Educational Background-
Wise Distribution of SHGs Members.

Source: Data Collected through Questionnaire.

Table-1.4 and figure-1.4 show the distribution of SHGs members according to their education in which 156 (28.9%) are up to primary level followed by 117 (21.7%) matriculate, 108 (20.0%) intermediate, 102(18.9%) up to elementary level and 57(10.6%) graduates and above. On the basis of above table, it can be said that respondents below metric have been found more concerned to join SHGs. However, a good proportion of sample respondents have been found graduate and post graduate which implies that all women want economic freedom irrespective of their educational background.

2.1 Impact of Financial Inclusion on the Empowerment of Women: A Descriptive Statistical Analysis.

Table-1.6 explains the descriptive statistics for the women empowerment through financial inclusion. The table shows the values of mean, standard deviation, skewness and kurtosis for twenty five variables. The table depicts that the mean value is highest i.e., 3.73, 3.60 and 3.56 respectively for economic self dependence, ability and involvement in decision making and access to micro finance as compared to other variables. Therefore, it can be said that these variables are the most important variables which are supportive for the upliftment of women through financial inclusion.

Table-1.6: Analysis of Factors Contributing towards Empowerment of Women

S.No	Statements	N	Min.	Max.	Mean	Std. deviation	Skewness	kurtosis
1	Access to microfinance	540	1	5	3.56	1.205	-0.507	-0.659
2	Increase in income	540	1	5	3.43	1.007	-0.435	-0.290
3	Ability to make decision regarding the utilisation of money/credit	540	1	5	3.39	1.072	-0.302	-0.469
4	Poverty alleviation	540	1	5	3.23	1.076	-0.139	-0.700
5	Increase in savings	540	1	5	3.24	1.126	-0.328	-0.687
6	Political awareness	540	1	5	3.22	1.031	-0.176	-0.395
7	Participation in political activity	540	1	5	3.12	1.089	-0.252	-0.325
8	Membership in local bodies	540	1	5	3.08	1.105	-0.140	-0.641
9	Position of power	540	1	5	3.53	1.078	-0.465	-0.279
10	Increase in mobility	540	1	5	3.17	1.122	-0.275	-0.525
11	Participation in the help of others	540	1	5	3.52	1.010	-0.585	0.053
12	Recognition in society	540	1	5	3.40	1.118	-0.382	-0.566
13	Participation in social activities	540	1	5	3.48	1.090	-0.329	-0.544
14	Decrease in cases of atrocities against women in the village	540	1	5	3.41	1.119	-0.336	-0.598
15	Participation in village level politics and gram sabha meetings	540	1	5	3.41	1.153	-0.383	-0.538
16	Ability and involvement in decision making	540	1	5	3.60	.983	-0.422	-0.347
17	Economic self dependence	540	1	5	3.73	1.015	-0.605	-0.017
18	Improvement in skills and abilities	540	1	5	3.43	1.018	-0.215	-0.632
19	Gender equality	540	1	5	3.41	1.092	-0.365	-0.451
20	Livelihood choices	540	1	5	3.45	.968	-0.473	-0.207
21	Education to children	540	1	5	3.28	1.109	-0.278	-0.527
22	Medical care to family members	540	1	5	3.28	1.078	-0.247	-0.478
23	Ability to provide nutritious food	540	1	5	3.30	1.106	-0.139	-0.811
24	Improvement in basic facilities and amenities	540	1	5	3.55	1.104	-0.460	-0.429
25	Improvement in family relationship	540	1	5	3.26	1.124	0.003	-0.844

Further, the calculated values of standard deviation expose high variation in the factors affecting the empowerment of women. In case of skewness, most values are concentrated on the right of the mean with extreme value to the right, so it can be said that distribution is negatively skewed. In case of kurtosis the calculated values are less than zero which reveals platykurtic distributions for the responses given by respondents. Further, the mean scores for all variables have been found more than three which reveals more than moderate effect on socio-economic development of women through financial inclusion.

2.2 Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity:

The Kaiser-Meyer- Olkin (KMO) measures the sampling adequacy which should be greater than 0.5 for a satisfactory factor analysis to proceed. Table-1.7 shows that the Kaiser-Meyer-Olkin measure is 0.880, which implies that the sample is adequate and factor analysis is appropriate for the data.

Table-1.7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.880
Bartlett's Test of Sphericity:	Approx. Chi-square	8916.918
	df	300
	Sig.	0.000

Further, the table shows that Bartlett's test of Sphericity is significant i.e., its associated probability is less than 0.05. In fact, it is actually 0.000 i.e., the significance level is small enough to reject the null hypothesis. This means that correlation matrix is not an identity matrix.

2.3 Total Variance

Table-1.8 explains the total variance. Table shows all the factors extractable from the analysis along with their eigenvalues, the percent of variance attributable to each factor, the cumulative variance of the factor and the previous factors.

Table-1.8: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sum of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	9.443	37.774	37.774	9.443	37.774	37.774	4.251	17.005	17.005
2	2.179	8.716	46.490	2.179	8.716	46.490	3.728	14.912	31.918
3	2.165	8.660	55.150	2.165	8.660	55.150	3.320	13.282	45.199
4	1.415	5.662	60.811	1.415	5.662	60.811	2.834	11.335	56.534
5	1.181	4.724	65.536	1.181	4.724	65.536	2.250	9.001	65.536
6	.969	3.877	69.413						
7	.923	3.692	73.105						
8	.838	3.351	76.455						
9	.754	3.017	79.473						
10	.687	2.747	82.220						
11	.562	2.246	84.466						
12	.527	2.109	86.575						
13	.500	2.000	88.575						
14	.414	1.656	90.231						
15	.397	1.589	91.820						
16	.341	1.365	93.185						
17	.284	1.138	94.322						

18	.262	1.048	95.371						
19	.222	.886	96.257						
20	.213	.853	97.110						
21	.181	.723	97.833						
22	.160	.640	98.474						
23	.147	.589	99.063						
24	.128	.512	99.574						
25	.106	.426	100.000						

Extraction Method: Principal Component Analysis.

The table reveals that, the first factor accounts for 37.774 % of the variance, the second factor 8.716 %, third factor 8.660%, fourth factor 5.662% and the fifth factor 4.724%. All the remaining factors are not significant.

2.4 Scree Plot

Figure-1.5 shows the scree plot, it is a graph of the eigenvalues against all the factors. The graph is useful for determining how many factors to retain.

Further, the graph depicts that the curve begins to flatten between factors four and five. Therefore, only five factors have been retained.

2.5 Component Matrix

Table-1.9 shows the component matrix results.

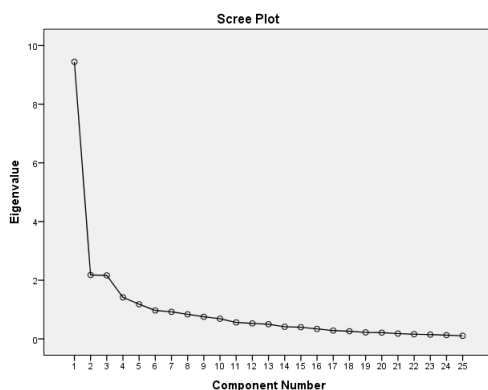


Figure-1.5: Scree Plot

Table-1.9: Component Matrix

	Component				
	1	2	3	4	5
Access to Microfinance	0.453	0.222	0.564	-0.240	-0.043
Increase in Income	0.587	0.147	0.606	-0.294	-0.048
Ability to make decision regarding the utilisation of money/credit	0.593	0.072	0.552	-0.182	-0.001
Poverty alleviation	0.623	0.046	0.381	-0.107	-0.142

Increase in savings	0.610	0.013	0.177	-0.018	-0.226
Political awareness	0.158	0.756	-0.076	0.231	0.035
Participation in political activity	0.127	0.838	-0.207	0.108	-0.158
Membership in local bodies	0.297	0.744	-0.136	0.020	-0.161
Position of power	0.583	0.138	0.088	-0.330	0.214
Increase in mobility	0.331	0.295	-0.099	0.177	0.309
Participation in the help of others	0.684	-0.001	-0.298	-0.323	0.091
Increase in social status	0.687	-0.004	-0.376	-0.263	0.059
Participation in social activities	0.728	-0.019	-0.263	-0.202	0.324
Decrease in cases of atrocities against women in the village	0.692	-0.071	-0.328	-0.196	0.335
Participation in village level politics and gram sabha meetings	0.613	0.025	-0.468	-0.227	0.075
Ability and involvement in decision making	0.710	-0.176	-0.139	0.152	-0.341
Economic self dependence	0.679	-0.170	-0.182	0.003	-0.356
Improvement in skills and abilities	.721	-0.147	-0.116	-0.013	-0.235
Gender equality	0.743	-0.144	-0.121	-0.069	-0.283
Live hood choices	0.741	-0.138	-0.059	0.146	-0.261
Education to children	0.748	-0.066	-0.009	0.477	0.036
Medical care to family members	0.773	-0.081	0.082	0.451	0.098
Ability to provide nutritious food	0.779	-0.141	0.011	0.405	0.168
Improvement in basic facilities and amenities	0.479	-0.020	0.340	0.134	0.267
Improvement in family	0.545	-0.096	0.283	0.232	0.347

Extraction Method: Principal Component Analysis

a. Five Components Extracted

The table reveals the loadings of the twenty five variables on the five factors extracted. The higher the absolute value of loading, the more the factor contributes to the variable.

2.6 Rotated Component Matrix

Table: 1.10 exhibits the results of rotated component matrix. The table reports that five factors are extracted through factor analysis i.e., personal empowerment, social empowerment, economic empowerment, family empowerment and political empowerment. The rotation matrix reduces the number of factors on which the variables under investigation have high loadings.

Table-1.10: Rotated Component Matrix

Variables	Component				
	1	2	3	4	5
1	.084	.046	.775	.089	.120
2	.168	.121	.873	.122	.048
3	.192	.113	.772	.224	.004
4	.265	.119	.621	.179	.047
5	.283	.137	.416	.153	.080
6	-.056	.007	.045	.163	.791
7	.038	.043	.004	-.074	.888
8	.132	.140	.150	-.041	.791
9	.074	.519	.464	.148	.697
10	-.036	.256	.026	.391	.336
11	.331	.720	.181	.068	.067
12	.384	.717	.097	.079	.095
13	.218	.758	.163	.308	.044
14	.217	.773	.084	.295	.003
15	.347	.714	-.017	.061	.135
16	.769	.218	.112	.206	.021
17	.735	.297	.128	.075	.003
18	.653	.343	.202	.159	-.001
19	.687	.367	.234	.102	.001
20	.705	.228	.193	.270	.035
21	.246	.154	.098	.668	.123
22	.199	.160	.184	.713	.082
23	.171	.254	.135	.716	.022
24	.069	.111	.397	.510	-.028
25	.104	.157	.322	.645	-.072

Extraction Method: Principal component analysis.

Rotation Method: Varimax with Kaiser Normalisation.

Rotation converged in 6 iterations.

Further, table reports the loading of different statements on identified five factors. Following variables are loaded on factor-1 i.e., personal empowerment includes ability and involvement in decision making, economic self dependent, improvement in skills and abilities, gender equality and livelihood choices. The variables which are loaded on factor-2, i.e., social empowerment are participation in the help of others, recognition in the society, participation in social activities, decrease in cases of atrocities against women in the village, participation in village level politics and gram sabha meetings. In the factor-3

i.e., economic empowerment are access to microfinance, increase in income, ability to make decision regarding the utilisation of money/credit, poverty alleviation and increase in savings. The factor-4 i.e., family empowerment are education to children, medical care to family members, ability to provide nutritious food, improvement in basic facilities and amenities and improvement in family relationship. The factor-5 i.e., political empowerment are political awareness, participation in political activity, membership in local bodies, position of power and mobility.

2.7 Reliability Statistics

The results of reliability statistics have been presented in table-1.11. The reliability of the construct is determined by computing the Cronbach's alpha. Cronbach's alpha coefficient value of 0.6 is considered acceptable for the exploratory purposes, 0.7 is considered adequate, and 0.8 good for confirmatory purposes.

Table-1.11: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	No of Items
0.922	0.923	25

Further, table reveals that the Cronbach alpha value based on standardized items obtained is 0.923 which shows high reliability of the scale. The overall reliability and validity of the scale as depicted by Cronbach alpha is well above 0.7, therefore it is valid to use this scale.

SUMARRY & CONCLUSION

It has been found that five factors are extracted through factor analysis, i.e., personal empowerment, social empowerment, economic empowerment, family empowerment and political empowerment through financial inclusion.

The results of a Kaiser-Meyer-Olkin measures support that factor analysis is appropriate for the data and Bartlett's test of Sphericity is significant, i.e., its associated probability is 0.000, which means that correlation matrix is not an identity matrix. The total variance table reveals that the first factor accounts for 37.774% of the variance, the second factor 8.716%, third factor 8.660%, fourth factor 5.662% and fifth factor 4.724, while all the remaining factors are not significant. Scree plot also reveals that only five factors are found significant. Further, component matrix depicts loadings of the twenty five variables on the five factors extracted.

Rotated component matrix shows that only five factors have been extracted through factor analysis i.e. personal empowerment, social empowerment, economic empowerment, family empowerment and political empowerment. Factor 1 i.e. personal empowerment comprises of five statements which are as follows: economic self dependence, ability& involvement in decision making, improvement in skills &

abilities, gender equality and livelihood choices. Factor:2 i.e., social empowerment includes five statements which are as follows: participation in the help of others, recognition in society, participation in social activities, decrease in the cases of atrocities against women in the village and participation in village level politics and gram sabha meetings. Factor: 3 i.e., economic empowerment includes five statements which are access to microfinance, increase in income, ability to make decision regarding the utilisation of money/credit, poverty alleviation and increase in savings. Factor: 4 i.e., family empowerment includes five statements which are as follow: education to children, medical care to family members, ability to provide nutritious food, improvement in basic facilities and amenities and improvement in family relationship. Factor: 5 i.e., political empowerment also includes five statements that is political awareness, participation in political activity, membership in local bodies, position of power and mobility. Cronbach alpha has been used to study the overall reliability and validity of the scale. The value shown by the test is above 0.7 which implies that the scale used in the study is valid. Finally, it is suggested that government and non-government agencies should come forward to strengthen these self help groups which ultimately empowers about half of the population of the country.

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Globalization and Challenges

Vikas Singh

GLOBALIZATION is a complex phenomenon that had far-reaching effects. Therefore globalisation has acquired many emotive connotations and become a hotly contested issue in current political discourse. At one time, globalisation is seen as an irresistible and benign force for delivering economic prosperity to people throughout the world. At the other hand, it is blamed as a source of all contemporary ills.¹ In a world in which the minds of individuals are so resolutely focused on mass-mediated images it is surprising that so much social scientific attention should have been paid to global integration by means of economics and so little to culture or consciousness.²

Generally globalisation is a process of change which brings the world into a very small space, a free place for technology for playing a predominant role in the new social order. Globalization started with relaxation of economy and economic rules so that the ideas of free market can be established. But now it has grown beyond the idea of comprehension of economy and today it should be understood through various processes and changes in culture, religion, society and politics. In this context multinationals become Global concerns, standardized time, money, and expert systems are introduced everywhere. A massive, Global exchange of people, goods, services and images takes place by means of Telecommunication and transport technology. Apart from the more rapid increase, the long-distance migration is also characterized by a wider distribution: more and more countries and regions becoming involved in network spanning the globe. Lifestyles, consumption patterns, and other forms of cultural expression are exchanged more rapidly between more and more locations. Developments of a political, ideological, religious, or cultural nature, which originally appear to connected with a specific region, culture, period, are being echoed in large parts of the world.³

The nature of globalisation is not predetermined and does not follow a given evolutionary path. Rather, it is a consequence of human actions and particular political choices. The political implications of this view are reformist; citizens and Nation-States have a role to play in resisting and regulating it, and alternative and progressive globalizations are possible. As such globalization can yield both positive and negative outcomes depending on how it is constructed.⁴ Globalisation has brought sweeping changes on the life of the individual. Today an individual's life is structured less by the past than by his/her anticipated future. Habits, custom and tradition play less of a role than they did for the previous generations. Similarly the beliefs and practices of individuals have also been changed significantly.⁵

While human lives continue to be lived in local realities, these realities are increasing being challenged and integrated into larger global networks of relationship. The forces of globalisation are taxing youth, families and education system worldwide. All social systems are predicted on the need to impart values, morals, skills, and competencies to the next generation. The lives in experiences of youth growing up today will be linked to economic realities, social processes, technological and media innovations, and cultural flows that traverse national boundaries with ever greater momentum.⁶

New hierarchies of power are evolving, particularly surrounding the newer international division of labour and through networks. States still attempt to manage the new divisions that arise between social groups, localities and sub-national regions using redistributive and welfare measures. These, however, are becoming increasingly difficult to sustain and are being reformed. There are thus winners and losers in the new global economy. The most important spatial implication of the transformationalist perspective is that the global capitalist system forges increased unevenness. This does not replicate traditional core-periphery patterns and is not territorial essence, but rather social in nature and articulated through networks.⁷ The capitalist seeks to transect national boundaries extending transportation and communication into the furthest reaches of the planet, restlessly seeking to expand markets throughout the world and to appropriate ever greater tranches of labour power. Capitalism is clearly the vehicle of economic globalisation because its particular institutions—financial markets, commodities, contractualized labour, alienable property—facilitate economic exchanges over great distances.⁸

Thus globalisation is most advanced in the areas of financial markets and organizational ideologies and least advanced in the labour market. A critical differentiating factor here appears to be mediation. Both financial markets and ideological arenas are highly 'tokenized' that is the exchanges within them are

symbolically mediated. Similarly there is considerable and increasing symbolic mediation in the arenas of trade and investment particularly in so far as services are becoming an increasing component of trade and as information and human skills become constituted as capital. At the risk of subscribing to the hacker reification, 'information wants to be free', symbolic goods cannot be contained within geographical and temporal boundaries in the way that material items can. Labour, on the other hand, remains resolutely material and largely controllable and so this market remains subject to the regulation of individual preferences.⁹

Indian society is passing through a rapid social change, induced by many international and national factors. The liberalization of Indian economy and rapid technological changes has ushered in a revolution of a sort in the life of the people. Information technologies have changed the meanings of trade and Commerce and new notions. Like E-Commerce, have begin to capture people's minds. The rise of media and communication system has considerably altered the Peoples way of looking at the external world. The domination of market economy has initiated the process of globalisation, which is cutting across the national boundaries. All these process are going to have both desirable and undesirable social consequences.¹⁰ The role of state has remained crucial in influencing the quality of education and excellence in research in sciences. What we are witnessing in India is that the state has started withdrawing from education. Ironically, in the recent economic crisis worldwide the market has not been allowed to correct the situation by the states. The private capital has been given the state support in most of the developed countries. It has become clear that free market is a myth when it comes to the issue of the survival of the private capital at the time of crisis. The present economic crisis has convincingly shown that neither the market not the state is self propelling system. Both survive and thrive on each other's support.¹¹

The rise of liberalism, deregulation and privatisation, the development of post-industrial employment structures in the west and the industrialisation of the so-called third world countries, the restructuring of the European welfare States, the growth of multiple identities, the rise of inter ethnic conflicts, the growing importance of regional and organisational networks, the fascination with regional identity, to name just a few, are in all respects at the same time causes and consequences of globalisation and localization. These will partly follow classic boundaries of region, socio-economic class, age, gender, and religion, but will also run along new lines of ethnicity and lifestyle. Because the disadvantages of this variety- lack of consensus, increasing strife over scare provisions- can often rely on more public interest than the advantages, increasing demands for integration and decreasing tolerance for variety will become significant social powers. This creates a new paradox: the growing variety of

calls up powers which hinder the pursuit of integration. Differences between nations and groups are great and their number sizeable, so common global or national culture is an illusion.¹

There is a general agreement on a widening of the gap between the developed, advanced economies and many developing countries. There is, however, no anonymity about the role played by globalisation. For example, UNCTAD blames the negative effects of globalisation for the developing countries on their being especially vulnerable to the dawn swings in global trade and finances. On the other hand, the World Bank asserts that the only way forward for these countries is to increase their participation in the globalisation process.¹³ On one of the most important aspect of the globalisation is that it connects the local with the general. Human Rights connect the individual with humanity by asserting that each individual is an instance of humanity. Another 'planetary problem' achieves this just as affectively- the issue of environmentalism that connects subjective lifestyles with the physical condition of the planet. Many inhabitants of the planet, especially those fortunate enough to be affluent are beginning to see the earth as a common home that needs to be maintained and tended if they and their individual dissidents are to have a comfortable prosperous and healthy life. A particularly globalizing aspect of this conceptualization is the view that human society cannot infinitely be extended beyond the physical limits of the earth and its constituent resources.¹⁴ A rapidly increasing population with an increasing economic growth rate also produces pollutants- heat, carbon dioxide, nuclear waste, and chemical waste, which can seriously impede its own capacity to survive. Thus the world finds itself in what may be called a population- resources trap in which a feedback system operates to exacerbate an already problematic situation. The more population increases, the more it uses up non-renewable resources and increase population. Resource shortages and pollution costs reduce international capacity to engage in sustained long-term economic growth. Yet economic growth is the engine which modernizes societies and alters traditional values about family size and age of marriage and thus a constraining effect on fertility. If these traditional orientations do not change than population will continue to increase and the cycle will begin again.¹⁵ So there is a need of proper education to be provided. A good education promotes a non parochial attitude, facilitates communication and understanding, and encourages people to broaden their knowledge and their experiences - all of which can spend up the progress of globalisation. Children need to develop the knowledge and skills to deal with issues that go beyond their countries borders and their everyday existence- such as environmental degradation, International migration, and International Security.¹⁶

The phenomenon of culture continuity has challenged the 'homogenization' hypothesis. While individual cultures are experiencing vast changes they are not becoming similar, not even look alike. Even the homogeneity both in terms of their demographic composition and cultural constitution. The so-called world culture's monoculture stance is no longer tenable. The plausible future can be seen imposed on all cultures. Cultures have their ingenuity to respond to changes and bring about new equations between the old and the new.¹⁷ The overthrow of entrenched traditional interests often requires the mobilization of new social forces into the politics, and the second key requirement of a modernizing system is the capacity to assimilate into the system the social forces which result from modernization. In many instances these will be new social grouping, that is entrepreneur or urban workers, which did not exist in traditional society.¹⁸ The nation-state is viewed as too small to cope with global economic, political and cultural flows and too large to represent effectively the need and desires of local and trans-local communities. The rise of global 'regulation' practised above the level of the state.¹⁹

The almost permanent legislation crisis that the states face has several dimensions. Perhaps most alarmingly, the state is unable to uphold the minimum requirements of formal legal rationality attributed to it. The lines between legality and un-legality, order and disorder, state and criminality, have come to be increasingly porous. Rather than an artifice, impartially superintending society, the state itself comes to be constituted by a network of powers relations between a wide range of constituents. Rather than upholding the law and enforcing it in some neutral way, state officials and actual enforcers of law selectivity intervene depending on sense of their own interest and the pressures they take themselves to be under.²⁰ So the states are always in need of more and more capital for doing developmental activities. Thus States have to take steps to generate capital and the steps which are taken by the states are mostly in the favour of the capital and the position of the labour is ignored. Because of the free flow of capital it becomes difficult for the government to carry on all the welfare activities, So the state is always in the need of international finance to attract investment. The notion of welfare state and the policy of the government are undermined by the investors, multinational companies and banks because of their less democratic nature, resulting a cut in jobs and an increase in the unemployment in the country. There is also a decrease in the credibility of the government towards the electorate. Hence, there is a need of global orientation of the states so that global problem can be solved with global co-ordination. Attempts should be made to promote social, economic and political justice through the political institutions to survive the humanity at global level for a long run.

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Water Footprints of Village Purtiala, Jawalamukhi Sub-Division, Kangra, District Himachal Pradesh.

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Abstract

Water is a transparent, tasteless, odourless, and nearly colourless chemical substance that is the main constitution of Earth's streams, lakes, and oceans, and the fluids of most living organisms. Water plays an important role in the world economy. Approximately 70% of the freshwater used by human being directly goes to agriculture purpose. India is a country of vast biological, geographic, and climatic diversity. It has total geographic area of 329 Mha. Excluding bodies of water, India's total land area is estimated at 297 Mha. The water footprint is defined as the volume of water needed for the production of goods and services consumed by the inhabitants of a country. This concept is developed in analogy to the ecological footprint. The water footprint can be divided into an internal and an external water footprint. Global water saving is created when a product that is traded has a higher virtual water content in the importing state than in the exporting state. A study to assess the water footprint, water demand and water supply in Village Purtiala subdivision Jawalamukhi district Kangra. As the people of Purtiala Village are much dependent on the water supply from IPH Jawalamukhi it naturally imposes a pressure on the local water resources and IPH Jawalamukhi. It is much clear that in last three to four years the population is increasing, the demand of water is also increasing per year. There is much stock of water to be distributed in the present era but in future the conditions may be reverse. Since not so far research has been done on "water footprints" the study is a beginning in this direction and not an end. Much more research is yet required to be done.

Keywords: Water footprints, Jawalamukhi, Kangra, Himachal Pradesh.

Introduction

The concept of the water footprint has been developed to create an indicator of water use in relation to the consumption by people. The water footprint of a

country is defined as the volume of water needed for the production of the goods and services consumed by the inhabitants of the country. The water footprint is divided into a blue, a green and a gray component. The blue component refers to the evaporation of groundwater and surface water during the production of a commodity, the green component to the evaporation of rain water for crop growth, and the gray component to the water required to dilute the water pollution, that is caused by the production of the commodity to acceptable levels. The water footprint is defined as the volume of water needed for the production of goods and services consumed by the inhabitants of a country. This concept is developed in analogy to the ecological footprint (Wackernagel & Rees, 1996).

Water is a transparent, tasteless, odourless, and nearly colourless chemical substance that is the main constitution of Earth's streams, lakes, and oceans, and the fluids of most living organisms. It also occurs in nature as snow, glaciers, ice packs and icebergs, clouds, fog, dew, aquifers, and atmospheric humidity. It is vital for all known forms of life. On earth, 96.5% of the planet's crust water is found in seas and oceans, 1.7% in groundwater, 1.7% in glaciers and Greenland, a small fraction in other large water bodies, and 0.001% in the air as vapour, clouds, and precipitation. Only 2.5% of this water is fresh water, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products. A greater quantity of water is found in the earth's interior. Water on Earth continuously moves through the water cycle of evaporation and transpiration (evapotranspiration), and runoff, usually reaching the sea. Evaporation and transpiration contribute to the precipitation over land. Large amounts of water are also chemically combined or absorbed in hydrated minerals.

Water plays an important role in the world economy; approximately 70% of the freshwater is being used by human being directly to agriculture purpose. Also Water is an excellent solvent for a wide variety of chemical substances; as such it is widely used in industrial processes, and in cooking and washing.

Water forms the basis of all life on earth and is the primary basic foodstuff for all kinds of civilization. This is why very high standards are set for the quality of drinking water. Many regions face the dilemma of deciding whether scarce water resources should be used as drinking water or for agricultural purposes. It is easy to turn rainwater into drinking water and it also has many other uses. The same holds true for water generated from atmospheric humidity. Ground water is continuously reached through infiltration, seepage and evapotranspiration. Presently about 25 percent of the ground water is being used by man. Agriculturist use maximum amount of ground water for their agriculture. It has

been found that excessive use of ground water depletes aquifers, lowers the water table and may lead to salivation, water logging and alkalization of the soils.

India is a country of vast biological, geographic, and climatic diversity. It has total geographic area of 329 Mha., excluding bodies of water, India's total land area is estimated at 297 Mha. In India, surface flow takes place through 14 major rivers systems. Between them they share 83 per cent of the drainage basin,' account for 85 per cent of the total population of the country. In addition to major rivers, there are 44 medium and 55 minor systems. These are fast flowing and monsoon fed. The surface flow is further enlarged by addition of about 450 cubic kms of fresh water from ground water flow while, about 50 cubic kms are added to runoff from irrigated areas. Out of this surface water, flow-about same amount of water percolates down to the ground water deposits.

India that receives average annual precipitation of 4000 km^3 is immediately lost to the atmosphere, 2150 km^3 soaks into the ground, and 1150 km^3 flows as surface run –off. India is one of the few countries in the world endowed with abundant land and water resources. Average annual precipitation including snowfall over the country is 4000 billion cubic meters (BCM). The utilization of water is expected to be 784 to 843 BCM by the year 2025. Through “the present utilization level is only about 53 percent, the availability of water is highly irregular. It is not available in places of need, at times of need and required quantities.

India receives about 3 trillion M^3 of water from rainfall. This is a huge resource and perhaps largest in the world. With over one billion people, India currently has the world's second largest population. Since most of the utilizable water supply in India is used for crop production, an important criterion for the evaluation of a possible food supply strategy is the pressure on renewable water resources. At the moment there are regions in India that are determined as water scarce ,as the water availability per is capita is less than 1000m cube /yr ,which is either caused by the lack of natural water resources or a result of over exploitation of ground water resources for irrigation purpose (CGWB,1989; Bobba *et al.*,1997).

In the major parts of the country, rainfall is the only sources for water, which is available mainly during the monsoon seasons lasting for less than 3 months. Due to tropical climate and it's geographical location, the country experiences vast spatial and temporal variation in precipitation. About one –third of the country's area is drought prone.

The pressure on water resources is also increasing through the increase in water pollution caused by diffuse agricultural sources in the form of animal manure, fertilizers and pesticides. While the application of fertilizers and pesticides is

currently low compared to developed countries, the intensification of agriculture is bound to cause an increase of diffuse agricultural pollution. In order to reduce the pressure on the renewable water resources, the government considering the concept of river interlinking as the solution for water scarcity in the dries regions. This concept means that water abundant regions will provide water to water scarce regions through the connection of rivers (NWDA, 2006).

With the current water productivity in India and the food demand scenario for the year 2050, it seems inevitable for India to become an importer of virtual water (Falkenmark, 1997; Yang et al., 2003; Falkenmark & Lannerstad, 2005). This is because the average (utilizable) water availability per capita in India will drop below the minimum amount of water needed to feed a person in the near future, This means that the water scarcity is not only a local problem in India but also a national issue. Given that the total water resources are more or less fixed, neglecting possible climatic changes, the only way to reduce the national water scarcity is to reduce the water use with a constant or growing agriculture production. This means that an increase in water productivity is needed together with water saving on a local as well as national level. Global water saving is created when a product that is traded has a higher virtual water content in the importing state than in the exporting state (Chapagain & Hoekstra, 2006). This means that the water loss in the exporting state is lower than the water saving in the importing state. If the water loss as a result of trade is larger than the water saving in the importing state. If the water loss as a result of trade is larger than the water saving, there is a global loss. To get more insight on whether the water scarcity in the Indian state is caused by local consumption or by the agriculture commodities to other states or countries, the water footprints of the village Purtiala subdivision Jawalamukhi district Kangra (H.P.) is assessed in this study, by assessing the water footprint released as domestic purposes and the water scarcity in the this area.

Study Area & Methodology

Kangra district is located at 32.1° N 76.27° E. It has an average elevation of 733 meters (2404 ft). The district of Kangra extends from the Jalandhar Doab far into the southern ranges Of the Himalaya. It is a town at the confluence of the Bener and Majhi Rivers. And Beas is an important river here. Kangra district presents an intricate mosaic of mountain ranges, hills and valleys. It is primarily a hilly district, with altitudes ranging from 350m to 4880m in the hills of Dauladhar. The climate of the district varies from sub- tropical to sub-humid. Winter extends from December to February and summer extends from March to June while July to September are the rainy months. The average annual rainfall of the district is

1751mm, out of which 83% occurs during June to Sept. Snow fall is received in the higher reaches of Dhauladhar ranges. Jawalamukhi is a Shakti Peetha town and a Nagar Parishad in Kangra district in the Indian state of Himachal Pradesh. Jawalamukhi is located at 31.88 N 76.32°E. It has an average elevation of 610 meters (2,001 feet). Purtiala is a medium size village located in Jawalamukhi Tehsil of kangra district, Himachal Pradesh with total 86 families residing. The Purtiala village has population of 352 of which 170 are males while 82 are females as per Population Census 2011.

The different aspects of methodology followed regarding the selection area ,sampling design, selection, of village for detailed survey of water footprints, collection of data and the techniques employed to meet out the objectives of the study, water footprints in the village was enumerators, rural development department and Panchayat. Both primary and secondary data matrixes have been used in the preparation of this report. While published and unpublished sources are taken in account for secondary data, the primary data was generated based on spot verification, field observation, questionnaires and case studies. A preliminary field visit was made to get an idea of the water footprints in the study area. The primary data was collected on the basis of a survey schedule. The data was collected through personal observation method from the selected village in the study area. The secondary data used in the study were collected from Irrigation and Panchayat and IPH department.

Fluctuations in the rate of Demand

Average daily per capita demand = Quantity required in 12 months / $(365 \times \text{population})$

Maximum daily demand = $1.8 \times \text{average daily demand}$

These are some formulas to calculate the water demand



Fig:1,2 Village Purtiala village of Jawalamukhi sub- division of Kangra District of H.P.

Purtiala is a medium size village located in Jawalamukhi Tehsil of kangra district, Himachal Pradesh with total 86 families residing. The Purtiala village has population of 352 of which 170 are males while 82 are females as per Population Census 2011. In this village population of children with age 0-6 is 31 which makes up 8.81% of total population of village. Average Sex Ratio for the Purtiala as per census of 972. Child Sex Ratio for the Purtiala as per census is 722, lower than Himachal Pradesh average of 909. Purtiala village has higher literacy rate compared to Himachal Pradesh . In 2011, literacy rate of Purtiala village was 90.97% compared to 82.80% of Himachal Pradesh. In Purtiala Male literacy stands at 97.37% while female literacy rate was 85.21%. In Purtiala village out of total population, 205 were engaged in work activities. 33.66% of workers describe their work as Main work (Employment or Earning more than 6 months) while 66.34% were involved in Marginal activity providing livelihood for less than 6 months. Of 205 workers engaged in Main Work, 35 were cultivators (owner or co-owner) while 0 were Agriculture labourers.

Water is one of the most vital natural resources of State. The state is richly endowed with a hilly terrain having an enormous volume of water from the catchment areas of Satluj, Beas, Ravi, and Chenab rivers. As such, the state has enormous potential of water resources in the form of glaciers and rivers but ground water resources are limited. The major consumptive use of water in the State has been for irrigation. Himachal Pradesh state has a traditional, social and cultural heritage of conservation and judicious use of water that helped the people to survive over the centuries against all odds of the environment. Various water harvesting structures and techniques like baories, dug well, khatries, ponds, choes, springs, etc. were practiced to suite particular conditions. A unique system of khatries was followed in some parts of the state for harvesting/store the rain water. A variety of traditional water sources are used for domestic use in different parts of study area. Among, these, the major traditional source of drinking water are baories, dug well, khatries, ponds, choes, springs, etc. The type, size, and structure of these traditional water sources could vary with the intended use. Those meant only for drinking water are generally smaller, sometimes covered, and have steps leading down to the water. This ensures that people could only collect water manually in small quantities to meet their individual or family's needs.

Water supply in Purtiala: Water supply data under Purtiala area by IPH department and other by traditional sources and Governmental Hand pumps

Table No:- 1 Showing Data of Water from IPH deptt

SR.NO.	PARTICULARS	VILLAGE PURTIALA
1	Water requirement	20,000lts.
2	Water being supplied	16,000 lts.
3	Number of Handpumps	6 no.
4	Number of Public Taps	9 no.
5	Number of Private Taps	87 no.
6	Source of water	River Beas

Source:- IPH deptt. of Jawalamukhi.

Table No;- 2 Demand of Water

Total Population	352
Household	86
Average person per household	$352/86 = 4.09$
Demand of water	20,000lts per day
Total population	352
Per capita demand=	$20,000/352 = 56.81\text{lt}$
Demand of water=	20,000lt per day
Average of person per household	4.09
Per household demand	$20,000/4.09 = \mathbf{4,889.9\text{lts}}$

Table No;- 3 Supplied Water

Total Population =	352
Household =	86
Average of Per Person household =	$352/86 = 4.09$
Supply of water =	16,000lt per day
Total population =	352
Per capita demand =	$16,000/352 = 45.4\text{lt}$
Supply of water	16,000lt per day
Average of per person household =	4.09
Per capita demand =	$16,000/4.09 = \mathbf{3,911.9\text{lts}}$

Table No:- 4 Water Footprint Calculation**External water OR Resource Government Tap's**

Number of Household	86
Total population	352
Government water supply	16,000lt per day
Average daily per capita	Quantity supplied per day $\times$ 12 months / (365 $\times$ population)
Water supplied in one year	$16,000 \times 365 = 5840000\text{lit}$
Per capita supply	$16,000 \times 365 / 365 \times 352 = 5840000 / 128480$
Per capita supply	45.4lt

Internal Water Resource**Traditional water Resources/ Govt. Hand pumps.)**

Water consumed by local people per day	15lit. $\times$ 3 times
Average water consumed by local people =	45lt per day
3 Water vessel(15lit) used by per capita =	45lit
Water consumed by per household=	$45 \times 4.09 = 184.05$ lits
Total household =	$86 \times 184.05\text{lit.} = 15824\text{lit}$
Water consumed in one year =	$15824 \times 365\text{days} = 5775760$ lts

The total WFP is divided into an internal water resource ($\text{WFP}_i \text{ m}^3/\text{yr}$) and an external water footprint ($\text{WFP}_e \text{ m}^3/\text{yr}$) as follows;

WFP_{tot}	$\text{WFP}_e + \text{WFP}_i$
WFP_{tot}	$5840000 / 5775760$
WFP_{tot}	1.011
The total water footprints of Village Purtiala are	1.011

Water supply by IPH department to the village Purtiala region by different sources like Hand pump, public taps, private taps etc. From these sources IPH PH supply 16000 lit. water per day. (Table1) whereas demand of 86 household, 356 peoples with average of 4.09 persons pr household. They required 4879.0lit of water per day (Table: 2). Water supply to the concern village as well as less i.e. 3922.9 lit per day (Table: 3) with the average person 4.9 per household with 45 lit of water per day whereas the requirement is minimum 56 lit per day. This deficient volume of water is meet out from the other sources of water like Baories, dug wells, step wells, khatries, springs etc. For calculation of water foot print of any particular area, source of internal and external water resources should be studied. The external water resources are calculated by water supply by the govt agency to that concern village per year. In this village water supply from the external water resources is 5840000lit per year. Whereas internal water sources are those traditional water sources, from people consume water daily other then the govt taps's supply. Average water consume by the local people are 45 litres per day per household from traditional water resources. Water foot print of village Purtiala is 1.011. It reveals that people of this village are mostly depending upon traditional natural water resources. If it became dry, then there must be drought like condition will be developed. So, overcome to this scarcity problem in this area we should take care of traditional water sources.

A study to assess the water footprint, water demand and water supply in Panchyat Purtiala sub-division Jawalamukhi district Kangra is conducted in IPH Jawalamukhi. As the people of Purtiala Panchyat are much dependent on the water supply from IPH Jawalamukhi it naturally impose a pressure on the local water resources and IPH Jawalamukhi. it is much clear that in last three to four years the is population increasing , the demand of water is also increasing per year. There is much stock of water to be distributed in the present era but in future these conditions may be reverse. It is concluded that the daily water requirement is more than the available water is less in that region.

Though the piped water supply has been provided to almost every habitation, the level of service delivery is far from satisfactory besides mounting operations and maintenance cost. There is heavy misuse of water by the public residing near storage tanks and the tail-enders is the main sufferers. They hardly get few vessels of water during summer months and at that time they have no option but to bring the water from traditional water sources. Since most of the drinking sources have been polluted, people using this water suffer from water borne diseases. People have no option but are forces to bring water from traditional water sources, when there is no supply of piped water supply scheme due to power failures and disruption in pipelines. Baories, dug wells, step wells,

khatries, springs are the traditional water harvesting structures that have been used as a sources of drinking water in this region over the centuries. Sometimes in many villages these system have fallen into disuse with the spread of piped water supply. The size of catchment limits the quantity of water collected. The water demand rose many times. It is something not possible to meet with the demand of villagers from the local sources. Traditional drinking water systems have passed the test of time and are suited to the specific environment in which they have been evolved. They worked efficiently in different social, economic, demographic, and political environment. Traditional water harvesting systems definitely have more relevance in areas where water scarcity in acute or water ground water is too deep to obtain cheaply. However, in these areas a supplementary source may be necessary. Traditionally, in these areas people have developed cultural practices which encourage judicious use of water but now these practices are dying. Water conservation education needs to be encouraged.

If development of water sources has to be sustainable, equitable, and community based, traditional systems have to be rejuvenated and developed. The revival of traditional sources is necessary because these are local spot sources near the habitations, water does not have to be pumped from far off distance, no energy is required to lift water, minimum maintenance is needed and the sources can be easily cleaned and disinfected. People have a sense of belongingness to the sources. Though a vast sum of money has already been spent on piped drinking water supplies, these have not been an unequivocal success. A revival of traditional drinking water sources is essential revival of traditional systems will have to take into account the state's ecological diversity. Imposing some technology in the varied regions of the state will be unsuccessful. The relevance of each technology in its local context must be addressed. The issues involved in the revival must be ecosystem-specific and location specific. The control of these systems must lie with the people and the system must be based on the needs and capacities of the people so as to ensure their sustainability.

There is indeed a strong case for a major effort at renewing and improving the traditional local systems. This can quite easily be fitted into the employment guarantee scheme and other schemes of the land and water management.

Recommendations

- For sustainable development of water sources in sub-division Jawalamukhi the following measures are suggested;
- To meet the water demand of increasing population of sub-division Jawalamukhi, urbanization and industrialization the traditional water systems must be re examined, reinvestigated, and preserved.

- These sources of studied area must be cleaned regularly and disinfected periodically and be kept free from contamination.
- Where there are the chances of contamination particularly in baories and wells, these must be covered with roof and protected with the netted doors.
- Periodic monitoring of water quality must be checked to ensure the deterioration in their quality.
- People participation and environment education are pivotal and needs to be encouraged.
- Those who are involved in polluting/ destroying the water sources must be severely penalized and sentenced to rigorous imprisonment of six months.
- People should be encouraged to decrease the misuse of water.

Since not so far research has been done on "water footprints" the study is a beginning in this direction and not an end. Much more research is yet required to be done. The actual research is done on water footprints is by others states and countries .Multidisciplinary research on traditional water sources of the entire state is required. Deeper and wider application of the social, economical and managerial aspects the system is necessary. A wide body of realistic data of all the water sources must be monitored regularly and database needs to be developed. Water is major sources has to be sustainable, equitable, and community based traditional systems have to be rejuvenated, developed and preserved.

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The Role of Bhimrao Ramji Ambedkar in the Upliftment of the Downtrodden and his Relevance Today

Chunni Lal

Abstract

THE PRESENT paper attempts to explore Ambedkar's vision and struggle for the upliftment of the downtrodden. He had a real vision towards the upliftment of the downtrodden. His main aim was to uproot the deep-rooted social evils like caste system, injustice and poverty and to uplift the status of the downtrodden in society. He tried to transform this country from uncivilized state to civilized state by rendering his contribution to the society. By fighting against the English rulers and including his articles in the constitution he tried his best to enable downtrodden to the present day developed state. Before independence the social, economic and political conditions of downtrodden were very grim and helpless. Today, we find all round development of the disadvantaged groups in India. With the passage of time their socio-economic and political status have improved. Untouchability has been reduced today. The downtrodden have become a powerful political force in India and enjoy greater access to education and economy than ever before. They are exercising their voting rights. Their political consciousness and awareness about various political activities and participation in these activities have increased. Due to these facts now-a-days the govt. is also making various decisions relating to their rights and privileges. Efforts are still go on to remove different discriminatory practices against them in the most effective way with the guidance of Bhimrao Ramji Ambedkar.

Keywords: Upliftment, vision, downtrodden, untouchable.

Most social reformers during Ambedkar's period worked for social reforms and tried to remove social evils from the society like sati system, child marriage,

female infanticide, and imparting education to women, emphasis on widow remarriage, use of swadeshi, etc. Ambedkar, one of the visionary sons of India, did yeoman service for the upliftment of scheduled castes by carrying out a life long struggle to safeguard effectively and properly the rights of the dalits and to lead his people to live a life of honour, meaning and self-respect. His mission aimed at bringing about a radical change in the living circumstances of millions of his community condemned for many a century to live degraded and dehumanized lives, performing the most defiling, tough impure and menial works such as carrying the night soil on their head, skinning carcasses, removing the dead cattle, grave digging and graveyard keeping etc. He also worked to protect the dalits from the atrocities of the upper castes. His life is the story of a man whose name shines like a pole star in the sky of downtrodden history. Prior to the time Babasaheb Ambedkar interested himself in the politics of depressed classes, the agitation carried on by the depressed classes was confined mostly for the improvement of the social disabilities of these classes. The Montague Chelmsford reforms of 1919 provided for the first time nomination of members in certain provinces to represent the interests of the depressed classes. The right to make such nomination was given to the governors and consequently persons so nominated in several examples did not, in fact, represent the interest of the classes whom they were hoped to represent.

Kolhapur and Nagpur have had the distinctive privilege of holding a series of the depressed classes conferences under the distinguished president ship of His Highness the maharaja of Kolhapur, Shri Shahu Chhatrapati Maharaj, a liberal broad-mined maharaja. Free from age-long caste prejudices, he did his utmost to promote education among the lower classes, to fight prejudices and barriers created by the caste system and to get rid the lower classes from the callous priesthood and unjust dominance of the Brahmins. He supported and encouraged the untouchables in every possible way not only going to the extent of appointing them to the posts on his personal establishment but also granted them sanads to practice as lawyers, and took meals with them free in public. He also provided Untouchable students with free education, free lodging and boarding. The honour of being his state elephant-driver was also accorded to an Untouchable (Rattu 2017:103).

Ambedkar was not the first person who attacked Untouchability. The depressed classes mission under the resident ship of Vithal Ramji Shinde had already been moving and working in this direction. It was backed up by some of the famous leaders like M.R. Jayakar, Bipin Chandra Pal, G. Tilak, Vithal Bhai Patel and Ganesh Narayan handavarkar. Ambedkar's self-respect did not let him to maintain and appreciate the efforts of the touchable or Savarnaindu, whether it

was a Brahmin like Tilak or a Maharaja keShinde. He felt the feeling of pity and obligation inherently in their works. On the contrary, he wanted to promote the slogans of self-help and self-respect among the untouchables. He did not, therefore, co-operate with this situation. He separately carried on his work, depicting his point of view through his paper MookNayak by participating in Untouchables conferences. He believed in that informal type of education depressed classes got by participating in the conferences. He realized the necessity of organizing the depressed classes in such a way that they might be able to carry on effective agitation against the social injustices under which they were groaning.

Ambedkar wanted to organize the Untouchables under one banner. Therefore, he established an organization, named The Bahishkrit Hitkarini Sabha, meaning "society for the welfare of the excluded". It was established on twentieth July, 1924. The key words of the organization were given in a nut-shell as, "Educate, Agitate and organize". Ambedkar started touring Maharashtra for creating the required awakening and preparing the ground for future reforms by trying to teach the depressed classes for their upliftment and welfare lay in their education and organization, and in agitations by them, and not in just looking up to others for reforming their lot.

Ambedkar presided at the provincial depressed classes conferences held at Nipani in the Bombay presidency on 10th and 11th April, 1925. He gave the key words as "be ready for social reform" (Bharill 2015:8).

It was here that he publicly asserted that Gandhi was not giving to the Untouchability problem the stress that he was giving to Khadi propagation and Hindu-Muslim unity. Ambedkar spoke of his untouchable brethren the reasons why they behaved like quiet cows, why they did not feel, did not wonder, did not shun, and were not even aware about the wrong acts practiced on them. According to Ambedkar this was due to two reasons. They had little knowledge and wisdom and they had their own problems also to be solved within them. The work of BahishkritHitkariniSabha was progressing well. On the January 1925, a hostel was opened for the Untouchable high school boys. Apart from hostel facilities, they were also helped with clothes, books and the needed stationery. It started running efficiently. A reading room and library were provided. Thus, a beginning of providing educational facilities for the boys of depressed classes was made by the Sabha (Chandra&Mittra: 2015:101).

The Kalaram temple entry campaign (1929) was important to Ambedkar for the question of whether they belonged to the Hindu religion was to be decided by them once and for all. The temple entry campaign, although, did not produce huge reforms for the Untouchables. It had important effect in India and the

outside world. The Untouchables became extremely loyal to Ambedkar. They were increasingly driven together by common reason; a community feeling was being developed amongst them. They pointed out that the caste system could be successfully removed and deleted; a new notion could be formed to know about the predicament of India's Untouchables.

As Ambedkar got elected as a member of the Bombay legislative Council which imparted him some official standing in the community as well as further chances to ameliorate the conditions of his fellow Untouchables. For instance, Ambedkar exposed, in fact, the unseen discrimination against the Untouchables in the police forces and also tried to demolish hereditary serfdom greatly.

Two instances during the early years of Ambedkar's leadership seem to show the turning points in his philosophy—the Mahad conferences of 1927 and the battle with Gandhi over the Communal Award that was the outcome of the Round Table Conferences. However, both analyzed closely, are consistent with his pragmatic faith in parliamentary democracy and legal redress for the Untouchable grievances. Both also, it must be said to illustrate the gift Ambedkar possessed for tackling with the psychological dimension of Untouchability, the need to build pride and self-confidence.

During the first Mahad Conference, Untouchables and some non-Brahmins met at a town South of Bombay in what began as a normal conference of the Depressed Classes. A sudden impulse to test the Bole Resolution of the Bombay Legislative Assembly (which had declared all public places open to Untouchables) led the conferees to the town pond to drink water. They were met with open violence and retreated from Mahad, only to return to a second conference later in 1927. Here in historic evidence, the classic Hindu law book which explicitly condoned the practice of Untouchability, the *Manusmriti*, was burned in public, whereas Mahad is seen as the real commencement of Ambedkar's leadership of the Untouchables; Round Table Conference is seen as recognition by all of that leadership.

At this conference, it was agreed that Ambedkar ought to represent them at the Round Table Conference. At the Round Table conference held in London during 1930-32 Ambedkar played a vital role and was able to invite British and world attention to the problems of the depressed classes and other weaker sections in India. Ambedkar and Rao Bahadur Srinivasan presented the depressed classes at the Round Table Conferences impressively.

At the first Round Table Conference B. R. Ambedkar spoke on his scheme of political safeguards for the protection of the depressed classes in the future constitution of India. He demanded that in the future constitution of India, "the depressed classes should be given a fundamental right enacted in the constitution

which will declare Untouchability to be illegal for all public purposes. Secondly, this fundamental right must also invalidate and nullify all such disabilities and all such discrimination as may have been made hitherto"(Kumar 2004:109).

He asked for safeguards to guarantee the right to suitable representation in the legislature. Speaking on the subject of joint versus separate electorates, Ambedkar said, "we the depressed classes, demand a complete partition between ourselves and the Hindus...we have been called Hindus for political purposes, but we have never been acknowledged socially by the Hindus as their brethren (Kumar 2004:110).

The conference was divided into sub-committees and Ambedkar served on three sub committees. Firstly, the Minorities Sub-committee, secondly, the Provincial Constitution Sub-committee and lastly, the service sub-committee. In all these committees, Ambedkar's contributions were excellent. For the Minorities sub-committee, he drafted eight point scheme for protecting the interests of the depressed classes; for the constitution sub-committee he suggested franchise and representation of different classes; for service (Defense) sub-committee, he recommended the recruitment to the services for all Indians. After his active and alert participation in the First Round Table Conference, Ambedkar returned to India on 27th February, 1931.

At the second conference, he came into direct conflict with Gandhi. Ambedkar's public position was not at variance with Gandhi's before the conferences. His position on political rights for Untouchables, articulated most recently in testimony to the Simon Commission, urged joint electorates for both the depressed classes and the Muslims, but with adult suffrage and reserved seats, as well as some special attention to the education and employment of the depressed classes in government positions. Ambedkar changed his position to one demanding separate electorates for Untouchables, Gandhi opposed Ambedkar in London(Zelliott 2013:164).

Ambedkar's cumulative role in ensuring justice for the depressed classes had its desired influence upon the British authorities. On 17 August 1932 Prime Minister Macdonald declared the Communal Award, creating separate electorates for the depressed classes. The announcement appeared to spot the culmination of a long and bitter struggle for the adequate representation for the Untouchables in their own terms. The depressed classes had been sanctioned a distinct status.

Gandhi fasted unto death, protesting separate electorates as a device which would separate the Untouchables from Hindu society forever. As Gandhi weakened, Ambedkar capitulated, but only when some Hindu leaders assembled to pledge their help in the removal of Untouchability, and the agreement that the

Untouchables would have reserved seats in all elected bodies.

The British government had a Round Table Conference in London in November 1930 to frame the constitution for India. On 8th and 9th August the same year the All India Depressed Classes Conference was held at Nagpur. At this conference Ambedkar made his speech on India's self-Government. In his words, "A common Government is often the best instrument one can advise to mould a diverse people into nation and demand adequate safeguards of the degraded Untouchables in the constitution"(Chandra &Mittra 2015:16).

The Poona Pact established the model for reserved seats for Untouchables (soon to be called scheduled castes as they were numbered on a schedule or list for the purpose of the elections) which still exists in India's elected bodies today. It is also exemplified at the basic difference in political philosophy and tactics between Gandhi and Ambedkar. Gandhi believed that only a change of heart on the part of caste Hindus would remove Untouchability, but he also believed this was a great change. His further attempts for the Harijans people of god), a name he termed after the Poona Pact, shows this emphasis on the necessity for penance on the part of upper castes. Ambedkar, on the other hand, believed in legal redress of grievances and guarantees of rights, supported by political power on the part of the aggrieved. The Poona Pact ensured what Ambedkar most wanted-the political participation to the depressed classes and even though it might be considered as a mighty advance over the one nominated member in the Bombay Legislative assembly given to the depressed classes just over ten years earlier, Ambedkar was to look back on the Poona Pact as the beginning of his bitter quarrel with Gandhi(Zelliot 2013:164).

Subsequently, there was a dual conflict between Gandhi and Ambedkar on the issue of temple entry and the doctrine of Chaturvarnya in which they were holding diametrically opposite views. In April 1933, Ambedkar left again for England to work in the joint committee for Indian Constitution and returned in January 1934. From 1929 till 1935, the political environment was more of bitterness for Ambedkar, who was British stooge and a cheater, as he opposed Gandhi. Having been the real victim of social ostracism from the time of his childhood, Ambedkar did not deter from his decision to struggle untiringly for the social upliftment of his people. In doing so, he became the far known leader of the depressed classes as well as a national leader. The bad reaction of the caste Hindus, especially at the MaharWater tank, and the temple entry and Gandhi's attitude towards separate electorate for the depressed class would have put any leader's spirit down. But the indomitable spirit in Ambedkar did not grant him to be cowed down. He remained true to his convictions and was defiant on the issue of basic! Humans rights being denied on caste basis(Ambedkar 2017:10).

The mid thirties, however, found Ambedkar in a triumphant and stubborn mood. In 1935 he announced that he 'would not die a Hindu', and called a conference in 1936 to discuss conversion. There is no reason to ponder that Ambedkar was not sincere in his personal rejection of Hinduism. Ambedkar's dramatic rejection of Hinduism took place at a conference of 10000 depressed class people meeting at a site not far from Nasik, at the place of a five year bitter battle over the right to enter the famous Kalaram temple. The 1936 conference was well published, and Ambedkar began to receive requests to visit depressed classes in the North and in Kerala. The announcement also came as a shock to the Gandhian and Hindu leaders who had been pursuing their campaign of attempting to persuade temple committees to open their temples to the depressed classes. A pamphlet was published by Ambedkar in 1936, *Annihilation of Caste*, which stated it necessity to uproot the concept of the hereditary priesthood in order to make Hinduism more than a 'religion of rules'.

The religion he had been drawn to since boyhood, Buddhism, had no viable remnant left in India and there was little understanding of it as a living religion, even among the elite. The choice was not clear, and Ambedkar simply moved along in the political world, shelving the religious aspects of the movement for two decades. The political efforts he made, however, represent a different world of opportunity from the pre-1935 era of Indian politics (Zelliot 2013:165).

The government set the stage for the election in 1937 of truly representative political bodies, and Ambedkar prepared his political campaign. Ambedkar's first political party-the Independent labour party, was born in great optimism to fight the election of 1937, the first elections in which the untouchables, or scheduled castes, were to have a specific number of designated seats according to their strength in numbers. The first announcement of the party came in August 1936; two months after the conference called by Ambedkar declared that the Mahar caste was ready to leave Hinduism. The spirit of the two moves was much the same-independent, innovative, intolerant to paternalism, determined to build new structures outside the old ways, determined to make a mark on India. The independent labour party had won eleven of the fifteen seats reserved for scheduled castes in the Bombay province. The Party was second only to the Muslim league as an opposition party to the Indian National Congress in Bombay, and it functioned with vigour but little effect (Zelliot 2013:167).

The All India depressed classes conference was held at Nagpur on July 18 and 19, 1942 was followed by the All India depressed classes women's conference and the Samta Sainik Conference held on July 20, 1942. These conferences were successful due to the record attendance of men and women. There were not less than 7000 men and not less than 20,000 women. In addition to this, this was a

conference which was fully representative of the depressed classes of almost all the provinces of India. The resolutions that were passed at this conference consisted of the first time, an apparent and positive articulation of the express necessities of the depressed classes which put emphasis on the need to launch an all India organization to act as the one single mouth piece of the depressed classes of India. The conference also shaped a definite decision that all other petty provincial organizations shall be merged in this one single organization which will have its provincial branches in the different provinces of India. These conferences thus created a lot of interest and energy in the ranks of the Untouchables all over India as they felt how the volunteer organization, the women's organization and the pupils' organization progressively made their influence felt to strengthen the life of the Untouchables both in social as well as in political fields. These conferences opened out a new vision for the depressed classes and gave a new direction to the movement of the Untouchables. Ambedkar made the scheduled federation in July, 1942 in order to signal, as the name of the organization advises, a shift in political strategy: the stress was again on caste. The immediate reason for this decision was the Cripps Mission formula, which was submitted in March 1942 to resolve India's constitutional impasse. It proposed the election of a constituent assembly without taking into account any of the demands of Untouchables, whereas Muslims were virtually assured with the viewpoint of a separate state, Pakistan. Ambedkar was not prepared to see his community's interest sacrificed in this manner (Rattu 2017:106).

The creation of the SCF therefore reflected a new mood, a new sense of identity among Untouchables. The scheduled castes wanted to be recognized as a minority in the same way as Muslims were, and as a consequence, sought the benefit, not only of a separate electorate, but also of separate territories. However, in spite of pressing his demands, Ambedkar was not heard by the British, who measured that the failure of the SCF in the elections of 1945-46 did not bestow it with the position of a vital player, or even merit a particular role in the Constituent Assembly (Jafferelot 2006:82).

In 1942, Ambedkar was appointed labour member in the Viceroy's Executive Council and he held this post until 1946. Ambedkar, as the labour member, was always in favor of the labourers. He said that labour ought to work for the total control over the government. It was not enough that India should obtain Swaraj, it was more important in whose hands the Swaraj would be (Ambedkar 2017:17).

As the labour member in April 1944, he moved an amending bill proposing holidays with pay for industrial workers employed in permanent factories. He also moved a bill to amend the Indian Trade Union Act (1926). In this post, he

was able to obtain such benefits for scheduled castes as a Mahar battalion in the Indian army and overseas scholarships for untouchable boys, but his major work was in the field of labour arbitration law, the condition of the industry, and such far-reaching projects as the Damodar Dam. This four year period was Ambedkar's chief opportunity to work in the area of economics, a subject in which he was highly trained. Here once again he concerned himself with the working man and the labour laws that affected both men and industry(Zelliot 2013:168).

The years between 1942 and 1946 were also years in which Ambedkar was harshly critical of the Congress. Nevertheless after he was elected to the Constituent Assembly in 1946, Ambedkar was named as the nominee for the cabinet post of minister of law. After partition of India Ambedkar became very much pragmatic and decided to work along with the power that be. It was this outlook that made the Congress support his candidature for the post of chairmanship of the drafting committee. Even Gandhi said that an intellectual like Ambedkar was worthy of having such a post. The other members of the drafting committee were N. Gopalswami Ayyanger, Sir Alladi Krishnaswami Ayyar, K. M. Munshi, Sir Muhammad Sadulla, N. Madhav Menon and D. P. Khaitan. B.N. Rao was the constitutional adviser (Sharma 1992:232).

B. R. Ambedkar's original genius and his rich experience in different constitutional systems of the world contributed highly in the constitution making process of India. He guided all the deliberations and decisions of the Constituent Assembly and shared the benefit of his wisdom in creating a constitution with the noble ideals of liberty equality and fraternity. After becoming the chairman of the Drafting Committee of the Constituent Assembly, Ambedkar fell under the sway of the dream of a new united and progressive India, and abandoned many of his more radical convictions as he steered the constituent assembly through the process of agreeing on a constitution. The proposed constitution of the United States of India which Ambedkar had published in states and minorities committee in March 1947, just four months before his appointment to the Cabinet is a very different document from the actual draft constitution he ably defended before the Constituent Assembly in November 1948. The provision for agriculture as a state industry and the provision for separate electorates and separate villages for scheduled castes were not there. In both the documents there were anti Untouchability clauses, provision for a government officer to look after minority affairs, representation of scheduled castes in legislatures and the governmental services and special government responsibility for the education of the scheduled castes(Zelliot 2013:169).

All these demands became part of independent India's governmental

policy. Ambedkar kept in mind the interests of the scheduled castes while participating in the process of drafting the constitution. In fact, he is quoted as saying, “I came into the Constituent Assembly with no greater aspiration than to safeguard the interests of the scheduled castes” (Kumer 2004:111).

But such a statement should not be construed to mean that Ambedkar was blind to the existence of other disadvantaged and exploited sections, and was not alive to other forms of social inequality needing immediate redressed. In reality, Ambedkar was a party to a general consensus in the constituent assembly that the term backward classes would cover three principal components, the scheduled castes, the scheduled tribes and the other backward classes. And Ambedkar addressed himself to the task of securing social justice for all the backward classes in the country under the mandate of a new constitution.

Ambedkar, as the campaigner of the downtrodden, was convinced beyond doubt for a bill of rights in the Indian constitution. He had been pleading continuously for an elaborate system of fundamental rights for the minorities in particular, and for all the citizens in general. His fight for social justice was the main plank in his struggle as the real leader of the minorities. He was also sure that social justice could not be secured to one and all unless it was enshrined in the constitution itself.

The specific constitutional provisions intended to safeguard the interests of the scheduled castes are on the abolition of untouchability and prohibition on its practice in any form (Article 17); prohibition of beggar of forced or ended labour (Article 23), consideration of the claims of The scheduled caste and The Scheduled tribes in appointment to services and posts a connection with the affairs of the union or a state Article 335) and reservation of seats in proportion to their numbers for scheduled caste and the Scheduled tribes in the Lok Sabha (Article 330) and in the Vidhan Sabha (Article 332). (Krishnan 2016:216).

Ambedkar was made the first law minister of independent India in Nehru's cabinet. He was the first untouchable to become the Cabinet Minister of Independent India. Ambedkar softened his attitude towards the Congress and Gandhiji to build up a new India where the people of depressed classes would really be free. As the Law Minister of India, he wanted to bring uniform civil code for the Hindus. Therefore, he brought Hindu Code Bill in the Parliament which included abolition of the doctrine of rights by birth, absolute right over property given to women, provision for inter-caste marriage and divorce. But the bill could not be adopted because of the conspiracy of some higher caste Hindu leaders and Ambedkar resigned from Nehru Cabinet on September, 27, 1951 and joined the rank of opposition leaders in the Parliament (Mohanty 2015:416).

Ambedkar gave much value to education for the upliftment of the Untouchables.

He developed a programme of education for the upliftment of the depressed classes as a part of the general manifesto of Independent Labour Party before the general election of 1937. To stamp out illiteracy, he emphasized the necessity of compulsory education. He advocated the adoption of diversified technical education. Since many pupils from depressed classes did not have the financial means to get education, he stressed the necessity of scholarships in educational institutions. Ambedkar was a great champion of universal primary education. An amendment to the Educational Act in Bombay Legislative Assembly was brought forth by the Education Minister who sought to introduce Charkha in the primary schools. The Charkha scheme drew its inspiration from Gandhi on the tenet of earning while learning. Ambedkar believed that the Gandhian scheme would deprive scheduled caste people of the curiosity and adventure of learning for they were to learn until education was sought to be made compulsory. Although, Ambedkar began educational institutions through voluntary efforts and organizations, in his concept of state socialism he allocated a major role for the state in discharging its duties in respect of education of the unlettered millions of citizens in the country (Lyer 2015:25).

Apart from his efforts for the upliftment of the depressed classes, the conversion to Buddhism was Ambedkar's ultimate answer to the question of how to eradicate the practice of untouchability. Ambedkar, along with lakhs of his followers embraced Buddhism at Nagpur on Dussehra day, the October 14, 1956. He had realized long back that Untouchability and caste system cannot be curbed within the Hindu religious framework. He had declared in 1935 itself, that he would not die as a Hindu. Ever since, he was engaged in the study of various religions like Christianity, Islam, Sikhism, Jainism and Buddhism. He was in search of a religion based on rational and universal principles. Before adopting Buddhism in 1956, he had realized that it was the most rational and scientific religion. He, therefore, undertook a thorough study of the Buddhist religion and wrote his magnum opus, *The Buddha and his Dharma* which was published in 1957 after his death in December 1956 (Chandra & Mitra 2015:301).

However, it can be said that he could not test the efficacy of the conversion to Buddhism, since he died within two months of the great event at Nagpur in October 1956.

Relevance of Ambedkar Today

The works of Bhimrao Ramji Ambedkar seem to be more relevant today than colonial times. In his address to the constituent assembly, while he was presenting the Constitution, he had spoken about the requisite of establishing a

social democracy after achieving a political democracy but after 71 years of freedom our country still can't claim to be a social democratic country. The attacks against scheduled castes, scheduled tribes, women, minorities are as common as they were earlier. The governments are functioning utopia with the belief that any talk about these issues would have hampered the development of nation. A nation is devised by its citizens and if one looks at the history of one's nation, oppressed classed are the ones which have been given the task of building the nation, but for whom, for the oppressors.

Ambedkar's contribution is of great relevance to Indian society even today in achieving social justice, removal of untouchability, in establishing equality and freedom and true democracy. Ambedkar is a socio-political reforms and had a deep impact on modern India. In post-independence India, his socio-political ideas have gained great respect across all spheres of the society. Ambedkar, as a real champion, worked throughout his life to ensure the rights of the scheduled caste and other socially backward classes as well as for the women. He also made a great contribution to economic and agricultural reforms. His life is a great source of inspiration to the people who want to serve the nation. Along with reservations in education, employment and legislature, rural development programme, Public Distribution System (PDS), public health programmes, cooperatives, the Right to Information Act, the Right to Education Act, mid-day meals programme, Mahatma Gandhi National Rural Employment Guarantee Act, the Food Security Act, the Sarva Shiksha Abhiyan, and the Sampoorna Grameen Rozgar Yojana are a few more significant state initiatives aimed at the creation of social democracy in India.

Conclusion

From the above evaluation of the works and contributions of Ambedkar one can conclude that he tried his best to give dignity to the downtrodden and at the same time, rescue them downtrodden from the clutches of the mighty higher caste structure. He made certain rules and regulations to safeguard the downtrodden from social evils. He also opened a new window for the downtrodden to convert into the Buddhism, where there is no caste, inequality, and no one is above or below of any. Every human being has self-respect and dignity. There is equality between men and women. He challenged the upper caste Hindus, the struggle for human dignity will continue unless and until the mighty Hindu castes are ready to embrace the Downtrodden into the Hindu fold and treat them on par with them. Ambedkar's works helped the downtrodden to get their self-dignity, identity and equal status in the caste-ridden society.

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Article 370 of Indian Constitution

Yog Raj

Introduction

India that is Bharat shall be a Union of States.¹ The term “Union of States” means and includes only the states which enjoy the status of being members of the Indian federal system and form part of territory of India. The unique feature of federal system is that there is clear division of powers between state governments and union government by the constitution and all states have equal status and equal amount of powers. But Indian system is considered as quasi federal. Such a system is subject to an exception that is special status to state of Jammu and Kashmir by the virtue of Article 370 of Indian Constitution. So, state of Jammu and Kashmir holds a peculiar position under the Constitution of India, from having separate Constitution to distinct political structure. This state enjoys all such powers which no other state has. The need to insert Article 370 is due to the peculiar political conditions that have risen after the independence. Even after sixty-eight years of independence this article is still there and is so deep rooted that state is not ready to repeal this.

Historical Background

The origin of Article 370 can be traced back to British Raj in India. Prior to independence there were two sets of geographical regions which were controlled by British. One set of region which was governed by British parliament in all the aspects and this was known as *British India*. Another set of region which was ruled by Maharajas, Nawabs and so on. They were known as “*Indian States*” by the British. Indian states include 562 princely states including state of Jammu and Kashmir. These states were allowed to govern themselves in internal matters like health, education, economic development etc. but British looked after these states for defence and foreign policy in return for which they each acknowledged British supremacy through individual treaties.²

On 20th February, 1947 British announced that independence be given to British India and be divided into two nations India and Pakistan on communal basis. With regard to Indian States policy was adopted to return them their powers and they became independent states. British policy was silent on their merger with either state which created a lot of chaos.³ To control the situation V.P. Menon came up with a solution that princely states should be persuaded to hand over just three functions of their states to the central government—defence, external relations and communications. With this, instrument of Accession came into existence.⁴ Now the princely states were sovereign states with surrendering of just three powers to central government free of cost and legally free to accede to either of the newly created dominions of India and Pakistan. The instrument of Accession signed by Maharaja Hari Singh on the 26th October, 1947 was in the same form as was executed by rulers of other princely states which had acceded to India by enactment of the Indian Independence Act, 1947. The legal basis as well as form of Accession was the same in case of those states which acceded to Pakistan and those which acceded to India. Therefore no doubt that by the act of accession the state of Jammu and Kashmir became legally and irrevocably part of Indian Territory and government of India can exercise jurisdiction over the state with respect of those matters to which instrument of accession extended.⁵

Drafting of Article 370

- For the drafting of special provision for the state of Jammu and Kashmir, a bill was proposed in India's Constituent Assembly by Gopalswami Ayyangar. He made following arguments in favour of Article 306-A (present article 370)⁷ –
- The state of Jammu and Kashmir is a unit of a federal state namely the dominion of India. This dominion is getting transferred into republic. The state has to become a unit of new republic of India.
- Till India become a Republic, the relationship of all the states with Government of India is based on instrument of Accession. In the case of other Indian states, the Instrument of Accession will be a thing of past in the new constitution, the states have been integrated with federal republic such a manner that they do not have to accede a document of accession for becoming units of the republic. But it would not be so in case of Jammu and Kashmir because of special conditions prevailing in the state. Firstly there is a war going on within the state and a part of state is still within the hands of enemy. Secondly the government of India has committed itself to the people of the state in certain matters.⁸ For the above reasons draft of Article 306-A was discussed elaborately and has been added formally as Article 370 of the Indian constitution.

Present Status

Presently the state of Jammu and Kashmir is governed by two basic legal documents one is Article 370 of Indian Constitution and another is constitution (application to Jammu and Kashmir) order 1954 which is amended from time to time. These two documents are the basis of relation of state with government of India as well as relation of state with its own people.

Article 370 of Indian constitution- Originally Article 370 fell under the constitution of India under part XXI called “temporary and transitional provisions and Article 370 was titled as “temporary provisions with respect to the state of Jammu and Kashmir”. But by 13th Amendment Act 1962 the title “temporary, transitional and special provision” was replaced by term “special”. However Article 370 has continued under the temporary status. Article 370(1) (a) states that provision of Article 238 shall not apply to state of Jammu and Kashmir. The Article 238 is now repealed. Article 370(1)(b) states that union parliament can make laws for the said state with consultation of state government on the matters mentioned in Union List and the Concurrent List. Article 370 (1) (c) states that provision of article 1 shall apply to the said state.

Constitution (application to Jammu and Kashmir) order 1954- The president of India in consultation with government of Jammu and Kashmir promulgated the Constitution (application to Jammu and Kashmir) order 1950. The order specified the matters with respect to which union parliament was to be competent to make laws for the state. This order was replaced by an order with same title in 1954.

Today not only the provisions of Indian constitution which pertains to the matter mentioned in the instrument of accession but many other provisions relating to several matters not specified in the instrument apply to the state which are as following⁸:-

- (a) Provision of the constitution regarding composition of central government shall apply to the state with some modification. The state has six members in Lok Sabha elected directly by the people of state.
- (b) The jurisdiction of the Supreme Court extends over the state except for article 135 and 139.
- (c) The state is governed by its own constitution drafted by its constituent assembly. This constitution came into force on 26 January, 1957 and it is patterned closely on the model of Indian constitution. Therefore the provisions of the Indian constitution relating to state government do not apply to the state except for the following provisions concerning High Court:
 - i) The judges of state high court can be removed from office in the same

manner as the judges of other high courts. ii) A judge may be transferred to or from state High Court after the consultation with the governor. iii) The state high court has been given power along with the supreme court of India to issue writs for the enforcement of fundamental rights. (d) Directive principles of state policy are not applicable in state of Jammu and Kashmir. (e) Election commission has jurisdiction over election held in state under its constitution.

(f) As regards sharing of revenue between centre and state the general scheme applies.

Judicial approach

Supreme Court of India got opportunity to interpret the provisions of article 370 in few cases. One of such land mark case is *Puranlal Lakhanpal versus President of India*⁹, in which court held that president of India has power to make provisions of Indian constitution apply to the state of J&K with such modifications as he thinks fit. The meaning of word “modification” used in Article 370(1) must be given the widest effect, including making radical changes.

In another landmark judgement, *Sampat Prakash versus State of J&K*¹⁰ the main contention of was that Article 35(c) of J&K constitution as initially introduced by the constitution (Application to Jammu and Kashmir) order, 1954 and had given protection to any law relating to preventive detention in Jammu and Kashmir is violate of one of the fundamental right given under part III of constitution. Initially is order was for 5 years but later on extended to 10 and then to 15 years. These extensions were challenged on the ground that orders making such modification could not be validly passed by President under Article 370(1). As Article 370 was intended to remain operative till State of J & K make its own constitution, so extensions were ineffectual. Supreme Court rejected the plea and held that Article 370 should be held continuing in force because the situation that existed when this article was incorporated in the constitution had not materially changed and purpose of introducing this article was to empower the President to exercise his discretion in applying the Indian Constitution.

In other case, *Mohd. Maqbool Damnoo V/S State of J&K*¹¹ the petitioner challenged the validity of his detention under the J&K Prevention Detention (Amendment) Act, 1967 on the ground that the Act is invalid as it has not been assented to by Sadar-e-Riyasat of the State. The apex court held that the essential feature of Article 370(1) (b) and (d) is the necessity of the concurrence of state government or the consultation of the state government and state government, at a particular time to be determined in the context of the Constitution of Jammu and Kashmir.

The Supreme Court of India, notwithstanding some controversial decisions in the matter of constitutional interpretation, has by far and large contributed to upholding the rights and privileges of the States and individuals. But with a decision *Ajay Kumar Pandey versus State of Jammu & Kashmir* decided by the constitution Bench on July 19, 2016 there was apprehension of interfering with the autonomy of J&K, guaranteed under Article 370 of the Constitution of India.

The Constitution Bench has decided that the Supreme Court has the power to transfer a civil or criminal case pending in any Court in the State of Jammu and Kashmir to a court outside that state and *vice versa*. It was common case that provisions of section 25 of the Code of Civil Procedure and section 406 of the Code of Criminal Procedure, which empower the Supreme Court to direct transfer of civil and criminal cases respectively from one state to other, do not extend to the state of Jammu and Kashmir and cannot, therefore, be invoked to direct any such transfer. It was also common ground that the Jammu and Kashmir Code of Civil Procedure, 1977 and the Jammu and Kashmir Code of Criminal Procedure, 1989 do not contain any provision empowering the Supreme Court to direct transfer of any case from that State to a Court outside the State or *vice-versa*. It was common ground that the provisions of Article 139-A of the Constitution which empower the Supreme Court to transfer a case pending before the High Court to itself or to another High Court also has no application to the cases at hand as the Constitution 42th amendment Act, 1977, which inserted the said provision, itself has no application to the State of Jammu and Kashmir. Thus while accepting that a litigant has no right to seek transfer of a civil or criminal case pending in the State of Jammu and Kashmir to a Court outside the State or *vice versa*., still the Court notwithstanding these formulations went on to answer the question whether independent of all these provisions contained in the Codes of Civil and Criminal Procedure there is still a source of power which the Supreme Court can invoke for directing transfer of a case from the State of Jammu and Kashmir or *visе-versa*. The Court has held that it has such a power invoking the principle of “access to justice” being a fundamental right and secondly the powers given under Article 142 of the Constitution.

The Supreme Court of India then dealt with the question, namely, whether Article 142 of our Constitution empowers the Supreme Court to direct transfer in a situation where neither the Central Code of Civil Procedure nor the Central Code of Criminal Procedure empowers such transfer to/from the State of Jammu and Kashmir. The Court thereafter concluded that the powers under Article 142 are wide enough to empower the Supreme Court to direct such a transfer in appropriate situations, no matter whether the Central Code of Civil and Criminal Procedures do not extend to the State nor do the Jammu and Kashmir State Codes

of Civil and Criminal Procedure contain any provision that empowers this Court to transfer cases. It is unfortunate that the attention of the Court was not drawn to a seven judge bench case *A.R. Antulay v/s R.S. Nayak* 1998(2) SCC 602 where the Court held: "Thirdly, however wide and plenary the language of the article, the direction given by the court should not be inconsistent with, repugnant to or in violation of the specific provisions of any statute. If the provisions of the 1952 Act read with Article 139-A and Section 406-407 of the CRPC do not permit the transfer of the case from a Special Judge to the High Court, that effect cannot be achieved indirectly". It is also unfortunate that the attention of the Supreme Court was also not drawn to an earlier five judge judgement of the Supreme Court (1998) wherein the Court said- "Article 142, even with the width of its amplitude, cannot be used to build a new edifice where none existed earlier, by ignoring express statutory provisions dealing with a subject and thereby to achieve something indirectly which cannot be achieved directly...that the Court will take note of the express provision of any substantive statutory law and regulate the exercise of its power and discretion accordingly. It must be remembered that wider the amplitude of its power under Article 142, the greater is the need of care for this Court to see that the power is used with restraint without pushing back the limits of the constitution so as to function within the bounds of its own jurisdiction".

More serious than the concern mentioned above, this judgement has in an indirect manner nullified the mandatory provision of Article 370 of the Constitution. The Jammu and Kashmir Legislature has specifically provided that the Court will have no such power to transfer cases from J&K Court to Courts outside the State. In such a situation to invoke the powers of Article 142 to pass order contrary to the J&K legislation is a serious breach of Article 370 having grave consequences. Hope the Union of India and State of Jammu and Kashmir will seek review of this judgement to avoid serious constitutional and political consequences, so as to assure the people of Jammu and Kashmir that there will be no weakening of their autonomy.¹²

Need to Review Article 370

- 1. Obstacle in economic development-** Article 370 is an obstacle in the economic development as due to legal and constitutional limitations Central Government is not able to provide employment avenues due to which youth from the state has to migrate outside state. Beside this centre government is not able to implement FDI policy. If such picture continues then state will definitely become a barren land of just old persons. This entire act as obstacle in economic development of state.
- 2. Security reason-** Major chunk of defence money of country is spent on

this sector. Despite of spending so much on state, central government is not able to maintain peace and to stop illegal activities because of lack of internal support. So Government becomes helpless because of such constitutional limitations.

3. **Human Rights issue-** State is highlighted for gross violations of human rights nationally as well as internationally. Position is worse when it comes to minorities of the state. The Hindu and Sikh minorities who has migrated to the state in 1947 from West Pakistan are not considered as citizens under Article 6 of the Jammu and Kashmir constitution. State has its own legislation known as “J&K Human Rights Protection Act, 1997”. This Act was amended in 2000 to take away the powers to state Human Rights Commission to hire its technical staff. For years state is hiding itself by invoking its special status under section 370.
4. **Non-applicability of good central laws-** No law of India can be extended to the state by virtue of article 370 unless state government extends it by an Act of the state legislature. Most of the welfare legislations are not applicable to the state like Human Rights Act 1993, Domestic Violence Act, and Right to Information Act etc.
5. **Temporary provision-** This is a temporary provision made for few years due to special reasons discussed above but even after more than 65 years of coming into force of constitution it is still there. It ought to be repealed because situation has changed a lot. The relation shared by state with Indian government is now not restricted just too legal documents but is based on cooperation liking executing welfare activities funded by centre etc. so there is need to repeal it.

Conclusion

By analysing the historical and present perspectives of Article 370 it is evident that this provision is added by constitution makers due to special circumstances that exist at that time. They never intended to continue with it forever. That is why they used the term temporary provision in the marginal notes of Article 370 and never amended these words. State of Jammu and Kashmir has also extended its jurisdiction to the provisions of the Indian Constitution by The Constitution (Application to J&K) Order, 1954 which has been amended various times. So it clear that even the state is showing positive signs in this direction. Beside this a lot of development, welfare and security are at stake because of Article 370. So it's high time to repeal Section 370 for the progress and peace of state as well as for the nation.

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- ¹. Article 1 of the Indian Constitution.
- ². Justice A.S.Anand, *The Constitution of Jammu and Kashmir-Its Development and Comments* (1998) pp.20-24.
- ³. *Ibid* p.67.
- ⁴. *Ibid*.
- ⁵. Durga Das Basu, *Introduction to constitution of India* (2001) P.264.
- ⁶. Constituent Assembly Debates, Vol. 10.
- ⁷. *Ibid*.
- ⁸. M.P.Jain, *Indian Constitutional Law* (2013) p.857.
- ⁹. AIR1961SC1519.
- ¹⁰. AIR 1969SC956.
- ¹¹. AIR1972SC963.
- ¹². Rajendar Sachar, Let Article 370 of Indian Constitution (on Jammu and Kashmir) not be Weakned, *Mainstream*, Vol. LIX, No. 37 (September 2016) pp. 3-4.

Dissolution of Cultural Symbioses: A Study of Ngugi wa Thiong'O's *The River Between*¹

Sanjeev Kumar

THE PRESENT study will investigate the dissolution of tribal and cultural symbioses of Gikuyu society with context of Ngugi wa Thiong'O's *The River Between* vis-a-vis through the incorporation of two ethnic Gikuyu tribes namely Makuyu and Kameno. The projection of these two tribes form the basis of cultural solidarity and tribal cohesiveness which the domineering and subversive imperialistic forces have targeted for recognizing their mode of education and religion. The disintegration of Gikuyu society has emanated mainly on account of cultural conflict which ultimately culminated in disrupting the pre-colonial traditional roots. Cultural revivalism in the third world countries has been one of the prominent ways of resisting colonialism. In the process, the native cultures have had to encounter the dominant alien culture geared to denude the identities of the natives and alienate them from their roots.

A comprehensive and detailed account of study of the novels of Ngugi with regard to the cultural dimensions prevailing on account of colonialism in general and the significant contribution to the African point of view, on life, politics, culture, history which makes him as a visionary and a writer of the protest literature in particular have been made. The present research proposal aims at discussing the tragic position of Kenyans after losing its cultural heritage and identity due to colonialism. Therefore the novels of Ngugi seek to highlight the epic struggle of African people against decolonization by stressing on the thematic, linguistic and stylistic technique to expose the cultural dynamic on the African culture at a multi-dimensional level.

Colonialism has affected more than half the current world's population in ways that have been profound and irreversible. Its cultural, social, economic and political effects have impinged on every aspect of the lives of the colonized, affecting the individual's sense of self and relationship with others and the wider community. While at independence colonial rule may officially have ended,

writers from former colonies continue to write critically of colonialism's remaining impact on their nations.

Significant African writers, critical of neo-colonial Africa, use literature as the medium through which such political disenchantment is articulated. The views of Ngugi wa Thiong'O Kenya's most prominent writer and dissident, (whose novel entitled *The River Between* forms the part of this research paper) on the relationship between aesthetics and politics have established his works among the most important to come out of African. His novels portray the postcolonial history of Kenya and the changes which happened on account of the contact with the Europeans culminating in disruption of socio-cultural and religious fabrics and continue to affect the inter-relationship between individuals and their communities. In this respect Ngugi's work, his treatment of the changing nexus within traditional Gikuyu society and indigenous social structure in the context of colonial and post-colonial Kenya forms the basis of this research work.

Ngugi's literary career starts with the publication of *Weep Not, Child* (1964). This is followed by *The River Between* (1965), *A Grain of Wheat* (1967), *Petals of Blood* (1971), *Devil on the Cross* (1982), and *Matigari* (1989). Except novels, Ngugi has written three plays which are *Black Hermit* (1968), *I Will Marry When I Want* (1976) and *The Trial of Dedan Kimathi* (1976), and one collection of short stories named *Secret Lives and Other Stories* (1975). Apart from these, he has written four exceptional books containing critical and auto-biographical essays *Homecoming: Essays on African and Caribbean Literature, Culture and Politics* (1972), *Writers in Politics* (1981), *Detained: A Writer's Prison Diary* (1981) and *Decolonizing the Mind: The Politics of Language in African Literature* (1986).

Ngugi's first novel *The River Between* portrays the picture of a traditional Gikuyu society and how the peaceful life of the Gikuyu is spoiled by the intrusion of the Europeans. In *The River Between* Ngugi has dramatically demonstrated the tragic and disruptive effect of Western education and religion on the African collective. The novel also delineates that at this stage of European intrusion the indigenous community, whether tribal or Christianized, still holds the balance of power over its individual members. Taking cognizance of the issue of cultural assimilation Ngugi states that African do not cohesively reject or embrace the influence of Western culture but have reacted differently and at different times to the intrusion of new cultural values. In *The River Between* Ngugi has irrevocably revealed the crises of leadership which do not guarantee the best leaders during the period the transition.

Postcolonial literature focuses on a number of issues and not the least on the ways in which Europe come to dominate those people who are gathered often unwillingly into the embrace of its extended empires. The era specifically

investigates the way in which colonially imposed socio-economic structures altered the lives of the colonized, forcing many off their lands and into the labor market as part of a docile, malleable and essentially powerless work force. Later, they are forced into accepting colonial rule and the consequent plundering of local natural resources, particularly land, whilst and imported colonial culture denigrated Africa and the African.

This is not to suggest that the communal aspect of pre-colonial Africa has no bearing on the discussion. Mazisi Kunene, in his *Introduction to the Ancestors and the Sacred Mountain*, claims, for example, that the past was communalistic and that these values have been eroded as a result of “A Continuous barbarization and brutalization of human life in the course of searching for material resources”². He strongly asserts that social unity represents “the highest ideal of society”. Ngugi's fiction itself suggests that traditional Gikuyu life was based on communal principles, regulated and maintained by such means as the land tenure system, the hierarchical structure of the community, rituals share within the community and among adjacent Gikuyu clans, and a continuing interaction among living members of the community and the tribe's ancestors. Ngugi represents the European presence in Kenya as a destructive force which, in the process of transforming the country into an economically self-sufficient colony, eroded the essential and unifying structures of Gikuyu tribal life. The post-independence novels, in particular, portray a modern Kenya Westernized, capitalist, corrupt, individualistic and with a ruling elite united in its dedication to exploiting the masses. His novels explore the process of this erosion, focusing on individual as well as community responses to social change.

Within this framework I have chosen to focus primarily on the various cultural dynamics in the Gikuyu society and its relationship with individual and to the community at large. In Ngugi's novels, central characters find their relationships with the community waxing and waning in intensity, and as we shall see, this is crucial to the author's method of characterization. Colonialism introduced changes that pushed African communities towards Western, capitalist values, elevating the individual over the collective at the local level, and the nation over the individual at the national level. The new pressure on the individual is to conform to structures which relied on individual autonomy rather than on intricate social relationships mediated by traditional structures.

The decade of 1880 is seen the coming of various European imperialist powers to Africa including—England, France and Portugal which divide the continent into segments and slowly established their rule. Colonialism is enforced and legitimized on the grounds of moral obligation and racial superiority. The history of European colonialism is justified registering their action by posting moral and

civilization claims. These notions and actions are validated by the following excerpts taken from various historical narratives from 1920 to 1960.

"The African is lacking in initiative, has little or no sense of personal responsibility, is unreliable. He is not a man of his word...And he is as a rule, quite unashamed of cowardice" (Norman Leys, *Kenya* 77)³.

"Their (European) contribution is more considerable than they always get credit for...That Africa is no longer a dark continent is almost entirely a European achievement" (Macmillan, *Africa Emergent* 90)⁴.

In contrary to this statement, Ngugi has conspicuously stated the majority of societies in Kenya has a highly developed structure with subsistence oriented economies, collective leaderships and strictly laid down norms of social behavior and a substantial body of songs, dances and narratives. However, with the coming of Christianity a process of disintegration of the various set-ups began shaking because acceptance of Christianity meant an outright of the values and rituals which had held them together. The missionaries, travelers and intellectuals, therefore, started condemning various aspects of different African cultures, their dances, their songs, their images of gods and their rituals as 'primitive', 'barbaric', and 'savages' and superseded them by their own which they considered to be superior. The cultural and social hob-nobbing can be systematically noticed between two cultures since inception of colonizer in Kenya which forms the major aspects of Ngugi's novels.

This wholesale condemnation of the Kenyan culture is not only desirable but perhaps essential from the point of view of the colonizing British because although their aim is to get at the people's land and other Kenyan resources, it would not have been either complete or secure without a control of the Kenya's cultural environment, its religious systems, its education system, its literature and its music. Soon after their arrival British missionaries perpetuating their colonial administration on various Kenyan tribes and asserted that they have no system of educating their young. What they in fact mean is that there are no schools modelled on the modern western systems of education. But no society, however primitive, can do without educating its younger generations. It is only through education, that a society is able to pass on the body of knowledge that has been handed down to it by the previous generation as well as the knowledge it has amassed by its own experience.

The primary concern of Ngugi's writing along with the entire gamut of post-colonial African art and literature has been achieving cultural-definition and political-determination to which the Africans are subjected to deprive as a strategic measure to colonized their minds and lives. In this respect, the indigenous form of culture and social system prevailed among the Gikuyu

society have manifested the larger system of discipline in family in particular and in society in general. This code of socio-cultural application exhibited within the African society has recognized the cohesiveness and solidarity which provides the basis for fictive undertaking of Ngugi's *The River Between*.

Let us make an illustration at the educational system which is prevailed among the Gikuyu the largest among the various groups in Kenya before the arrival of the British. Among the Gikuyu the children are first educated in the family and the clan traditions. For them, 'the homestead is the school.' The Gikuyu's are primarily agriculturists in which father takes the responsibility to impart practical training. Here he makes them digging sticks –Moro—for the sons to play with, while he busies himself with either weeding or turning the soil. Apparently, the sons are taught the names of herbs, plants, trees and their various uses. As for the daughters, the mother undertakes a similar responsibility of teaching all things concerning the management of the homestead. In the evening, she teaches both boys and girls the laws, customs and the moral code of the community.

Piercing of ears form the unique part of their culture which marks the advancement from childhood to boy hood. In this respect the biggest and most significant part is the circumcision which constitutes a boy and a girl full membership of the community. Circumcised boy is taught various martial arts and are allowed to mix with circumcised girls. An uncircumcised boy has no possession rights, cannot build his own homestead and cannot participate in a war to defend the tribe. Circumcision also brings the social status of the father.

Among Gikuyu three types of religious systems are generally recognized which supported them and held their culture together. First of all there is Ngai, the highest god and supreme deity among Gikuyu. On the occasion of tribal importance the rituals and ceremonies are made in front of Ngai. During the occasion of birth, marriage and death of Gikuyu communion is established with Ngai. Mount Kenya, the mountain of prosperity is considered to the dwelling place of Ngai and all rituals are offered under sacred trees facing Kere-Nyaga which is the Gikuyu name for Mount Kenya. In Gikuyu tradition human beings are approached deity only when they are in real need without fear of disturbing him and incurring his wrath.

The second religious ceremony on which Gikuyu operate is 'ancestor worship'. This is established when a taboo has been broken or some ill –luck has befallen on individual members of a family. Third level of religious ceremony involves 'nature worship'. Since the Gikuyu are primarily agriculturists they are in constant touch with nature and offer propitiation to nature on occasions like planting and harvesting of crops. Such ceremonies are generally performed by

either elder-Morathi, as they are called in Gikuyu- or medicine men that are also called Mundo Mugo.

These two aspects of Gikuyu culture namely the education system and the religious systems are a part of the larger system of the Gikuyu social organization which the missionaries and the colonial administrations have decided to attack simultaneously. Indirectly they tend to destroy the Gikuyu way of life by perpetuating their own. The physical colonization of Kenya means to get at the people's land and other natural resources.

An analysis of Kenyan history establishes that land ownership is one of the most volatile issues in the conflict between Africans and Europeans. While recognizably important in much of Africa's resistance to colonialism as a whole, it was of critical concern in Kenya, particularly in relation to the way in which the relationship between European and the Gikuyu come to be structured. However, once Kenya become a settler colony, land ownership become paramount, and Ngugi's own people, the Gikuyu, who had instigated some of the earliest resistance to European intrusion into the interior, emerged as the group most severely affected by loss of traditionally owned tribal land, and therefore become the most active in seeking its return.

The narrative of this novel revolves around the character of Waiyaki who can be taken as Ngugi himself, fails in bringing about reconciliation between traditionalism and Christianity. This is not an individual problem but is a social problem which affects many societies and tribes during the 1920s. In this novel Ngugi has beautifully depicted that the traditional life which aim at communal consciousness has been greatly disturbed and disrupted by the entrance of the Europeans. Ngugi himself is seen making a compromise between traditionalism and Christianity saying that juxtaposing the good qualities of both the traditions would have been a better choice. But lack of social consciousness among the people has created chaos in the society which ultimately led to the destruction of traditional values.

The mythological legend of the Gikuyu tribe is incarnated in most of Ngugi's novels and so does in *The River Between*. Story and myth intertwine in Ngugi's narration and even some whole chapters are devoted to tracing the origins of the Gikuyu tribe. The first chapter of *The River Between* which begins with the myth of Murungu, the creator of giving land to Gikuyu and Mumbi-the father and mother of the tribe.

This land I give to you, o man and women.
It is yours to rule and till you and your
posterity. (Ngugi, *The River Between* 2)

It mentions its mythical forebears, Gikuyu and Mumbi, the father and mother of the Gikuyu tribe and their nine daughters. Ngugi has significantly recreated the mythical image of Mugo wa Kibiro, a prophet, Kamiria magician Wachiori, a great warrior, Demi Na Mathathi, giants of the tribe. These all are invoked here to show that the tribal society had a history and their existence dated back to antiquity. After that, the novel gives us an insight into the land given to Gikuyu and Mumbi and landscape where the entire actions unfold.

Then it follows a description of two ridges namely Kamenno and Makuyu lying side by side and through it flows the river Honia which Ngugi implies “cure or bring back to life”(1). The hills are living their ancient life and remained isolated and aloof from the Kenya and rest of the world. Both the ridges have always been rivals, with competing versions of their myth of origin, and there has always been conflicts regarding leadership. Nearby, missionary activity has exacerbated this rivalry by taking root in one of the village, named Makuyu and eroded the tribal purity by penetrating in the ridges on female circumcision issue. Makuyu's enthusiastic adherence to Christianity under the leadership of Joshua introduces a serious source of division among the Gikuyu people.

The geographic gulf between the two villages becomes emblematic of ideological difference. Between the two communities the River Honia flows, joint site of traditional circumcisions and Christian baptisms suggesting the possibilities of a reconciliation that the narrative's denouncement does not in fact reinforce. Ideological difference is the sole concern of rivalry between the two ridges which colonial power has exploited the most. The sense of timelessness and solidarity of tribe is threatened by the predictions of prophet Mugo wa Kibiro, who predicts the coming of the white man. But these strangers-the ukabi-are still held at bay and for the present.

The country of many ridges was left alone,
unaffected by destructive force outside. These
ancient hills and ridges are the heart and soul of
the land. They keep tribes, magic and rituals pure
and intact. (3)

These above mentioned lines conspicuously state that the destructive forces will be soon threatened the solidarity of Gikuyu tribal society. The effect of colonialism is soon felt in this self-governed, isolated world. European imperialist, mainly British know that the physical subjugation of people is not possible merely through the exercise of political power and use of force alone. Cultural, religious and psychological exploitation are all used to establish European hegemony over the psyche of the colonized. As it is quite evident from the history that Christian missionaries have been playing a keen role in

exercising the superiority of colonizer upon colonized. Therefore, Christian missionaries are often considered the forerunners of colonial administrators. In fact, the accession into the ridges of Kameno and Makuyu is made possible through the missionary activity and education.

Subsequently, Christianity and education are forcefully imposed which resulted into breaking their traditional religious moors, customs and values and fragmentation of society and individual psyche are some of the major concerns of *The River Between*. David Carroll has significantly stated while analyzing the process of conversion to Christianity, “converts were not merely substituting a Christian for a tribal god, they were exchanging a religion through which they were identified with a tribe for a religion without any such affiliation” (David Carroll, *Chinua Achebe* 9)⁵.

Through Waiyaki, Ngugi explores the way in which, particular aspect of Christian mission activity and education, as well as their own isolationism, contributed to the social and cultural dysfunctional of traditional Africans and their communities. Although Waiyaki may seem ideally situated to mediate change yet his bi-cultureless sows the seeds of his undoing early in the novels.

The three agents of this novel named Waiyaki, Joshua and Kabonyi are source of conflict which widens the rivalry between the Gikuyu communities and hence are representative of the first wave of Western educated Kenyans. Joshua is a convert Christian, Kabonyi initially a convert to Christianity but is reconverted later to tribal purity; Waiyaki stands midway between the two conflicting ideologies. His father aspires in him a great duty and responsibility to the community. His education at Siriana however shifts his horizons beyond the local village, dissolving the parameters set by his father's generation.

The community cherishes in him the scope of leadership but he makes a self-conscious savior, unsure of the scope or direction of his mission outside education. The conflict he experiences in choosing between cultural isolation or progress is articulated at several points in the novel in the form of soliloquies or reflections on the community's expectations of him, culminating, towards the end of the novel, in his return to the sacred ancestral grove for spiritual guidance when the conflict between traditional Kameno and Christian Makuyu has reached the point of erupting into violence, and when his own position in relation to leadership within his community has also reached crisis point.

The impact of western education and culture for Waiyaki is resulted into the sense of disintegration with his community. Waiyaki believes in the need for harmony between the ridges but fails to recognize his own need for reintegration within the community. He would have been accomplished the task of reconciliation the ridges if Kiama (council of elders) had accepted his role as a

mediator. As a result, Waiyaki has no longer believe in Kiama and subsequently resigns from it and put himself out of touch with the attitude of the community and its executive voice.

Waiyaki fails to perform the role of *muthamaki* or spokesperson for the community. He finds it difficult to synthesize the relation as a spokesperson for upholding traditional values and agent of change through western education. Through Waiyaki Ngugi portrays a fine and complicated point about the conflicts inherent in taking up a position of leadership in a communally based society at the moment of transition.

Emergence of new African intellectuals which threatens the traditional tribal authority by promoting western education is yet another aspect of this novel resulting on account of an alien culture. The narrative of *The River Between* clearly reinforces that reconciliation is a possibility; like Chege, the community accepts the need for Western education. But on certain platform, traditional authority and western values could not bring about a solution which culminated in disruption of community. Like Waiyaki's own decision to live with Nyambura cast him in opposition with his community and is sanctioned by the law of his community.

In this mythological land of Gikuyu and Mumbi the traditional authority is replaced by the missionaries. But in its initial stages, people refuse to take them seriously. Chege, Waiyaki's father warns the people about the Siriana Mission and the butterflies...a euphemism for the white man who flies around everywhere but cannot be caught or driven away. Lacking his vision the people fail to listen to him or take his warning seriously. Chege who has until been respected and given due consideration by the elders of the tribe is now moved to the periphery of the tribe. As a result of this there is a conflict of perception mounting between the people who do not see any threat from the missionaries and chege's prophesy about the change these missionaries would bring. Chege has become aware that the missionaries have not come to stay, but will eventually rule over them gradually results in his decision to send his son Waiyaki to Siriana Mission School.

Go to the mission place; learn all the wisdom and all the secrets of the white man. But do not follow his vices. Be true to your people and the ancient rites. (20)

In the first phase of colonialism and conversion, it is decided that only Christian converts would be allowed to attend and to take education in a mission school. In the subsequent period, the value of education is gradually felt and increased amongst the tribal people. Once the people accept the norms of culture and Christianity as their religion, the missionaries find it easy to enforce their power

over them. Hence, Waiyaki tends to attend the missionary school but still follows the traditional religion and custom of his ancestors.

Ngugi in this novel, significantly goes on to dramatize the most burning and controversial issues of the time that is of female circumcision. According to Gikuyu tradition adolescent boys as well as girls are circumcised before they are accepted as full-fledged adult members of the tribe. The missionaries have a great aversion to most of all religious custom and tradition, and they find the practice of circumcising girls to be particularly savage and barbaric. The symbolic and spiritual meaning it embodies to the individual, the identity it gives to those who faithfully followed it goes unheard. For them, it is a barbaric practice and a brutal attack on the body that no civilized people should allow and participate in. For

The missionaries like the administrators had an occupational need to consolidate the image of savage Africa. The more barbaric were the tribal gods and rituals, and then clearly more praiseworthy were the attempts to reform and convert (9).

Historically, the attack on those customs considered to be integral to Gikuyu community cohesiveness, give rise to leadership conflicts within the same tribe. Therefore, the disintegration of tribal custom and tradition on account of the European accession is the worst ramification of cultural symbiosis. In his essay *Ngugi wa Thiong'O: The Making of a Rebel*⁶, Sicherman states that female circumcision issue has emanated the gulf between loyalists and nationalists (Christian and non-Christian) during Mau-Mau period. According to few, the converts denounce the practice as barbaric and are agreed to banning female circumcision while majority proportion of African converts to the Church to Scotland Mission discontinues the practice and congregation of the Church in protest against British interference in tribal affairs. Some African converts accepted the ruling of the missions while the majority supported the retention and defense of tribal customs a stand which become crystallized in the Kikuyu Central Association's promotion of itself at the time as the defender of tribal unity. In this context KCA has strongly expressed allegiance to the tribal view of female circumcision as a significant ritual and custom for making the transition from girlhood to womanhood.

Joshua's daughter, Nyambura and Muthoni symbolize the younger generation who frequently express their revolt against orthodox Christianity and the rebellion against authority. These two show their disappointment with the parental and colonial administration. Nyambura whereas has embraced Christian practices like Joshua, Muthoni, on the other side she does but seeks freedom to participate in the tribal rites. This defiance shows that the new order

has failed to grip the younger generation in the manner it did the old.

Crisis of leadership has been the debate of issue in the post-colonial Kenya. In a discussion of the origins of Kenyan literature, Werner Glinga argues that *The River Between* focuses on what he calls a crisis of leadership following colonization⁷. Circumcised Waiyaki marks not only his public reintegration into the tribe but also his private awareness of the gap between himself as an individual and as a member of the tribe. Unlike Muthoni he is not integrated into the collective. Instead, he has become, metaphorically, a divided individual. Muthoni's death and her action in the tribal affair have an important dimension of this novel. Like Muthoni the sowing of this rebellion seeds also generated in the mind of Waiyaki, but he seems bound between his two worlds, education at Siriana mission school and responsibility given to him by his father Chege

The novel *The River Between* is written during the period of heightened nationalist concern about education and cultural identity. Waiyaki, who can be taken as an alter ego of Ngugi's himself, has devoted himself completely to this task. Opening new school and imparting Gikuyu education becomes for him the predominant concern, excluding all other areas of social enquiry. In this following stage, Waiyaki's utopian vision about opening more school on other parts of Gikuyu land, involving parents and children at a deeper level and try to distance African from colonial education and tradition is quite outstanding.

Perhaps this was the answer to a peoples longing and hopes. For a moment he becomes lost in his contemplation of education and the plans he had in mind.... He wanted to concentrate on education. Perhaps the teaching at Livingstone, which education was of value and his boys should not concern them with what the government was doing, or politics had found a place in Waiyaki's heart. (64-65)

Waiyaki is the weak hero of this novel who does not realize that radical measure has to be taken for the safeguard of interest of people. If Chege, his father is ahead of his time in warning the people about the white man, Waiyaki is behind them in not realizing the serious issues at stake. His idealism and medial position prevent him from a comfortable and convenient balance between the two worlds. Avoidance of a violent confrontation seems his first priority. Further, Ngugi tries to bridge the gulf between the two ridges by the growing love between Waiyaki and Nyambura. Now Nyambura has grown and matured through the years and yearnings for the traditional rituals and felt guilty at the thoughts. Muthoni's action and her dying words have significantly influenced and contributed to Nyambura's maturity. This is quite evident from the scene that personal relationship can be formed between Nyambura and Waiyaki but neither elders of Kameno nor the converts of Makuyu desire to discuss the possibility of an

ordinary meeting at stake. Their action further alienates them from one another.

The old rivalry went on. And it was spreading to the other ridges... Waiyaki did not like to be identified with either side; he was now committed to reconciliation. But things had gone from bad to worse. (110)

In the final analysis, Waiyaki's stature as a leader fails, not because of social and political issues but because of his personal relationship with uncircumcised Nyambura. The proposed union could have been a symbolic reconciliation between the ridges if both sides more particularly Kiama had not considered it a denial of fundamental beliefs.

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An Insight of Śiva-linga Sculpture in the Kulūta Region

Savita Kumari

Introduction

The Kulūta region presently Kullu district forms the eastern part of the Central Himachal Pradesh and the world famous Kullu Valley is situated on the banks of the river Beas. Its position lies latitude between 31° 81' and 32° 25' north and longitude between 76° 55' and 77° 55' east.¹ The Kulūta region is very rich in architectural and sculptural wealth. It possesses various *śikhara* and *pagodā* type temples which have a number of stone sculptures. Sculptures of Śaiva, Śākta and Vaisnava sects are found in a large number. The Śaiva sect seems the oldest sect in the region.

Historic Perspective of Śiva-linga in the Kulūta region

Śaivism came in the Kulūta region from the Indus valley or it had a local origin is not clear. But the first archaeological evidence of the Śaivism can be traced on the coin of Virayaśa, ruler of the Kulūta region. On the coin the symbols such as *nandipāda* and *nāga* show the Śaivite leaning of the region.² The *Kulāntapīṭha Mahātmaya* also refers to the existence of Śaivism in this region. It tells that Śiva along with other gods resided in this region. To examine Arjun Śiva assumed the guise of a *bhīla* here and bestow on him the *paśupāstra*.³

The Nirmand copper plate inscription of the *Mahāsāmant* and *Mahārāja* Samudrasena tells that Śiva was worshipped under various names – Maheśvara, Tripurāntaka, Mihireśvara and Kapāleūvara – during the seventh century CE.⁴ The copper plate inscription of Bahadur Singh the ruler of Kulūta, also indicates towards the spread of Śaiva cult in this region.⁵ Śiva has been called Daksajākānta (husband of Daksha's daughter) in the aforesaid inscription.

The Kulūta region had been a great centre of Śaiva sect in the ancient times. Nirmand, the particular area of this region is famous as *Chhuttī Kāśī*. The presence of Śiva in the sculptural art has been depicted in symbolic and anthropomorphic forms. The following paper deals mainly with the sculptures of Śiva-linga (which is symbolic form) are found in the Kulūta region. The

progress of Śaivism in this region, in the post – Gupta period is evident from the architectural and sculptural remains. The earliest Śaiva temples in the were constructed from the seventh century CE onwards. Almost all the sculptures of Śiva-linga in the region are in a state of ruins and are datable to c. seventh to fourteenth century CE.

Śiva is often represented by linga set in a 'yoni' in the several temples dedicated to the deity. The Skanda Purāna describes that the sky is shaft, the earth is its pedestal and all gods dwell in the linga. Since the whole creation finds its origin in it and rest there, it receives the name linga. In the various Śilpa texts the Śiva-lingas are divided in two classes – chala-lingas (moveable lingas) and achala-lingas (immovable lingas). They are again divided into sub-classes.⁶ Among these the mānusa linga (man – made) is a sub-class of achala-lingas which are found mostly in the Kulūta region.⁷

Sculpture of Śiva-linga in the Kulūta Region

The mānusa-lingas, are classified as the *Astattaraśata-linga* (one hundred and eight miniature lingas), the *Sahasta-linga* (one thousand and one lingas), the *Dhārā-lingas* (the *pūjābhāga* or *Rudrabhāga* of which is round in vertical fluted facets), the *Śaiveśṭya-linga* and the *Mukha-linga*.⁸ Lingas are almost set up in the *pindikās* or *pīṭha*

as (pedestals) in various shapes – square, oblongular, octagonal, elongated octagon, elongated hexagon, duodecagon, elongated duodecagon, sixteen sided, regular or elongated, circular, elliptical, triangular and semi-circular, in plain.⁹ Both square and round *pīṭhas* are in fashion in the Kulūta region. The upper surface of the *pīṭhas* is so shaped as to allow free flow of water towards the water spout out known as *nāla*.

At present, in the Kulūta region, most of the śaivite temples enshrine lingas in their *garbhagrihas* as the main object of worship. Most of the lingas, found in the region, are simply rounded at the top with octagonal shafts and square bases. The topmost rounded part is the *Rudrabhāga*, the middle octagonal part is the *Viṣṇubhāga* and the lowest square part is the *Brahmabhāga*.¹⁰

First we will study the lingas with the round *pīṭhas* or *pindikās* (pedestals) which have been numerous in the Kulūta region. In the Viśveśvara Mahādeva temple at Bajaura, the Śiva-linga has been established on the round *pīṭha* (pl. I). It is built in proportion to the sanctum as diameter of the *pīṭha* is 96 cm and diameter of the linga is 32 cm, i.e. one-third of the *pīṭha*. *Rudrabhāga* is 27 cm. Its octagonal part (*Viṣṇubhāga*) has been inserted in the *pīṭha* which rests on *Brahmabhāga*. The length of the *nāla* is 24 cm, i.e. one-fourth of the side of the *pīṭha*.¹¹ The

Viṣṇudharmottara refers to the upper round portion of the *linga* should be visible as in the pl. I, below it the octagonal part (*Viṣṇubhāga*) should be inserted in the *pītha*, and further below the square portion should be in the *Brahmbhāga*.¹²

The Daksani-Mahādeva temple at Nirmand possesses a similar *Śiva-linga* in the *garbhagraha*. But the difference is that the *linga* in the *garbhagriha* of Viśveśvara Mahādeva temple at Bajaura is simple whereas the *linga* in the *garbhagriha* of the Dakasni-Mahādeva temple is surrounded by mini images may be *ganas* (pl. II). It is not a *mukha-linga* since these images are neither as is described in the *Śilpa* texts nor like *Astottarta-śata-linga* or *Saharsa-linga*.¹³ Several *lingas*, which have round shaped *pīthas*, have been found with little differences in the complexes of the temples in various places of the Kulūta region such as Ani, Behna, Dalash, Nirmand, Bajaura, Naggar, Jagatsukh, Manali. But it is not possible to give the details of those all in this paper.

Now we will study the *lingas* with square *pīthas* or *pindikās* (pedestals). This kind of *lingas* are less in number in the Kulūta region. Mainly this kind of *lingas* are found at Bajaura. In the yard of the Viśveśvara Mahādeva temple at Bajaura and a temple at Hat village hardly two metre far from Viśveśvara Mahādeva temple. One *Śiva-linga* (pl.III). The *pītha* is established in the centre of the *garbhagriha* of the temple which in square shape. On the *pītha*, *linga* is inserted at the centre. The upper round portion (*Rudrabhāga*) is visible as the *Viṣṇudharmottara* refers to. The octagonal portion (*Viṣṇubhāga*) has been inserted in the *pītha* which rests on *Brahmbhāga*. There are other *lingas* with square *pīthas* but several are in fragmentary condition and many *pīthas* has lost the original *lingas*. Therefore, the details of other such kind of *lingas* is difficult to give.

In addition to the aforesaid two kinds of *lingas*, there are some *lingas* without *pītha*. These are found in the complex of Ambikā Devī, Daksani-Mahādeva, Parshu Ram and Viśveśvara Mahādeva temples Nirmand. These *lingas* have round *Rudrabhāga*, octagonal *Viṣṇubhāga* and square *Brahmbhāga*. The proportion of the *Brahmbhāga*, *Viṣṇubhāga* and *Rudrabhāga* of the *linga* in the yard of Ambikā temple is 5 :5 : 6 as given in the *Śilpa* texts and such *linga* is known as *Suredhya linga*.¹⁴

Conclusion

After a careful analysis we come to the conclusion that the sculptures of *lingas* in the Kulūta region are mainly in two kinds i.e. *lingas* with round and square shaped *pīthas*. The several *lingas* are established in the *garbhagrihas* of the temples for worshipping. This depicts that Śiva was worshipped in the symbolic

form. *Lingas*, such as in the *garbhagriha* of Viśveśvara Mahādeva temple at Bajaura and in the complex of the Ambikā Devī temple at Nirmand, show that the sculptors of this period followed *Śilpa* texts. The paper throws light on the evolution and various form of *linga* sculpture in the Kulūta region between sixth and fourteenth century CE. Although several sculptures of *lingas* have been found in scattered form in the complexes of temples all over the region but are in poor state due to lack of proper care and protection.



Pl. I. Śiva-linga with round pitha in the garbhagriha of the Viśveśvara Mahādeva Temple at Bajaura.



Pl. II. Śiva-linga with round pitha in the garbhagriha of the Daksani Mahādeva Temple at Nirmand.



Pl. III. Śiva-linga with square pitha in a temple at Hat village near Viśveśvara Mahādeva Temple at Bajaura.



Pl. IV. Śiva-linga in the complex of the Ambikā Devī Temple at Nirmand.

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Sustainability Reporting in India: A Step Towards Becoming More Responsible

Shish Pal Sinhmar and Ajay Solkhe

Abstract

THE FRIEDMAN'S formulation that "the business of business is business" has outlived its utility, social responsibility and being a good corporate citizen are the buzzwords today. Therefore, an organization needs to operate a business in a manner that meets or excels the ethical, legal, commercial and public expectations that a society has from the business. Over the years India has emerged as a major global economic power and that is why the disclosures on sustainability in the annual reports of the company affect its image all over the globe. The changing environment has forced companies globally to look beyond financial performance for growth, expansion and enhancing stakeholder's confidence. Sustainability reporting is a vital step towards achieving sustainable global economy and acting more responsibly. It has gained importance over the years as it brings transparency, reputation, builds brand value and trust. Widespread sustainability reporting make markets function more efficiently and indicate towards the health of the economy. A large number of Indian Companies are using sustainability reporting as a tool to create a competitive advantage in the market. All stakeholders are directly benefiting from it and the positive impact on environment, society is quite evident. The report, co-produced by the Indian Institute of Management (IIM), Udaipur, and business advisory Futurescape Netcoms, found that 26% more companies published business responsibility reports (BRR) and 11% more companies published sustainability reports. The study looked at information filed by companies in 2015-2016. As of 25 August 2017, a total of 89 organizations released 107 sustainability reports that use or reference the GRI framework in 2016 and 2017, according to the GRI Sustainability Disclosure Database. This paper focuses on the development of sustainability reporting in India, benefits, intention of Indian Companies towards sustainability reporting, and challenges ahead.

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Keywords: Sustainability Reporting, GRI, Financial Performance, Environment, Stakeholders.

Introduction

In the year 1962 Friedman formulated that “*the business of business is business*” i.e. the only motive of companies should be to increase profits and take care of shareholders and not society as a whole. However due to changing expectations the above formulation has outlived its utility, being socially responsible and a good corporate citizen are the buzzword today. Businesses can be successful in the long run only when society as a whole is satisfied with their contributions towards the society. Due to changes in the way of doing business across the world, companies have been forced to look beyond profit- maximization approach and move towards socially responsible approach which is more inclusive and take care of stakeholders and not just shareholders. *World Business Council for Sustainable Development (2002)* defined Corporate Sustainability as - “the commitment of business to contribute to sustainable economic development, and to work with employees, their families, the local community and society at large to improve their quality of life.” The reasons for change in perception are due to the fact that the activities of business houses have harm the society and environment in the many forms such as pollution, change in climate, health, poverty, education and development. And globally there is a feeling that companies should give back to the society in which they operate.

The increasing environment concerns has forced companies globally to look beyond financial performance for growth, expansion and enhancing stakeholder's confidence. In India sustainability reporting has gained importance over the years as it brings transparency, reputation, builds brand value and trust. This raises the need of accurately and transparently accounting for and reporting these activities. For this sustainable reporting was used as a tool for measuring performance and looked upon as a viable solution for sustainable development. Sustainability reporting is a vital step towards achieving sustainable global economy and acting more responsibly. *Global Reporting Initiative (2011)* defines “Sustainability Reporting” as – “*The practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development.*” Widespread sustainability reporting make markets function more efficiently and indicate towards the health of the economy. A large number of Indian Companies are using sustainability reporting as a tool to create a competitive advantage in the market. A comprehensive reporting (SR) framework developed by GRI is widely used in India and abroad. Various countries all over the World are scrutinizing companies under the different dimensions of sustainable development. SR or NFR (Non-financial reporting) is all about communicating the social and environmental effects of organization to the society.

Global Reporting Initiative (GRI) - Concept & Background

The story of Global Reporting Initiative (GRI) started in 1997 as a joint project of the Coalition for Environmentally Responsible Economies (CERES) and the United Nations Environment Program (UNEP) that aimed to enhance the quality and utility of sustainability reporting. It is an international, non-profit, network-based organization whose aim is to build comprehensive sustainability reporting guidelines which can be widely used by companies globally. The Sustainability reporting Guidelines are the basis and spine of GRI Framework. The main goal of the organization is to create a globally accepted common framework for reporting by companies on its economic, environmental and social impacts. Analysis of sustainability reports confirms that vast majority of companies are using GRI and its popularity and acceptability has grown globally. Of the World's largest 250 corporations, 93% report on their sustainability performance and 82% of these uses GRI's Standards to do so (Haldar, 2015).

Other organizations and standards related to sustainability reporting include International Integrated reporting Council (IIRC) - formed in August 2010, United Nations Environment Programme Finance Initiative (UNEP FI), ISO 14063: 2006 on Environment Management & Environment Communication, AA1000 Accountability Principles Standard (AA1000APS-2008), AA1000 Assurance Standards (AA1000AS-2008), Social Accountability 8000 (SA8000), etc.

Significant Milestones of GRI

The Milestones of GRI are as follows:-

Table 1: Milestones of GRI

Year	Guidelines
2000	GRI 1
2002	GRI G2
2006	GRI G3
2013	GRI G4

The GRI sustainability reports are prepared on the basis of certain best principles which define the contexts and quality of reports. These include:

- Materiality
- Stakeholders Inclusiveness
- Sustainability Context
- Completeness
- Balance

- Comparability
- Accuracy
- Timeliness
- Clarity and
- Reliability.

The standard disclosures under GRI Sustainability Reporting Guidelines include- Strategy and Analysis, Organizational Profile, Report Parameters, Governance, Stakeholders Engagement, and Management Approach and Performance Indicators, i.e. Economic, Environmental, and Social Performance Indicators. Social indicators are again divided into 4 categories:

- Labour Practices and Decent Work
- Human Rights
- Society and
- Product Responsibility.

GRI has also provided guidance for sectors and by year 2012 it has published 10 sector supplements versions of its Guidelines, tailored to address the sustainability issues of specific sectors.

Definition- Sustainable Development and Reporting

There exist many definitions of sustainability around the world given by various authors, which initially begin from the 1987 UN definition, very popularly known as the Brundtland Report.

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (Brundtland 1987)”

There is always argument over the exact interpretation of the definitions but here it is important to concentrate on the commonality i.e. sustainability. Real development will make sense when we concentrate on economic, social and environmental concerns of the society to have a good quality life in the present and in the near future.

Sustainability Reporting is also known as Ecological Footprint Reporting, Environmental Social Governance (ESG) reporting, Triple Bottom Line (TBL) reporting, Corporate Social Reporting (CSR) reporting. *Under GRI Sustainability Reporting Guidelines (G4)*, sustainability reporting is defined as “a process that assists companies in setting goals, measuring performance and managing change towards a sustainable global economy-one that combines long

term profitability with social responsibility and environment care. Sustainability reporting is the key platform for communicating the company's economic, environmental, social and governance performance, reflecting positive and negative impacts”.

Sustainable Reporting Initiative in Indian Scenario

Over the years India has emerged as a major global economic power and that is why the disclosures on sustainability in the annual reports of the company affect its image all over the globe. Sustainability reporting is a vital step towards achieving sustainable global economy and acting more responsibly. A large number of Indian Companies are using sustainability reporting as a tool to create a competitive advantage in the market. India forms a very small percentage of all the sustainability reports published globally. According to the report Carrot & Stick (2013), as one of the fastest growing economies in the World and the tenth largest country by nominal Gross Domestic Product, India plays a strategic role in the global debate on Sustainability Reporting. Reporting has increased after the establishment of Focal point in India. The GRI Focal Point, India was established in January 2010 and it was hosted by the German International Corporation, India (GIZ). The Focal Point has an important strategic collaboration with IICA (Indian Institute of Corporate Affairs), under the Ministry of Corporate Affairs, GOI and German International Corporation, India (IICA-GIZ). National Voluntary Disclosure Frameworks were prepared as a part of IICA-GIZ, Corporate Social Responsibility Initiative which facilitated the development of NVG Guidelines. And in 2012 as per the directives by SEBI, top 100 companies as per market capitalization were required to release Business Responsibility Reports (BRRs) based on NVGs.

Milestones –Till Date

Table 1.2: Recent Milestones of SR in India

Year	Description
2009	Release of Voluntary Guidelines on Corporate Social Responsibility (CSR) by the Ministry of Corporate Affairs (MCA) of the GOI.
2011	Launch of NVG Guidelines. (Based on 9 Principles)
2012	SEBI releases a circular which mandates inclusion of Business Responsibility Reports as part of the Annual Report of top 100 listed companies based on Market Capitalization of the NSE and the BSE.
2013	Release of Guidelines on CSR and Sustainability for Central Public Sector Enterprises.
2013	Section 135 of Companies Act 2013 stipulates that companies with net worth of more than Rs 500 Crores/turnover of more than Rs. 1000 Crore/ net profit of more than 5 Crore will be required to spend atleast 2% of the average net profits on CSR activities.
2017	GRI launched the First Global Standards (36) for sustainability reporting in Mumbai in collaboration with BSE Ltd, CII and Yes Bank.

Source: Global Reporting Initiative

Sustainability Reporting – Recent Developments

The report, co-produced by the Indian Institute of Management (IIM), Udaipur, and business advisory Futurescape Netcoms, found that 26% more companies published business responsibility reports (BRR) and 11% more companies published sustainability reports. The study looked at information filed by companies in 2015-2016. As of 25 August 2017, a total of 89 organizations released 107 sustainability reports that use or reference the GRI framework in 2016 and 2017, according to the GRI Sustainability Disclosure Database.

Under the NVGs, as per the 2012 directives by Securities Exchange Board of India (SEBI), top 100 companies as per market capitalization were required to release Business Responsibility reports (BRRs) based on NVGS; *this has been extended 500 companies beginning April 2017*. The GRI has also launched the first global standards (*36 Standards*) for sustainability reporting in Mumbai in collaboration with BSE Ltd, CII and yes Bank Ltd. These standards are aimed at enabling companies globally to be more transparent about their impacts on the economy, the environment and society.

Sustainability Reporting – Benefits & Challenges

India has made long strides in the area of sustainability reporting towards achieving a sustainable economy. Widespread sustainability reporting make markets function more efficiently and indicate towards the health of the economy. All stakeholders are directly benefiting from it and the positive impact on environment, society is quite evident. Reporting Information helps the government in assessing the impact and contribution made by the companies towards the economy, environment and society. It brings transparency, reputation, builds brand value and trust. These practices tell us about the progress made by all organizations towards a sustainable future and inclusive growth plus organizations use this information to make their strategies to cover risk, boost their businesses & gain competitive advantage in the market. All stakeholders benefit from it and the positive impact on the society as a whole is quite evident. Some of the major benefits include:

- Better financial performance
- Good Stakeholder relationships through participation and communication.
- Improved Trust
- Better business opportunities/New Markets
- Transparency
- Increased Brand Value
- Attract Investors etc.

The major challenge for the companies has been to gather and monitor the large amount of data required for the annual reports. It is a very time consuming and a costly exercise. Many business houses see it as an increase in red tapism and increase direct cost. Another important challenge is the coordination among various countries/ associations related to frameworks/guidelines. Some of the significant challenges to be tackled are as follows:

- Developing and implementing data gathering systems
- Time for Inputting Data
- Lack of necessary expertise for reporting
- Less availability of analytical tools and techniques
- Preparation of Reports
- Less attention given to detailed reports, there should be brief and concise versions of detailed reports.

Conclusion

The progress made by the Indian Companies in reporting – (both mandatory/Voluntary) is significant. Various studies indicate that Indian Companies are conscious in reporting about sustainability but still a lot needs to be done in the area of sustainable development. The efforts put by companies should be visible on the ground, only then it will make a difference and make this planet earth a better place to live a dignified life. Moreover Indian organizations need to come out with innovative ideas for addressing sustainable issues such as education, climate change, water management, health, poverty, natural resource management etc. Ernst Ligteringen, CEO of GRI has rightly pointed out that “The future is not a printed report- there is still far too much greenwash, too many collections of nice stories, too little of commitments to the future. Materiality cannot be determined only in the eyes of the reporting company.”

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Academic Anxiety and Family Environment in Relation to Achievement in Science

Rajender Singh and Surender Kumar Sharma

Abstract

THE PURPOSE of this paper was to investigate the academic anxiety and family environment of students of Sr.Sec.school of Mandi District of Himachal Pradesh. The study was conducted among Sr.Sec. Schools situated in Himachal Pradesh affiliated to HP Board of School Education Dharmshala. For this research work the researcher used Academic anxiety scale for children by Singh and Gupta Family Environment Scale (FES) by Bhatia and Chadda and Achievement test in Science prepared by the investigator. Researcher finds out Mean, Median S.D. Skewness and Kurtosis for testing null hypothesis and find that there is no significance difference among both variables.

Key Words: Academic anxiety, family environment

INTRODUCTION

Academics have become an important factor as far as achievement is concerned. Each student wants to excel in every subject. The role of family also becomes prominent in the achievement of a child. Many researches have been conducted on Anxiety, family environment and achievement from time to time. Nowadays, the changing family environments and growing rate of changes in the academic scenario like changes in the HPSEB patterns, contribute to the academic anxiety amongst the students and this has made it important to study these variables in the present context.

OBJECTIVES

1. To study the relationship between academic anxiety and achievement in science of class 10th students.
2. To study the relationship between family environment and achievement in

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science of class 10th students.

3. To study the relationship between academic anxiety and family environment of class 10th students.

HYPOTHESES

1. There exists no significant relationship in academic anxiety and achievement in science of class 10th students.
2. There exists no significant relationship in family environment and achievement in science of class 10th students.
3. There exists no significant relationship in academic anxiety and family environment of class 10th students.

DELIMITATION OF THE STUDY

1. The study will be limited to the government schools of Mandi Distt of Himachal Pradesh.

2. The study will be limited to 10th class Himachal Pradesh board of School Education Dharmshala.

SAMPLE

The population for the present research paper is the students studying in class 10th class of government schools of Himachal Pradesh. In the present study a representative sample of 100 students (boys and girls) of 10th class from two government senior secondary schools of Mandi District of Himachal Pradesh was collected randomly. The schools were selected randomly and 50 students from each school were taken as cluster. The data was collected from the selected schools after getting the permission from the school authority.

TOOL

In the present study the following standardized tools are used:

1. Academic anxiety scale for children by Singh and Gupta (2009) to measure the Academic anxiety of high school students.
2. Family Environment Scale (FES) by Bhatia and Chadha (2009) to measure the Examination Anxiety of the high school students.
3. Achievement test in Science prepared by the investigator.

METHOD

The population for the present study is the students studying in class 10th class of government Sr.Sec.Schools of Mandi District. In the present study a representative sample of 100 students (boys and girls) of 10th class from two government senior secondary schools of Mandi District of Himachal Pradesh was collected randomly. The schools were selected randomly and 50 students from each school were taken as cluster. The data was collected from the selected

schools after getting the permission from the school authority.

DESCRIPTIVE STATISTICS

Descriptive statistics refers to those statistical techniques which are used to condense and summarize quantitative data, for the purpose of converting a mass of numerical data into a mathematical model that may be more readily comprehended and discussed. The data has been organized and described to yield statistics namely frequency distribution, mean, median to study the general nature of data for variables of academic anxiety, family environment and achievement in science. Skewness and kurtosis were also used in order to see trend and nature of distribution of scores of variables. The values, results and discussion of various selected variables of study have been presented in the following pages. The techniques of descriptive statistics used in present study are mean, median, standard deviation, skewness and kurtosis.

TABLE 1 Frequency distributions of scores of Academic Anxiety

Class interval	Mid point	Frequency	Smoothed frequency
1-5	3	4	16
6-10	8	44	29
11-15	13	39	31.66
16-20	18	12	17
21-25	23	0	4.33
26-30	28	1	0.33

TABLE 2 Table Showing Mean Median, S.D, Skewness and Kurtosis of Academic Anxiety

N	Mean	Median	Standard deviation	Skewness	Kurtosis
100	11.17	11.00	3.990	1.299	3.972

INTERPRETATION

Table 1 shows the frequency distribution of the scores of academic anxiety variable which shows the tendency of the distribution is towards normal. This is supported by the fact that the values of mean, median are 11.17 and 11.00 (Table 2) respectively which are closer to each other. The value of skewness is 1.299 which shows that the mean scores are positively skewed and thus the distributions are skewed to the right which means that the scores are massed at the low end of the scale and spread out gradually towards high or right end of the curve. The value of kurtosis is 3.972 which is greater than 0.263 which indicates that the distribution of scores in this case is platykurtic and is more flatter than normal as shown in fig. 1.

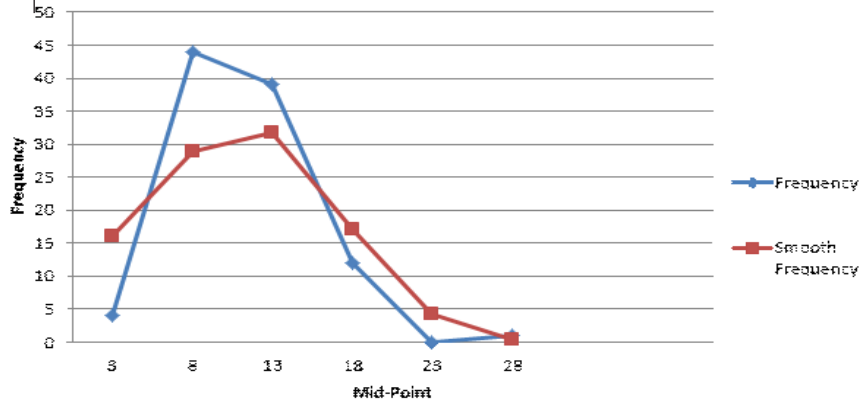


Fig 1

Line Graph Showing Frequency Distribution of Academic Anxiety of High School

TABLE 3

Frequency Distributions of Scores of Family Environment

Class interval	Mid point	Frequency	Smoothed frequency
171-190	180.5	1	4.66
191-210	200.5	13	12
211-230	220.5	22	22.33
231-250	240.5	32	22
251-270	260.5	12	17.33
271-290	280.5	8	10.33
291-310	300.5	11	6.66
311-330	320.5	1	4

TABLE 4

Table Showing Mean Median, S.D, Skewness and Kurtosis of Family Environment

INTERPRETATION

Table 3 shows the frequency distribution of the scores of family environment variable which shows the tendency of the distribution is towards normal. This is supported by the fact that the values of mean, median are 243.93 and 241.50 (Table 4.4) respectively which are closer to each other. The value of skewness is 0.473 shows that the mean scores are positively skewed and thus the distributions are skewed to the right which means that the scores are massed at the low end of the scale and spread out gradually towards high or right end of the curve. The value of kurtosis is -0.307 which is less than 0.263 which indicates that the distribution of scores in this case is leptokurtic and is more peaked than normal as shown in fig. 1.2.

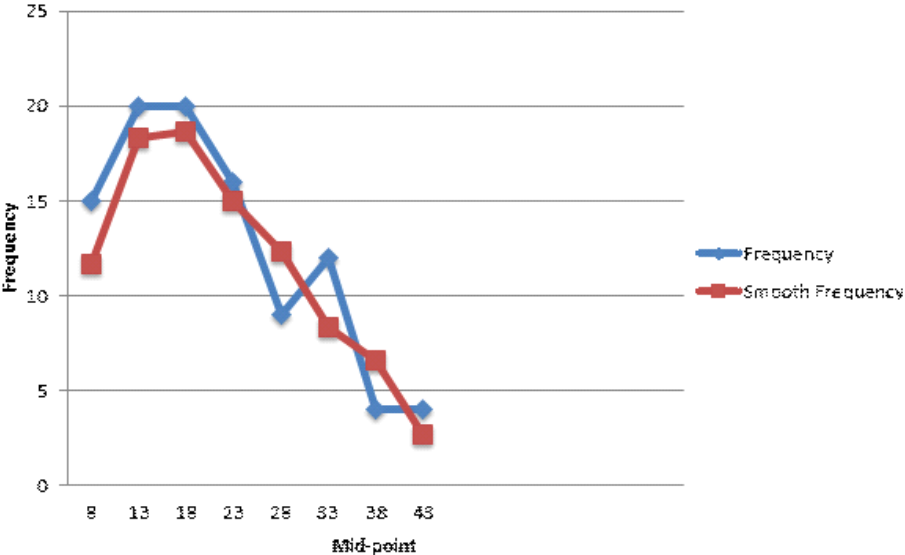


Fig 2 Line Graph Showing Frequency Distribution of Family Environment of High School Students

TABLE 5 Frequency distributions of scores of Science Achievement Test

Class interval	Mid point	Frequency	Smoothed frequency
6-10	8	15	11.66
11-15	13	20	18.3
16-20	18	20	18.66
21-25	23	16	15
26-30	28	9	12.3
31-35	33	12	8.3
36-40	38	4	6.6
41-45	43	4	2.66

Table 5 Table Showing Mean Median, S.D., Skewness and Kurtosis of Achievement Test in Science

N	Mean	Median	Standard deviation	Skewness	Kurtosis
100	20.770	18	9.638	0.594	-.523

INTERPRETATION

Table 5 shows the frequency distribution of the scores of achievement test in science variable which shows the tendency of the distribution is towards normal. This is supported by the fact that the values of mean, median are 20.770 and 18 respectively which are closer to each other. The value of skewness is 0.594 shows the mean scores are positively skewed and thus the distributions are

skewed to the right which means that the scores are massed at the low end of the scale and spread out gradually towards high or right end of the curve. The value of kurtosis is -0.523 which is less than 0.263 which indicates that the distribution of scores in this case is leptokurtic and is more peaked than normal as shown in fig. 3.

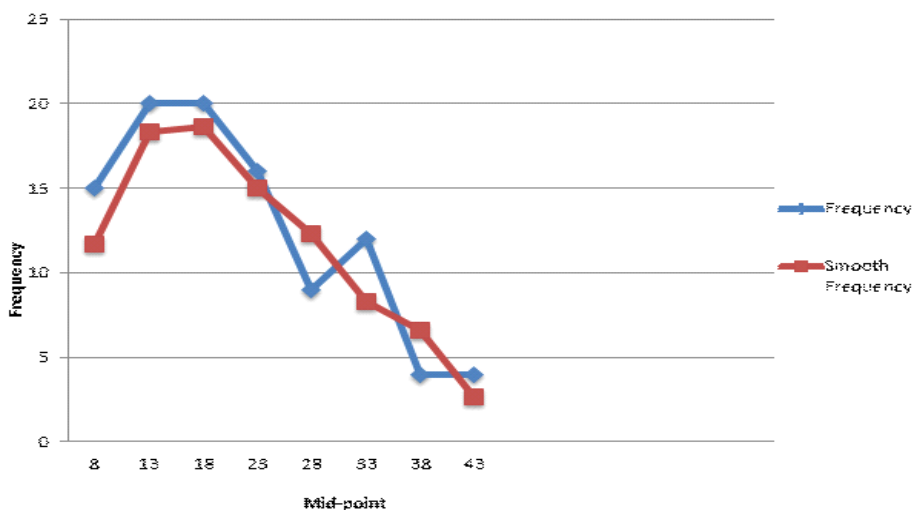


Fig 3

Line Graph Showing Frequency Distribution of Achievement Test in Science of High School Students

INFERENCE STATISTICS

Inferential statistics refers to those statistical techniques which are based on the theory of mathematical probability and are used to induce generalizations about a population from a sample of that population. Inferential statistics provides techniques for estimating population parameters and testing statistical hypothesis about population on the basis of sample data. The techniques enable the investigator to arrive at the probability statements about a population. So in the present study Product - Moment coefficient of correlation has been used as one of the techniques of inferential statistics.

INTERPRETATION AND DISCUSSION ON THE BASIS OF CORRELATION

1. The 1st objective of the study is to study the relationship between the academic anxiety and achievement in science. It was tested by employing Product - Moment coefficient of correlation.

TABLE 4**Table Showing Correlation Between Academic Anxiety and Achievement Test in Science**

Variable	N	Coefficient of Correlation (r)
Academic anxiety and achievement in science	100	.016

INTERPRETATION

It reveals that the correlation between academic anxiety and achievement in science is 0.016 which means that a positive correlation between the two variables exists. As the value is very low the correlation is not significant. Hence, the null hypothesis i.e. there is no significant correlation between the academic anxiety and achievement in science is accepted.

1. The 2nd objective of the study is to study the relationship between the Family environment and achievement in science of high school students. It was tested by employing Product- Moment coefficient of correlation.

TABLE .5**Table Showing Correlation Between Family Environment and Achievement in Science**

Variable	N	Coefficient of Correlation (r)
Family environment and Achievement in Science	100	0 .027

INTERPRETATION

Table 4 reveals that the correlation between family environment and achievement in science is 0.027 which means that a positive correlation between two variables exists. It is very low correlation and indicates that the correlation between the two variables is not significant. Hence the null hypothesis i.e. there is no significant correlation between the family environment and achievement in science of high school students is accepted.

1. The 3rd objective of the study is to study the relationship between the Academic Anxiety and Family Environment of high school students. It was tested by employing Product- Moment coefficient of correlation. The results are entered in table 4.5.3.

TABLE 5
Table Showing Correlation Between Academic Anxiety and Family Environment

Variable	N	Coefficient of Correlation (r)
Academic Anxiety and Family environment	100	0.075

INTERPRETATION

Table 5 reveals that the correlation between Academic Anxiety and Family Environment is 0.075 which means that a positive correlation between two variables exists. It is very low correlation and indicates that the correlation between the two variables is not significant. Hence the null hypothesis i.e. there is no significant correlation between the Academic Anxiety and Family Environment of high school students is accepted.

SUMMARY

The result of the present study supports the hypotheses that there is no significant correlation between academic anxiety, family environment and achievement in science of high school students. Though the achievement in science shows a positive correlation with academic anxiety and family environment but the values does not comes out to be significant. Similarly academic anxiety and family environment does not show significant correlation.

FINDING

- There was no significant correlation between academic anxiety and achievement in science of high school students.
- There was no significant correlation between family environment and Achievement in science of high school students.
- There was no significant correlation between Academic anxiety and family environment of high school students.

EDUCATIONAL IMPLICATIONS

Teachers can work out the reasons and conditions of high academic anxiety among children thereby making efforts to reduce it.

1. This study will help the teachers to formulate teaching strategies keeping in view improving the achievement of the student.
2. This study will help pupils to handle the anxiety and will help them to improve their academic performance.
3. This study will help the parents and teachers to guide the students with

the help of counselors to overcome the problem of high academic anxiety and low achievement

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A Comparative Study of Vocational Aspiration Among Rural and Urban IX Grade Students in Himachal Pradesh

Surender Kumar Sharma

Abstract

PRESENT STUDY has been done to know the vocational aspiration among rural and urban 9th grade students. Descriptive research design was used to accomplish the objective of the study. A sample of 200 students was taken from one district of Himachal Pradesh for the study. The investigator has used stratified random sampling technique and data was collected with the help of Occupational Aspiration Scale. T- test was used for analysis of data. The finding of the study revealed that there is no significant difference and exists significant difference between rural and urban IX grade students on vocational aspiration.

Keywords: Vocational Aspiration, Rural and Urban, IX grade Students.

INTRODUCTION

Vocational aspiration helps an individual to shape his career and plan for future how to earn his livelihood. One should make an intelligent choice of vocation. It should be according to the abilities, capacities, capabilities and potentialities of the students. Guidance services also help the individual to understand him and the world of work, which helps the individual to choose the right field from innumerable opportunities open to him. It has been rightly said that the choice of vocation is the most important thing in one's life and should not be left chance. Choosing the vocation, in reality is choosing a way of life. The better the way of life of people of nation, the better would be the fate of the nation.

Occupation may be viewed as organizations of social roles. They are positions to prove their skill, system of rights and duties, like and dislikes towards things and

activities of vocational significance. Occupations are sets of expectations as these are sometime specified in the job description of civil service or business and industrial concerns. These job specifications describe the actions expected of the worker and the actions which may expect from others with whom he is working.

When the word 'aspiration' has caught the world attention, the meaning of the term should also be clear. Many philosophers, educationists and psychologist have interpreted the word in different way but all agree the aspiration refer to a person's orientation towards goals mostly idealistic ones.

The study attempts to find out whether the vocational aspiration of the ix grade students is influenced by their area of residence and sex difference.

OBJECTIVES

1. To compare the vocational aspiration of rural and urban students of IX grade.
2. To compare the vocational aspiration of rural boys and rural girls of IX grade.
3. To compare the vocational aspiration of urban boys and urban girls of IX grade.

HYPOTHESES

- 1 There will be no significant difference between rural and urban IX grade students on vocational aspiration.
- 2 There will be no significant difference between rural boys and rural girls of IX grade students on vocational aspiration.
- 3 There will be no significant difference between urban boys and urban girls of IX grade students on vocational aspiration.

DELIMITATION OF THE STUDY

1. The study was limited of IX grade students of government schools of district shimla of Himachal Pradesh.
2. A sample of 200 IX grade students i.e., 100 urban and 100 rural was randomly selected for study.
3. The study was delimited to the variables of vocational aspiration, area of residence and sex difference only.

DESIGN OF THE STUDY

Descriptive survey method of research was employed for the present paper. This method is concerned with surveying, describing and investigating the existing phenomenon or issues, conditions and relationship that exist.

VARIABLES

In the present study Area of residence (urban and rural) and gender were treated

as independent variables and Vocational Aspiration as the dependent variable.

SAMPLE

In the present research paper the sample consisted of 100 urban and 100 rural IX class students studying in different Senior Secondary and High Schools of District Shimla were randomly selected.

TOOL USED

In the present study Occupational Aspiration Scale was used which was constructed by Shabnam Randhawa under the supervision of Dr. Y.K. Sharma.

STATISTICAL TECHNIQUES USED

To obtain the correct information from the data following techniques were used by the researcher:

1. The descriptive statistics like mean, standard deviation and standard error were used to ascertain the nature of distribution of the scores on vocational aspiration.
2. t- ratio was calculated to test the various hypotheses.

TESTING OF HYPOTHESES The results have been discussed in the light of the hypothesis of the study.

TESTING OF THPOTHESIS (1)

TABLE – 1

TABLE SHOWING SIGNIFICANCE OF DIFFERENCE IN MEAN SCORES OF RURAL AND URBAN IX GRADE STUDENTS ON VOCATIONAL ASPIRATION (200)

Groups	Number	Mean	S.D.	S.E.	df	t-ratio	Level of Sig.
R.	100	31.83	3.39	0.33	198	2.72	S
U.	100	30.81	3.22	0.32			

R –Rural , U – Urban ,S – Significant (t-values to be significant at df 198 should exceed value of **1.97** at **0.5** level and **2.60** at **0.1** level).

Table no. 1 indicates that 't' – ratio between the mean scores of rural and urban students on vocational aspiration is **2.72** 't' to be significant should exceed **1.97** at **0.5** level and **2.60** at **.01** level but since obtained 't' – value is more than **1.97** and **2.60** at both **0.5** and **0.1** level, so it is significant.

It indicates that there is significant difference between the mean score of rural and urban students on vocational aspiration. Hence, hypothesis I stand rejected.

TESTING OF HYPOTHESIS -2

TABLE – 2
TABLE SHOWING SIGNIFICANCE OF DIFFERENCE IN MEAN
SCORES OF RURAL BOYS AND RURAL GIRLS OF IX GRADE
STUDENTS ON VOCATIONAL ASPIRATION (100)

Groups	Number	Mean	S.D.	S.E.	df	t-ratio	Level of Sig.
R.B.	47	30.34	3.33	0.48	98	1.37	NS
R.G.	53	31.23	3.10	0.42			

R.B. - Rural Boys, R.G. – Rural Girls, NS - Not Significant ('t' -values to be significant at df **98** should exceed value of **1.98** at **0.5** level and **2.63** at **0.1** level).

RESULTS ON TABLE OF 2

Table no. 2 indicates that 't' –ratio between the mean scores of rural boys and rural girls of IX grade students on vocational aspiration is **1.37**, 't' - to be significant should exceed **1.98** at **.05** level and **2.63** at **.01** level but since obtained 't' –value is less than **1.98** and **2.63** at both **.05** and **.01** level, so it is not significant.

DISCUSSION OF RESULTS

It indicates that there is no significant difference between the mean score of rural boys and rural girls of IX grade students on vocational aspiration. Hence, hypothesis II stands accepted.

TESTING OF HYPOTHESIS -3

TABLE – 3
TABLE SHOWING SIGNIFICANCE OF DIFFERENCE IN MEAN SCORES OF
URBAN BOYS AND URBAN GIRLS OF IX GRADE STUDENTS
ON VOCATIONAL ASPIRATION (100)

Groups	Number	Mean	S.D.	S.E.	df	t-ratio	Level of Sig.
U.R.	45	31.40	3.53	0.52	98	1.14	NS
U.G.	55	32.18	3.26	0.44			

U.B. – Urban Boys, U.G.- Urban Girls, NS – Not Significant ('t' -values to be significant at df 98 should exceed value of **1.98** at **0.5** level and **2.63** at **0.1** level).

RESULT ON TABLE 3

Table no. 3 indicates that 't' –ratio between the mean scores of urban boys and urban girls of IX grade students on vocational aspiration is **1.14**, 't' - to be significant should exceed **1.98** at **.05** level and **2.63** at **.01** level but since obtained 't' –value is less than **1.98** and **2.63** at both **.05** and **.01** level, so it is not significant.

DISCUSSION OF RESULTS

It indicates that there is no significant difference between the mean score of urban boys and urban girls of IX grade students on vocational aspiration. Hence, hypothesis III stands accepted.

MAJOR FINDINGS AND CONCLUSIONS

The present study entitled as “A comparative study of vocational aspiration among rural and urban IX grade students in Himachal Pradesh.”

For the convenience results have been presented one by one according to the objectives.

CONCLUSION -1 the first objective was to compare the vocational aspiration of rural and urban students of IX grade. Table – 1 indicates that t-ratio between mean scores of rural and urban students on vocational aspiration are 2.72. As obtained 't'- value is exceeded the table value at both .05 and .01 level of significance. So, it indicates that there exists significant difference between rural and urban students on vocational aspiration.

CONCLUSION-2 The second objective was to compare the vocational aspiration of rural boys and rural girls of IX grade. Table – 2 indicates that t-ratio between mean scores of rural boys and rural girls on vocational aspiration are 1.37. As obtained 't' – value is less than the table value at both .05 and .01 level of significance. So, it indicates that there exist no significant difference between rural boys and rural girls on vocational aspiration.

CONCLUSION-3 The third objective was to compare the vocational aspiration of urban boys and urban girls of IX grade. Table – 3 indicates that t-ratio between mean scores of urban boys and urban girls on vocational aspiration are 1.14. As obtained 't' – value is less than the table value at both .05 and .01 level of significance. So, it indicates that there exist no significant difference between urban boys and urban girls on vocational aspiration.

EDUCATIONAL IMPLICATIONS

1. Proper vocational guidance should be given to the students on the basis of their capacities, abilities, interest and level of aspiration.

2. In these types of studies teacher can understand students ability and their level so aspiration. So they can suggest suitable options in which students can adjust themselves.
3. After knowing gender difference and its effect on vocational aspiration students can be guided to choose suitable vocation.
4. Students can be given proper guidance and counseling.
5. Students can make educational and social choices according to their level of aspiration.
6. From the study, it is evident that the factor of area of residence also affects the level of aspiration of the students. So it can be positively used.
7. Co-curricular activities and syllabi can be formulated according to the aspiration level of the students.
8. Adequate vocational information should be provided in school. It will enable the pupils to know about the requirements of different occupation.

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Effect of Bloom's Mastery Learning Strategy on Mathematics Achievement and Achievement Motivation Among Low Achievers at High School Stage

Reena Devi and Surender Kumar Sharma

Abstract

The said research paper involves a study of Effect of Blooms Mastery learning Strategy on mathematics Achievement and Achievement Motivation among low achiever at High School stage. The present study was aimed at studying the effect of Bloom's mastery learning strategy and conventional method of teaching on mathematics achievement and achievement motivation level of low achievers at high school stage. To realize the objectives of study, the selected sample of low achievers was divided into two groups by subject-to-subject matching on their mathematics achievement scores in previous class annual examinations. These two groups were then assigned randomly to different experimental treatments on the basis of above mentioned two instructional strategies. By applying Below mentioned statistical Techniques the investigator finds that the strategies under study are proved to be effective in improving the mathematics achievement and enhancing achievement motivation level of low achievers in mathematics, then the present study will be of great help to the teachers, students, educational planners and administrators and curriculum constructors.

Key Words:-Blooms Mastery learning Strategy, Mathematics Achievement, Achievement Motivation, low achiever, Instructional Strategies.

INTRODUCTION

The teachers use such teaching methods which aim just at scoring marks in final examination and no emphasis is given on achieving other affective and psychomotor domain objectives of teaching mathematics. In addition to this, it

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has been continuously noted that students feel afraid of mathematics. The unfavorable attitude of students towards mathematics is one of the reasons for students' low academic achievement in mathematics. This is also due to the reason that the methods used to teach mathematics are obsolete and thus, fail to arouse any interest and motivate the students. So, there is a need for using innovative teaching methods and strategies which will ultimately result in development of mathematical concepts among children and diminishing the feeling of fear towards mathematics. This will also help in enhancing the interest among students towards mathematics and motivating them to study mathematics in future. Apart from this, it will help in improving the syllabus, providing guidance to students and evaluating effectiveness of various teaching methods. So, it was thought worthwhile to undertake this type of study that will help in ascertaining the effect of such type of teaching strategy on mathematics achievement and achievement motivation level of particularly low achievers at high school stage. Further, from the review of the related literature, it was observed that no study was conducted to find out the effect of mastery learning strategies on different cognitive and non-cognitive characteristics of low achievers.

OBJECTIVES

1. To study and compare the effect of Bloom's mastery learning strategy and conventional method of teaching on mathematics achievement among low achievers at high school stage.
2. To study and compare the effect of Bloom's mastery learning strategy and conventional method of teaching on achievement motivation level of low achievers at mathematics.

HYPOTHESES

1. There will be no significant differences in mathematics achievement between low achievers taught through Bloom's Mastery Learning Strategy and conventional method of teaching.
2. There will be no significant differences in achievement motivation between low achievers taught through Bloom's Mastery Learning Strategy and conventional method of teaching.

DELIMITATIONS OF THE STUDY:

1. The study was delimited to the following teaching strategies:
 - Bloom's Mastery Learning Strategy.
 - Conventional/Traditional Method of Teaching.
2. The study was confined to 10th grade students studying in private

schools of Mandi district of Himachal Pradesh.

3. The study was restricted to the subject of mathematics and further to first four chapters of algebra namely, (i) Linear Equations in Two Variables, (ii) HCF and LCM of Polynomials, (iii) Rational Expressions and (iv) Quadratic Equations.

1. Mathematics Achievement.

2. Achievement Motivation.

Tool Selected:

In addition to formative tests and criterion referenced test in mathematics, following tool was also used for conducting the present study.

Prayag Mehta's Achievement Motivation Inventory.

Methodology and Design of the Study:

The present investigation was based on "Two Groups: Randomized Matched Subject Design". In this research design, two different teaching strategies were the independent variables and mathematics achievement and achievement motivation were the dependent variables. The students' mathematics achievement score in previous class i.e. 9th class annual examination and their previous knowledge about the content to be taught during experiment were considered as pertinent control variables. This was controlled by adopting the technique of subject-to-subject matching on students' mathematics achievement score in previous class annual examination. The students' previous knowledge about the content if any, before applying different treatments; was controlled by using the statistical technique of 'Analysis of Covariance.'

Sampling:

In the present study, the procedure of multi-stage sampling was adopted. In the first stage, thirty (35) students studying in 10th class were selected for calculating the indices of criterion difficulty (Dc) and sensitivity to instructional effects (S) for item analysis of preliminary draft of criterion referenced test in mathematics. For computing the reliability of criterion referenced test in mathematics, 42 students were selected. At the third stage, a sample of 60 students from one school and 55 students from another school were selected to conduct the experiment. These students in two groups were matched on the basis of their mathematics achievement score in previous class annual examination. Since it was difficult to get exactly the same score for combination, a match was obtained within a range of ± 5 . Finally, the sample was consisted of 64 students with 32 students in each group. Although, the experiment was conducted on all 115 students but remaining 51 students were not taken into consideration for the

purpose of data analysis and interpretation. The two groups were then assigned randomly to two experimental treatments.

DESIGN OF THE STUDY: Since the present research study was aimed at comparing the performance on (i) Criterion Referenced Test in Mathematics and (ii) Achievement Motivation Inventory of two groups of students: first following instruction through Bloom's mastery learning strategy, and the second group through conventional method of teaching. Therefore, 'Two Groups: Randomized Matched Subject Design' was used in the present study.

In an experiment, the condition or treatment which is going to alter a particular criterion is referred to as independent variable. In the present study, following two teaching strategies were treated as independent variables.

- Bloom's Mastery Learning Strategy.
- Conventional/Traditional Method of Teaching.

According to *Fox (1963)*, "the criterion by which a particular condition is evaluated is called a dependent variable." In the present study, the effectiveness of treatment was determined by the performance of low achievers on criterion referenced test in mathematics and achievement motivation inventory.

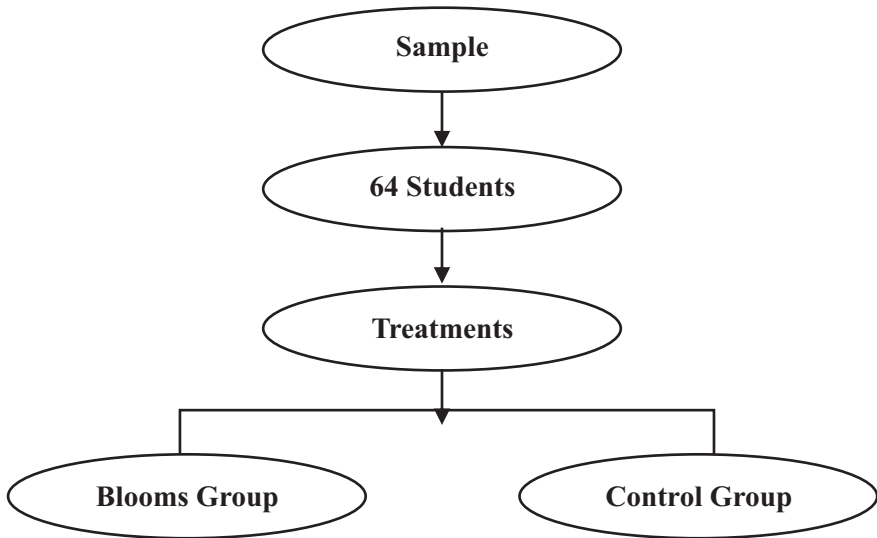
In order to achieve the desired outcome concerning the relationship of independent variables with the dependent variables, it was necessary to control the effects of certain pertinent extraneous variables. A pertinent extraneous variable is that variable which is not related to the purpose of a study but may affect the dependent variable. The term 'control' is used to indicate an experimenter's procedures for eliminating the differential effects of all variables extraneous to the purpose of the study. In the present study, the groups were made comparable on mathematics achievement in previous class i. e. 9th class annual examination. In addition to this, pertinent extraneous variables were controlled by taking pre-test scores of students with respect to their performance on criterion referenced test in mathematics and achievement motivation inventory. The effect of pre-test scores was partialled out by using the method of 'Analysis of Covariance'.

LAY-OUT OF THE EXPERIMENTAL DESIGN:

The present investigation is primarily based on "Two Groups: Randomized Matched Subject Design". The experiment was conducted on two groups of students of 10th class drawn from Tungal English Model Senior Secondary School, Gharwan and Nav Chetana High School, Kot. These two groups with 32 students in each group were formed by using the technique of matching and randomization. The matching of low achievers was done on the basis of their previous year's annual examination score in mathematics. These two groups

were designated as Bloom's group and Control group. The lay-out of the experimental design is given in Figure 4.1.

FIGURE.1
Lay-Out of the Experimental Design



DESCRIPTION OF THE EXPERIMENT:

The experiment was conducted in three phases, the description of which is mentioned here under:

Phase–I

In the first phase of the experiment, different tools namely, criterion referenced test in mathematics and achievement motivation inventory were administered to the students of two treatment groups under investigation to obtain 'pre-test scores'. The main purpose of obtaining the data in terms of pre-test scores was to find out the student's previous knowledge, if any, about the selected course content.

Phase–II

In the second phase of the experiment, Bloom's Group was imparted instruction on first unit of selected content matter using Bloom's mastery learning strategy. After imparting instruction on the first unit, students were given a formative test based on the content of the first unit taught. Then, the formative test was scored and the scores were tabulated. The students who were not able to achieve pre-

specified criterion of 80/80 were provided remedial instruction and parallel form of formative test was re-administered on the same students to check their mastery of the content. The investigator proceeded to the next unit only when 80/80 criterion was achieved by the students. The same procedure was followed for other units of selected course content.

The second group of 32 students, designated as 'Control Group' was imparted instruction on selected course content through conventional method of teaching for all eight learning units. Each unit was taught in the time as thought reasonable by the investigator. No formative test was administered and no remedial instruction was provided to this group.

The investigator himself taught two groups to eliminate the teacher effect. These experimental treatments were given for a period of six weeks.

Phase –III

After the completion of the instruction, criterion referenced test in mathematics and achievement motivation inventory were re-administered on them. The scores thus obtained were tabulated and termed as 'post-test scores'. Here, it is worth mentioning that at the time of post test data collection, 2 students were absent from the control group and hence, the final analysis of data was carried out on 30 students in each group.

ANALYSIS AND INTERPRETATION OF DATA

The present study was aimed at studying the effect of Bloom's mastery learning strategy and conventional method of teaching on mathematics achievement and achievement motivation level of low achievers at high school stage. To realize this objective, the selected sample of low achievers was divided into two groups by subject-to-subject matching on their mathematics achievement scores in previous class annual examinations. These two groups were then assigned randomly to different experimental treatments on the basis of above mentioned two instructional strategies. The pre-test and post-test scores of the selected students were obtained by administering criterion referenced test in mathematics and achievement motivation inventory before and after the completion of the experiment. The data thus obtained was tabulated separately for different treatment groups under each variable. These pre-test scores were used as covariates to partial out the initial differences if any, among the low achievers in different treatment groups on different variables.

STATISTICAL TECHNIQUE EMPLOYED:

For further analysis of obtained data, the statistical technique of 'Analysis of Covariance (ANCOVA)' was employed by following the procedure given by Ray (1960). It represents an extension of analysis of variance that tests the

significance of differences between means of final experimental data by taking into account the correlation between the dependent variables and one or more covariates or pertinent control variables, and by adjusting initial mean differences in the groups. Before applying the technique of analysis of covariance, the data pertaining to variables namely; mathematics achievement and achievement motivation was tested for certain basic assumptions underlying the statistical technique of analysis of covariance.

TABL1
Values of Chi-Square for Testing Homogeneity of Variances of Scores on Criterion
Referenced Test in Mathematics and Achievement Motivation Inventory

Sr. No.	Group	df	Obtained Value of χ^2
1	Mathematics Achievement Bloom and Control	1	2.491
2	Achievement Motivation <i>Bloom and Control</i>	1	1.736

From Table 5.1, it is clear that obtained values of 2 for testing the assumption of homogeneity of variance for two treatment groups on different variables, namely mathematics achievement and achievement motivation are less than the table value (3.841), for df 1, to be significant at 0.05 level. Hence, the variance within the treatments on all the variables was treated to be homogeneous.

Assumption of Constant Effect of Treatments

The assumption that the effect of treatments was constant and additive on the responses of the subjects in the groups on which the treatments were imposed was tested by using the procedure described by *Ray (1960)*. This test employs a variance ratio calculated in terms of F-value. The 'F-values' for testing the assumption of additivity for two groups under study, were computed by taking into account the post-test data on different variables. The results are given in Table 5.2.

TABLE 2

F-Ratios for Testing the Assumption of Constant Effect of Treatments for Two Treatment Groups on the Variables of Mathematics Achievement and Achievement Motivation

Sr. No.	Group	df	Obtained Value of F
1	Mathematics Achievement		
	Bloom Vs. Control	29/29	1.804
2	Achievement Motivation		
	Bloom Vs . Control	29/29	1.633

Table 5.2 reveals that all the 'F-values' computed to test the assumption of additivity or constant effect of treatments for different variables namely, mathematics achievement and achievement motivation for two treatment groups are less than the table value (1.90), for df 29/29 at 0.05 level of significance. Hence, the assumption of additivity was found to hold good for the data pertaining to different variables for two treatment groups.

5. Assumption of Correlation

The assumption that there should be a real correlation between dependent variable and pertinent control variable was tested by using the “Test of Significance of Correlation” as described by Ray (1960). In this test, variance ratio is computed in terms of F-ratio. In the present investigation, pre-test scores on criterion referenced test in mathematics and achievement motivation inventory were considered as pertinent control variables and post-test scores were taken as dependent variables. The summary of the results is given ahead in Table 3.

TABLE 3

F-Ratios for Testing the Assumption of Correlation between Pre-Test Scores and Post-Test Scores of Two Treatment Groups on the Variables of Mathematics Achievement and Achievement Motivation

Sr. No.	Group	df	Obtained Value of F
1	Mathematics Achievement Bloom and Control	1/57	14.63**
2	Achievement Motivation <i>Bloom and Control</i>	1/57	87.76**

** Significant at 0.01 level.

From Table 3, it is evident that obtained F-values on the variables of **mathematics** achievement and achievement motivation are significantly higher than the table value (7.08), for df 1/57 at 0.01 level of significance. Hence, the assumption of real correlation between the dependent variable and pertinent control variable is justified and that the use of pre-test scores as pertinent control variable was worthwhile in partially eliminating error from the data.

Assumption of Homogeneity of Regressions

The assumption that there should be homogeneity of regressions from group to group was tested by computing F-ratio for the 'Test of Homogeneity of Regressions' as described by *Ray (1960)*. The summary of the results is given in Table 4.

TABLE 4
F-Ratios for Testing the Assumption of Homogeneity of Regressions for Two Treatment Groups on the Variables of Mathematics Achievement and Achievement Motivation

Sr. No.	Group	df	Obtained Value of 'F'
1	Mathematics Achievement Bloom and Control	1/56	0.173 (NS)
2	Achievement Motivation <i>Bloom and Control</i>	1/56	0.2087 (NS)

NS-Not Significant

Table 4 reveals that 'F-values', for testing the assumption of homogeneity of regressions for different treatment groups on the variable of mathematics achievement and achievement motivation, for df 1/56 came out to be 0.173 and 0.2087 respectively, which are not significant at 0.05 level of significance. This result is indicative of the fact that the assumption of homogeneity of regressions was justified.

EFFECT OF BLOOM'S MASTERY LEARNING STRATEGY ON MATHEMATICS ACHIEVEMENT:

After testing all the assumptions of analysis of covariance, the investigator further proceeded to test the significance of the difference between the adjusted mean scores on mathematics achievement among two treatment groups of low achievers following two different instructional strategies, by using the statistical technique of 'Analysis of Covariance'. The summary of the results of Analysis of Covariance is given ahead in Table.

TABLE 5

**Summary of the Results of Analysis of Covariance for Scores on
Criterion Referenced Test in Mathematics for Bloom and Control Group**

Sr. No.	Components of Variability	SS	df	Variance	F-Ratio	S.D.y.x.
1	Between Treatments	4025.31	1	4025.31	129.63**	
2	Within Samples of Error	1769.66	57	31.05		5.57
3	Total	5794.97	58			

**Significant at 0.01 Level.

Table 5 reveals that the obtained value of F (129.64) is higher than the table value (7.11) at 0.01 level of significance, for df 1/57. Hence, it may be interpreted that the adjusted means of criterion referenced test scores of two treatment groups, namely, Bloom and Control group differ significantly. In order to find out the significance of the difference in the adjusted mean scores of two treatment groups, least significant differences (LSDs) at 0.05 and 0.01 level of significance were computed. The results of means of pre-test, post-test and adjusted mean scores of students of two treatment groups on criterion referenced test in mathematics are given in Table 6.

TABLE 6

**Means of Pre-Test (M_x), Post-Test (M_y) Scores and Adjusted Means (M_{y.x}) on
Criterion Referenced Test in Mathematics of Two Treatment Groups: Bloom and Control**

Sr. No.	Group	N	M _x	M _y	M _{y.x} Adjusted	Difference
1	Bloom (A)	30	39.00	66.33	64.67	15.61** A-B
2	Control (B)	30	35.03	47.40	49.06	
3	General Means (GM)		37.02	56.87	56.865	

**Significant at 0.01 Level.

For df 57, Least Significant Differences at;

- 0.05 level of Significance = 2.86
- 0.01 level of Significance = 3.80

From Table 6, it is evident that the computed value of difference in the adjusted means of criterion referenced test scores between Bloom's group and Control group came out to be 15.61, which is greater than the least significant difference (3.80) at 0.01 level of significance, for df 57. Hence, the **Hypothesis number 1** that, *"There will be no significant differences in mathematics achievement between low achievers taught through Bloom's Mastery Learning Strategy and Conventional Method of Teaching"* **is not accepted.** It may be interpreted that the adjusted mean of criterion referenced test scores of low achievers taught through Bloom's mastery learning strategy (64.67) was significantly higher than those who were taught through conventional method of teaching (49.06). Hence, Bloom's mastery learning strategy was found to be significantly more effective in the enhancing the academic achievement in mathematics of low achievers than the conventional method of teaching.

4 EFFECT OF BLOOM'S MASTERY LEARNING STRATEGY ON ACHIEVEMENT MOTIVATION:

In order to find out the effect of Bloom's mastery learning strategy on adjusted means of achievement motivation scores of low achievers at high school stage, the statistical technique of 'Analysis of Covariance' was applied. The summary of the results is given in Table 7.

TABLE 7
Summary of the Results of Analysis of Covariance for Scores on Achievement Motivation Inventory for Bloom and Control Group

Sr. No.	Components of Variability	SS	df	Variance	F-Ratio	S.D.y.x.
1	Between Treatments	63.72	1	63.72	20.42**	
2	Within Samples of Error	177.6 8	57	3.12		1.77
3	Total	241.40	58			

**Significant at 0.01 Level.

Table 7 reveals that the obtained value of F (20.42) is higher than the table value (7.11) even at 0.01 level of significance, for df 1/57. Hence, it may be interpreted that the adjusted means of achievement motivation scores of two treatment groups, namely, Bloom and Control group differ significantly. In order to find out the significance of the difference in the adjusted mean scores of two treatment groups, least significant differences (LSDs) at 0.05 and 0.01 level of significance were computed. The results of means of pre-test, post-test and adjusted mean scores of students of two treatment groups on achievement motivation inventory are given in Table 8.

TABLE 8
Means of Pre-Test (Mx), Post-Test (My) Scores and Adjusted Means (My.x.)
on Achievement Motivation Inventory for Two Treatment Groups: Bloom and Control

Sr. No.	Group	N	Mx	My	My.x. Adjusted	Difference
1	Bloom (A)	30	8.50	10.73	10.145	1.999** A-B
2	Control (B)	30	7.17	7.57	8.146	
3	General Means (GM)		7.83	9.15	9.145	

**Significant at 0.01 Level.

For df 57, Least Significant Differences at;

- 0.05 level of Significance = 0.91
- 0.01 level of Significance = 1.21

Table 8 indicates that the computed value of difference in the adjusted means of achievement motivation scores between Bloom's group and Control group came out to be 1.999, which is greater than the least significant difference (1.21) at 0.01 level of significance, for df 57. Hence, the **Hypothesis number 2** that, "*There will be no significant differences in achievement motivation between low achievers taught through Bloom's Mastery Learning Strategy and conventional method of teaching*" is not accepted.

It may be inferred that the adjusted mean of achievement motivation scores of low achievers taught through Bloom's mastery learning strategy (10.145) was significantly higher than those who were taught through conventional method of teaching (8.146). Hence, Bloom's mastery learning strategy was found to be

significantly more effective in the enhancing the achievement motivation among low achievers as compared to the conventional method of teaching.

GENERAL CONCLUSIONS:

In the light of analysis and interpretation of results, following conclusions were drawn:

1. The two treatment groups namely, Bloom's group and control group differ significantly with respect to mathematics achievement of low achievers in mathematics at high school stage. Bloom's mastery learning strategy was found to be significantly more effective in enhancing the mathematics achievement of low achievers as compared to conventional method of teaching.
2. The two treatment groups namely, Bloom's group and control group differ significantly with regard to achievement motivation level of low achievers in mathematics at high school stage. Bloom's mastery learning strategy was found to be significantly more effective in enhancing the achievement motivation of low achievers as compared to conventional method of teaching.

EDUCATIONAL IMPLICATIONS:

On the basis of conclusions of the present study, following educational implications may be drawn:

1. It was found that both Bloom's mastery learning strategy was significantly more effective in enhancing the achievement motivation of low achievers as compared to conventional method of teaching. So, the teachers should make use of Bloom's mastery learning strategy or the principles involved in this strategy like formative evaluation of the students, finding the difficulties of the students and providing them remedial instruction/corrective feedback in conventional classroom teaching, so that the interest and motivation among low achievers could be developed towards study of mathematics. The teachers can use following four steps for enhancing the achievement motivation level of low achievers in the classroom.
 - First, the learner's distress about the mistake should be acknowledged.
 - Second, the learner should be complimented by the instructor's finding something about the performance which was correct. This compliment must be about an important and relevant aspect of task; otherwise, it is likely to be discounted by the learners.
 - Third, the instructor should provide instructions on how the learner can improve upon his/her mistake.

· Last, the instructor should end with a positive note by encouraging the learner to keep trying.

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पर्यटन स्थलों की प्राकृतिक गरिमा निर्मल वर्मा के साहित्य के संदर्भ में

पूनम कुमारी

मानव के निवास स्थान पृथ्वी को बहुत से महाद्वीपों, द्वीपों, भूखण्डों, महासागरों, सागरों, पर्वतों, मैदानों, पठारों, घाटियों, वादियां आदि में विभाजित किया गया है। एक पृथ्वी की भोभा को पेड़-पौधे, फूल-फल, पशु-पक्षी, झीलें-झरने, नदी-नाले आदि मिलकर बढ़ाते हैं। कहानियों में जब अपने देश के अतिरिक्त किसी दूसरे देश के भूखण्डों का वर्णन किया जाता है तो उसे विदेशी भौगोलिक परिवेश कहा जाता है निर्मल वर्मा ने अपनी कहानियों में कुछ प्रसिद्ध पर्यटक स्थलों जैसे प्राग, चेकोस्लोव्हाकिया, लन्दन, वेनिस और पेरिस इत्यादि की गरिमा का वर्णन किया है। साथ ही उन्होंने उन भाहरों के टापुओं स्टीमरों, सड़कों गलियों तथा बाजारों का भी खूबसूरत वर्णन किया है।

निर्मल वर्मा की 'अंधेरे में' कहानी में बीरेन चाचा के माध्यम से शिमला भाहर की प्राकृतिक सुशमा के दर्शन कराये गए हैं "रेस कोर्स की भीड़ दिखाई गई है बहुत से लोग भीड़ में खो गए हैं, लेकिन एक अंग्रेज लड़की का चेहरा बिल्कुल साफ दिखता है – वह पवेलियन के पास छाता लिए खड़ी है – जबकि और सब लोगों की आँखें भागते हुए घोड़ों पर जीम है – वह गहरी उत्सुक आँखों से पीछे की ओर देख रही है – उसका इस तरह पीछे मुड़कर देखना मुझे काफी अजीब-सा लगा।" "फोटो के नीचे लिखा था, 'ऐननडेल, शिमला, 1903'.....पचास साल गुजर गए और वह वैसे ही छाता लिए पीछे मुड़कर देख रही है।"¹

शिमला एक प्रसिद्ध पर्यटक स्थल है। यहां पर लाखों सेलानी प्रतिवर्ष घूमने के लिए आते हैं। बर्फ से ढके ऊँचे-ऊँचे पहाड़ इसके सौन्दर्य को दो गुना कर देते हैं। निर्मल वर्मा की कहानी 'अंधेरे में' शिमला की प्राकृतिक गरिमा का अत्यधिक सुन्दर चित्रण प्रस्तुत करती है बीरेन चाचा बच्ची से पूछते हैं "तुमने कभी बहुत पास से किसी पहाड़ी की चोटी पर बर्फ देखी है?" उन्होंने मुझसे पूछा। मैंने सिर हिला दिया। वहां से बर्फ का रंग बिल्कुल नीला दिखता है। मैंने एक कलर्ड फोटो लिया है मैं मेज पर रखी अलबमों को उलटने-पलटने लगा। हर फोटो में शिमला का कोई न कोई दृश्य था ग्लैन, जाखू, चैटविक फाल। मैंने इन सब स्थानों को आसानी से पहचान लिया।"²

'चीड़ों पर चॉदनी है' यात्रा वृत्त में निर्मल वर्मा ने प्रकृति के सौन्दर्य का अत्यन्त मार्मिक चित्रण किया

है। कहानीकार अपने बचपन के कुछ क्षणों के विशय में बात कर रहा है। रात को सोते समय आकाश साफ़ होता था। दिसम्बर के निविड़, गहन अन्धकार में दूर की पहाड़ियाँ झाड़ंग-पेपर पर धूमिल रेखा-चित्र-सी स्तब्ध, निश्चल, दिखती थीं — इतनी महीन, इतनी म्लान कि लगता था, जैसे अंधेरे पर हाथ फेरते ही सब कुछ मिट जाएगा। आकाश कुछ नीचे सरक आता है। हम बच्चे थे, इस तरह के अजीब अद्भुत चीजों को आँखों में वसाकर लिहाफ में ठिठुरते हुए सो जाते थे। क्या यह शिमला है— हमारा अपना भाहर — या हम भूल से कहीं और चले आए हैं। हम नहीं जानते कि पिछली रात जब हम बेखबर सो रहे थे, बर्फ चुपचाप गिरती रही थी। “खिड़की के सामने पुराना, चिर परिचित देवदार का वृक्ष था जिसकी नंगी भाखों पर रूई के मोटे-मोटे गालों-सी बर्फ चिपक गई थी। लगता था, जैसे वह ‘सान्ता-क्लॉज’ हो, एक रात में ही जिसके बाल सन्-से सफेद हो गए हैं। टेलिग्राफ के तार बर्फ की परतों में लिपटकर मोटी सफेद रस्सियों की तरह आकाश में खिंच आए थे — हर कुछ क्षणों बाद इन रस्सियों पर बर्फ के ‘आइसिकल’ फ़र में लिपटी सफेद गिलहरियों से नीचे लटक आते थे।”³ “कालका और शिमला के बीच एक वीरान उपेक्षित हिल-स्टेशन है — सोलन। अँगरेजों के जमाने की कुछ कोठियाँ और बँगले यत्र-तत्र मिल जाते हैं — खाली और उजाड़ जिनके आगे टुलटुकी टूटी-फूटी तख्तियाँ झूलती रहती हैं।”⁴

शिमला प्रमुख पर्यटक स्थल है। शिमला में भीमताल नाम की एक छोटी सी झील है उसी के सौन्दर्य का वर्णन यहां वर्मा ने किया है “मन्दिर के घेरे से जरा दूर झील के पश्चिमी कोने में छोटा-सा टापू है उसके बीचोबीच पेड़ों का हरा-पीला झुरमुट है, जिनकी मटियाली छायाएं दिन-भर झील के पानी में तिरती रहती हैं। किनारे पर तीन-चार नौकाएं खड़ी रहती हैं, पर्यटकों को द्वीप तक ले जाती हैं और फिर उन्हें वापस किनारे पर पहुँचा देती हैं।”⁵

‘पहाड़’ कहानी में पति-पत्नी अपने बच्चे के साथ शिमला घूमने आते हैं। “अक्तूबर के महीने में, जब पत्ते झरने लगते हैंवे यहां आये थे। दोनों को यह पहाड़ी स्टेशन बहुत प्रिय था। विवाह के बाद कुछ दिनों के लिए वे यहां आये थेरिज की वेंच, लोअर बाजार जानेवाली पगडण्डी, पुराने चर्चयार्ड का कोना, जहाँ वे अकसर बैठते थेअक्सर बैठते थे।”⁶ ‘पहाड़’ कहानी में निर्मल वर्मा शिमला सौन्दर्य का वर्णन करते नजर आते हैं “तीनों ने एक-दूसरे का हाथ पकड़ रखा था। भुरु जाड़े के हल्के बादल थे और वे बहुत सफेद थेसमूचे पहाड़ी भाहर पर एक पीली-सी छाया उतर आयी थी। आखिरी धूप के धब्बे चीड़ की सुइयों पर लिपट गये थे सोने के छल्लों से और हवा खामोश थी। माल रोड पार करने के बाद लाइब्रेरी आयी जो चर्च के सामने थी। लाइब्रेरी की लम्बी खिड़कियों पर पत्तों की बेल झूल रही थी। जब कभी हवा का हल्का-सा झोंका आता, उनकी छाया किरिशिए से काढ़े गये बेल-बूटे-सी दीवार पर डोल जाती.....सब वैसा ही था। कुछ भी नहीं बदला।”⁷

शिमला में रिज, मालरोड़, जाखू, तारा देवी मन्दिर, कामना देवी, काली वाड़ी इत्यादि प्रसिद्ध पर्यटक स्थल हैं। पूरे वर्ष यहां पर पर्यटकों की भीड़ जमा रहती है। वह पति पत्नी और बच्चा रिज के एक कोने में खड़े थे। सामने हवाघर की बेंचे थी और उनके परे लकड़ी का जंगल था। नीचे धान की ढलान थी। जहां पर जुगनू एक दो जुगनू चमक रहे थे सामने वेंच थी। जो खाली थी उस पर धीरे-धीरे धूल और धूल से सने पत्ते इकट्ठा हो रहे थे।

‘लाल टीन की छत’ उपन्यास में निर्मल वर्मा ने शिमला के इतिहास के विशय में लिखा है। भारतीयों को शिमला के माल रोड़ व रिज पर आने की मनाही थी अगर कोई भारतीय गलती से मालरोड़ पर

चला जाता था तो उसे सीढ़ियों के रास्ते जल्दी से लोअर बाजार की तरफ भेज दिया जाता था। बुआ और काया माल रोड पर हर दिन घुमने जाया करते थे। बुआ थककर एक वेंच पर बैठ गई। वहां बहुत—सी बेंचे थी “गर्मियों में बैड वजता था, तो लोग उन्हीं बेंचों पर बैठकर लाल वर्दी में हाथ घुमाते हुए वैंड मास्टर और उसकी फौज को देखा करते थे। अब वे खाली थीं।

अब वहां कोई भीड़ नहीं थी। सिर्फ कुछ कुली और रिक्शेवाले आग जलाकर हाथ सेर रहे थे। बुआ नीचे देख रही थी। काया सामने गिरजे की ओर— जिसकी वगल से जाखू की चढ़ाई भुरु होती थी। बाईं तरफ लायब्रेरी थी, हार्डिंग लायब्रेरी — ऊपर की खिड़कियां बन्द थीं, सिर्फ उनके भीशे धूप में चमचमा रहे थे।⁸ बुआ काया को चुंगीखाना दिखाती है बुआ जैसे पहाड़ों के बीच निखरी किसी पहेली का हल ढूँढ रही हो, वह बताती है कि “उधर पहाड़ की ओट में है एननडेल जो यहां से दिखाई नहीं देता, और उधर, उस तरफ तुम्हारे बावू का मकान।”⁹ कालका से शिमला तक रेल द्वारा सफर करना काफी रोमांचक लगता है “यह समर हिल हैजब दिल्ली से लौटते थे, तो गाड़ी सिर्फ तीन मिनट समर हिल के स्टेशन पर रुकती थी। और जब तक रेल अगली सुरंग में न खो जाती, वे पीछे मुड़—मुड़कर उन पहाड़ियों को देखते रहते।”¹⁰

जलती झाड़ी में नायक कहता है कि — “यह एक टापू था, भाहर के छोर पर, जहां पहाड़ी भुरु होती है। नदी की दो धाराएं कैंची की तरह उसे बीच से काट गई थी। पुल के नीचे लम्बी घास भीगती रहती थी। किनारे पर दूर—दूर लाल तख्तों की बेंचे पड़ी थी।सांय की मद्धिम धूप में धुएं के दायरे फैल जाते थे। एक सोंधी सी गंध टापू के इर्द—गिर्द हवा में तिर जाती थी।”¹¹

टापू के इस खूबसूरत दृश्य से पाठक का मन स्वयं भी हिलौरे खाने लगता है तथा टापू की सुगन्ध से विदेश की धरती के दर्शन कहानियों से ही कर लेता है इसके पश्चात पुनः इसी कहानी में टापू का सौन्दर्य नायक के मन को मोह लेता है जब वह “अपने पास बैठी लड़की से उसके मित्र के विशय में पूछते हुए नायक उसे बतलाता है कि वह कहां छुपा है। यह बताने के लिए नायक ज्यों ही पीठ मोड़ता है उसे लड़के के बजाए टापू का सौन्दर्य मोह लेता है। वह कहता है — टापू पर डूबते सूरज की पीली, मैली सी ललहाट फैल गई थी दूर पुल के पास जलते पत्तों के ढेर से अब भी धुंआ उठ रहा था, किन्तु वह कहीं न था। सिर्फ हवा चलने से पत्ते बेंचों पर लुढ़क कर धरती पर लौटने लगते थे।”¹²

निर्मल वर्मा ‘एक भुरुआत’ कहानी में सी—गल्फ की प्राकृतिक सुशमा का चित्रण करते हैं। इटली अपने समुद्र तट, टापू, डेक तथा सी—गल्फ के लिए बहुत प्रसिद्ध माना जाता है। इस कहानी का नायक जब वियना से लौटता है तो यूरोप के प्राकृतिक सौन्दर्य को निहारते हुए कहता हैं कि “अब मैं वापिस यूरोप लौट रहा हूँ.....बीच में चैनल का समुद्र है, और दूर सागर के पर सी—गल्फ का झुंड का झुंड उड़ा जाता हैडोबर से परे यूरोप के आकाश पर।”¹³

पतझड़ में भी सौन्दर्य के दर्शन निर्मल वर्मा अपनी कहानी ‘दो घर’ व ‘लन्दन की एक रात’ के माध्यम से करवाते नजर आते हैं। विदेशों में पतझड़ के मौसम को देखकर ‘दो घर’ कहानी का भारतीय नायक आश्चर्यचकित हो जाता है तथा उसका घबराया हुआ दिल उदासी के भंवर में चक्कर काटने लगता है। वह कहता है — “पहली बार विदेश में यों भी अकेलापन खटकता है और फिर वे ढलते पतझड़ के दिन थे। घर और बाहर की बीच समूचा भाहर एक पीली छाया सा फैला रहता है। मैं गलियारे के लम्बे भीशे के बाहर देख रहा था, जहां भुरु भाम का हल्का सा अंधेरा था। पीछे नदी

थी जो पतझड़ की इकट्ठा होती धूप में छिप गई थी।¹⁴

लन्दन की एक रात' का नायक जब घास पर पत्तों को उड़ते हुए देखता है तो कहता है — “हम धीरे-धीरे कदम बढ़ाते हुए नार्थ एक्टन के पुल पर आ गए थे। लंदन की डबल- डैबर बस हमारे पास से गुजर गई थी। अगस्त महीने के पीले करारे पत्तों का रेला देर तक घास के पीछे भागता रहा।”¹⁵

‘लवर्स’ का ‘निन्दी’ सुबह उठकर देखता है — “कल रात में जागता रहा था। मैंने सोचा और बाहर सूखे पत्तों का भोर होता रहा था। सितम्बर के दिनों में बहुत से पत्ते गिरते हैं, रात भर गिरते हैं।”¹⁶ इसी प्रकार शिमला के रिज पर खड़ा ‘पहाड़’ का नायक भी उड़ते हुए पत्ते ही देखता रहता है।

कुमारु’ की पहाड़ियों पर बसने वाली लतिका की मनःस्थिति भी अजीब सी बनी हुई है। वह भी ‘चीड़ों के पेड़ों’ की छाया तथा उन पेड़ों के सुनहरे मनमोहक दृश्य को कभी भी आंखों से ओझल नहीं होने देती। वह कहती है — “वे नाले से कुछ दूर हट कर चीड़ के दो पेड़ों की गुंथी हुई छाया के नीचे बैठे थे।”¹⁷ “लतिका सुबह उठकर खिड़की से झांकती है तो उसे ‘चैपल’ के भीशों के परे पहाड़ी, सूखी हवा, हवा में झुकी हुई वीपिन विलोज की कांपती टहनियां पैरों तले चीड़ के पत्तों की धीमी सी चिर-परिचित खड़-खड़ी तथा फीकी सी चांदनी में चीड़ के पेड़ों की छायाएं लान पर गिर रही थी।”¹⁸

डायरी का खेल’ का नायक ‘बच्ची’ भी यूक्लिप्टस के पेड़ों की कतारों को निहारता हुआ कहता है — “आधी रात के समय हवा में सरसराती यूक्लिप्टस वृक्षों की टेढ़ी-मेढ़ी छायाओं के पीछे चेपल की उन सफेद दीवारों को देखकर भारीर में एक झुरझुरी सी आ गई थी।”¹⁹

निर्मल वर्मा ने विदेशी भाहरों की स्थिति का भी कहानियों में वर्णन किया है। ‘जलती झाड़ी’ में नायक भाहर की स्थिति को निहारते हुए कहता है — “शहर का सबसे पुराना पुल था, उसके परे नेशनल थियेटर की बारीक दीवारें और छतें और बीच में पुल का टावर, जो भाम को डूबती रोशनी में झिलमिला खड़ा था। किन्तु ये ऐसी चीजें थी जिन्हें हम उस भाहर में चलते हुए, गलियों में गुजरते हुए हर रोज देखते थे।”²⁰

परिन्दे की ‘लतिका’ उदासी से भरे क्षणों में जब खिड़की खोलकर प्रकृति के सुन्दर नजारे से अपना मन बहलाना चाहती है तो बाहर फिर धुंध देखती है — “सुबह की बदली छाई थी। लतिका के खिड़की खोलते ही धुंध का गुब्बारा सा भीतर घुस आया, जैसे रात भर दीवार के सहारे सर्दी से ठिठुरता हुआ वह भीतर आने की प्रतीक्षा कर रहा था।”²¹ लतिका पुनः कहती है — “स्कूल से ऊपर चैपल को जाने वाली सड़क बादलों से छिप गई थी। केवल चैपल का क्रास धुंध के परदे पर एक दूसरे को काटती हुई पेंसिल की रेखाओं सा दिखाई दे जाता था।”²²

निर्मल वर्मा की कहानियों में यूरोप के बहुत से ऐसे स्थानों का वर्णन किया गया है जिसके सौन्दर्य से नायक नायिका एवं कहानियों का सौन्दर्य निखरता है बेनिस के टापू, समुद्र के खूबसूरत तट, लन्दन की सुहानी मस्त रातें तथा भाम कें समय पार्को, बेंचों तथा हवाओं में उड़ते और बिखरते पत्ते, म्यूजियम, आर्ट गैलरीज इत्यादि मनमोहक दृश्य स्थल हैं। ‘एक भुरुआत’ कहानी में बेनिस का एक निवासी नायक से पूछता है — “क्या आप पहली बार यूरोप आए हैं तोम्यूजियम, आर्ट गैलरीज,भायद आप यही सब कुछ देखेंगे?”²³ इसके अतिरिक्त कहानियों में बुर्जियां, गुम्बद, चर्च,

गिरजाघर, सैनैटोरियर तथा पव्व इत्यादि भी खूबसूरत स्थान है।

भाहर की पहाड़ियों पर अब अँधेरे में छिप गयी थीं, किन्तु उनके ऊपर पीछे की ओर उठती हुई गोथिक गिरजे की धूमिल मीनारे एक अधभूले स्वप्न की तरह हवा में टंगी थी। उन्हें देखकर लगता था जैसे एक विशालकाय पक्षी उड़ता हुआ अचानक ठिठक गया हो, पहाड़ी और खुले आकाश के बीच उसके दोनो पंख ऊपर की ओर मुड़ गये हों – पथरा गये हों खाली हवा पर। “टापू से कुछ दूर भाहर के पुराने पुल की बतियाँ भिभकती – सी एक के बाद एक टिमटिमाती मोमबतियों—सी काँप जाती थी . . . बहते पानी को देखना भायद बहुत अजीब है। ज्यादा देर तक एकटक देखते रहो तो लगता है, हममें से भी कुछ टूट—टूटकर उसके संग बह रहा है। हमारे भीतर दूरी के जो हिस्से हैं, जिन्हें कभी—कभार सोते हुए नींद की चंद लहर भिगोकर वापस लौट जाती है, जो हमारी आधी अँधेरी जिन्दगी का हिस्सा है, लगता है, जैसे वे स्याह, गहरे पानी के भीतर से उन पर झाँक रहे हों, हमें देख रहे हो।”²⁴

अतः उपरोक्त विवेचन से स्वतः ही स्पष्ट हो जाता है कि निर्मल वर्मा की कहानियों में उन्होंने यूरोप की कुछ विशेष जिन्दगी, भाहरों, वियाना, सासेल, लन्दन, प्राग, चेकोस्लोवाकिया, मोराविया, ब्रेसेल्स, इंग्लैंड, बेल्जियम आदि के साथ यूरोप की जलवायु, ऋतुओं, पुलों आदि का वर्णन किया है। निर्मल वर्मा के मानव चरित्र प्राकृतिक वातावरण में किसी पौधे, फूल या बादल की तरह अंकित होते हैं गोया वे प्रकृति के ही अंग हैं। परिन्दे कहानी की छोटी—छोटी स्कूली लड़कियाँ तथा मीडोज झरने, झाड़ियों, फूलों, चिड़ियों में कोई अन्तर नहीं है। नीचे वे भाोर करती हुई खेल रही हैं और दूर लतिका तक जो प्रभाव पहुँचता है उसमें झरने, चिड़ियों और लड़कियों के स्वर घुलमिल गए हैं। निसर्ग एक है जिसमें सारे भेद सहज ही मिट जाते हैं।

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कुल्लू जनपद में प्रचलित प्रणय परक लोक कथाएं

प्रकाश चन्द

एक छोटी सी सुन्दर तथा मनोहर उपत्यका है, जिसे कुल्लू कहते हैं। कुल्लू की वादियां धौलाधार एवं हिमालय के बीच की शृंखलाओं से घिरी हुई हैं। कुल्लू जनपद अपनी प्राकृतिक छटा एवं विशेषता के लिए विश्व विख्यात है। यहां के हरे-भरे खेत, बर्फ से सफेद ऊँचे पर्वत, फूलों से लदी वादियां, व्यास की लहरों के कल-कल तथा छल-छल के संगीत से सबको मोह लेती हैं। कुल्लू को अपने शान्तिप्रद वातावरण पर गर्व है।

कुल्लू शब्द का वर्णन रामायण, महाभारत, बृहत्संहिता, राजतरंगिणी तथा वेदों में भी मिलता है। कुल्लू जनपद उत्तर-पूर्व में लाहुल-स्पिति तथा चम्बा, पूर्व तथा दक्षिण पूर्व में किन्नौर व शिमला, दक्षिण पूर्व में कांगड़ा तथा मण्डी जनपद से घिरा हुआ है। गगन चुम्बी हिमालय पर्वत इसका सिरमौर है। कुल्लू भौगोलिक दृष्टि से चार घाटियों में बंटा हुआ है। तीर्थन घाटी जोकि सिराज घाटी के अन्तर्गत आती है, विश्व की सबसे बेहतरीन ट्राउट मछली के लिए जानी जाती है। यहां हर वर्ष अन्तर्राष्ट्रीय मत्स्य आखेट प्रतियोगिताएं आयोजित होती हैं। जनपद की घाटियों में रूपी, उझी, लग्ग घाटी और सिराज घाटी है। रूपी घाटी सौंदर्य की दृष्टि से महत्वपूर्ण है, उझी घाटी सेबों के बगीचों के लिए प्रसिद्ध है, लग्ग घाटी सबसे शिक्षित घाटी मानी जाती है। जनपद की चौथी घाटी सिराज है, जिसके रीति-रिवाज शिमला जनपद से मिलते जुलते हैं। सिराजी नाटी कुल्लू में प्रसिद्ध है तथा शिवालय के अधिक होने पर इस घाटी में शिव उपासना अधिक की जाती है।

कुल्लू जनपद के मणिकर्ण, खीर गंगा, वशिष्ठ, क्लाथ में गर्म पानी के चश्में हैं। व्यास, पार्वती नदी, तीर्थन, कुर्पण व सरबरी खड्डें जनपद की शान को बढ़ाती है। कुल्लू का इतिहास आर्यों के आगमन से पूर्व अर्थात् प्रागैतिहासिक युग से आरम्भ होता है। कुल्लू को विहंगमणिपाल द्वारा बसाया हुआ माना जाता है। विहंगमणिपाल कुल्लू का प्रथम राजा था। अनेक स्मृतियों और लोकमानस में पली विश्रुतियों के सहारे हिमाचल प्रदेश का यह हृदय स्थल अपनी इतिहास और सुषमा की गौरव गाथा सुनाता है। कालक्रम के अनुसार कई वंशावलियों ने इस स्थल पर राज किया। बाहरी उथल-पुथल के बावजूद भी कुल्लू जनपद अपना वैशिष्ट्य बनाए रखने में सफल हुआ है।

प्रणय जीवन की सरिता है। जिस प्रकार नदी अपने पथ से जनता का पोषण करती है, उसी प्रकार प्रणय भी जीवन में आवश्यक होता है। यदि मानव में प्रेम का भाव न होता तो प्रत्येक प्राणी का

अस्तित्व एवं व्यवहार भिन्न हो जाता और द्वेष एवं घृणा की भावना ही प्रबल होती। प्रेम ही एक ऐसी परिपाटी है, जिससे एक प्राणी दूसरे प्राणी को सही माध्यम से समझता है। हर सजीव प्राणी में प्रेम की भावना विद्यमान रहती है। कुल्लू जनपद में मानव के लोकजीवन में प्रणयभाव का आधिक्य है। प्रेम जीवन का मूल तत्त्व है। प्राचीन काल से ही स्त्री-पुरुष का प्रेममय सम्बन्ध चला आ रहा है। नर तथा नारी में जो सहज आकर्षण होता है, उसे प्रणय कहा जाता है। इसी भाव से जीवन को गति मिलती है। प्रेम सृष्टि के कण-कण में विद्यमान है। ज्ञान की भांति प्रेम भी ईश्वरीय देन है। प्रेम हार्दिक अनुभूति है। इसे केवल अनुभव किया जा सकता है। प्रेम अव्यक्त है, अर्थात् प्रेम जैसे गूढ़ एवं सूक्ष्म भावना को शब्दों में बांध पाना कठिन ही नहीं, बल्कि असम्भव भी है। प्रेम के विस्तृत क्षेत्र में ही प्रणय समाहित हो जाता है। बृहत् हिन्दी शब्दकोश में 'प्रणय' का अर्थ, "प्रेम, प्रीति, प्रीतियुक्त प्रार्थना, विश्वास, निर्माण, मोक्ष, उदारता, कृपा, श्रद्धा, नायक, नेतृत्व आदि है।" स्पष्ट है किसी के प्रति आकर्षण होना ही प्रणय है। संक्षिप्त हिन्दी शब्द सागर में 'प्रणय' का अर्थ, "प्रीतियुक्त प्रार्थना, प्रेम, विश्वास, भरोसा, निर्माण, मोक्ष आदि है।" अतः प्रेम भावना और भरोसा प्रेम का परिचायक होता है। आधुनिक हिन्दी शब्दकोश में 'प्रणय' का व्युत्पत्तिपरक अर्थ इस प्रकार से है, "प्रणय-प्रेम, प्रीति, स्नेह, अनुराग, अभिलाषा, मित्रता पूर्ण परिचय, घनिष्ठता।" अतः आलम्बन के भेदानुसार स्नेह, वात्सल्य और रति सब प्रणय के ही रूप है।

संस्कृत हिन्दी कोश के अनुसार, "प्रणय शब्द 'प्र' उपसर्ग 'णि' धातु से 'अच्' प्रत्यय करने से निष्पन्न होता है; जिसका व्युत्पत्तिगत अर्थ, प्रीति, प्रेम, स्नेह, मैत्री, घनिष्ठता, अभिलाषा, इच्छा आदि।" अतः पुरुषों की स्त्रियों के प्रति और स्त्रियों की पुरुषों के प्रति आकर्षण, अभिलाषा और मैत्री का नाम 'प्रणय' है। इस प्रकार कहा जा सकता है कि पुरुष एवं स्त्री के मध्य एक-दूसरे के हृदय में परस्पर आकर्षण भावना ही प्रणय है। यह आकर्षण भावना स्त्री एवं पुरुष की शारीरिक एवं मानसिक क्रियाओं से दृष्टिगोचर होती है। पति-पत्नी के मध्य सहज प्रेम प्रणय माना जाता है। प्रणय सूत्र पति-पत्नी को परस्पर बांधता है। 'प्रणय' दाम्पत्य जीवन का आधार माना जा सकता है। 'प्रणय' पति-पत्नी के आचरण को मर्यादित करता है। गृह की वंश-बेल को सींचता है तथा गृहस्थ जीवन को सार्थक करता है। पति-पत्नी के मध्य यदि प्रेम नहीं है, तो उनका जीवन एक बंधक माना जाता है। उनका जीवन दमघोटु उद्योग कर्मचारी से बेहतर नहीं है। प्रणय को न ही खरीदा जा सकता है, न बेचा जा सकता है। यह प्रणय श्रद्धा एवं विश्वास से एक-दूसरे के प्रति पुष्ट होता है। 'प्रणय' के समक्ष बलिदान भी तुच्छ माना जाता है। प्रणय वासना से पावन माना जाता है। लोकजीवन में प्रणय को उच्च मानभूमि पर प्रतिष्ठित किया गया है। कुल्लू जनपद में प्रणय भावना सम्बन्धी अनेक लोककथाएं प्रचलित हैं। प्रणय संयोग और वियोग दो प्रकार का होता है। प्रेम एक नैसर्गिक प्रवृत्ति है। इसका मानव जीवन में महत्वपूर्ण स्थान होता है। लोककथाओं में प्रेम की अमिट छाप है। नायक-नायिका का मिलन इन कथाओं का मुख्य विषय है। इच्छित वस्तु की प्राप्ति संयोग कहलाती है। संयोग प्रेम की मूल चेतना रति है। संयोग में नायक-नायिका के पारस्परिक मिलन, आलिंगन, प्रेमालाप, रूप, सौन्दर्य का वर्णन होता है। संयोग कथाओं में प्रेम लीला की धारा तीव्र गति से बहती है। नालन्दा विशाल शब्द सागर में प्रेम को स्पष्ट करते हुए कहा गया है, "प्राणियों का पारस्परिक स्नेह जो बहुधा रूप, गुण, सान्निध्य या काम वासना के कारण होता है, उसे प्रेम कहते हैं।" अतः प्रेम सृष्टि के लिए विधाता का अपूर्व वरदान है। संयोग प्रेम के दो भेद हैं - स्वकीय संयोग और परकीय

संयोग ।

स्वकीय संयोग की कथाओं में नायक—नायिका के सौन्दर्य, सुख, मिलन एवं प्रेम का वर्णन मुख्य विषय होता है। नायक—नायिका को समाज का कोई बन्धन या भय नहीं होता। दोनों सामाजिक रीति—रिवाजों के अनुसार परिणय सूत्र में बंध जाने के बाद प्रेम करते हैं। नायक और नायिका सदा—सदा के लिए एक—दूसरे के हो जाते हैं। स्वकीय कथाओं में नायक—नायिका लोक मर्यादाओं का पालन करते हैं। लोक कथाओं में प्रेम की एकनिष्ठता और दृढ़ता की बड़ी सुन्दर अभिव्यक्ति हुई है। स्वकीय संयोग में नायक और नायिका एक—दूसरे की प्रशंसा करते हैं।

कुल्लू जनपद में स्वकीय संयोग से सम्बन्धित कथाओं में पति—पत्नी की एक प्रीति, बलवती भावनाएं विविध रूपों में उजागर हुई हैं। इन कथाओं में नायक—नायिका के प्रेम की घनिष्ठता, उत्कंठा, स्नेह, आत्मीयता, विचार—विनय, हास—परिहास, मिलनाभूति, प्रणय—निवेदन, प्रणय—कलह एवं मनोभावों का भी सूक्ष्म चित्रण मिलता है। इन लोक कथाओं में परिकल्पना एवं प्रतीकों के माध्यम से प्रेम का शाश्वत् रूप भी रूपायित हुआ है। स्वकीय संयोग से सम्बन्धित 'रूप—बसंत' की लोककथा इस प्रकार है —

एक राजा था। उसके दो राजकुमार थे, जिनका नाम रूप और बसंत था। रूप बड़ा व बसंत छोटा था। एक बार उनकी माँ बीमार पड़ गई। राजा ने बहुत ईलाज की, लेकिन वह स्वस्थ नहीं हो पाई। जब रानी बहुत ही बीमार हुई तो उसने राजा से वचन ले लिए कि — वह मरने के बाद दूसरा विवाह न करे। कुछ दिनों के बाद रानी ईश्वर को प्यारी हो गई। राजा को बहुत दुःख हुआ। वजीर ने राजा से कहा, “महाराज आप दूसरा विवाह कर लो ताकि आपके बच्चों की भी देखभाल हो सके।” राजा ने बहुत बार न किया। प्रजा के बार—बार आग्रह करने पर उसने दूसरा विवाह कर ही लिया।

नई रानी राजा के सामने बच्चों के साथ खूब खेलती, उन्हें खाना खिलाती। राजा भी खुश हो जाता। कुछ सालों के बाद दोनों भाई बड़े होने लगे। नई रानी उन दोनों भाइयों के साथ अनैतिक सम्बन्ध बनाना चाहती थी। लेकिन दोनों भाइयों ने उसे डांटा। नई रानी को डर हो गया। एक बार नयी रानी ने राजा के पास झूठी शिकायत की। उसने कहा — दोनों लड़के बड़े उदंड हो गए हैं। ये कह रहे थे कि आप हमारी माँ नहीं हो, इसलिए हमारी पत्नी बनों। राजा को क्रोध आ गया। उसने दोनों भाइयों को देश निकाला दे दिया। रूप—बसंत बहुत दुखी हुए। वे जंगल में घूमते—घूमते कहीं दूर दूसरे प्रदेश में पहुँच गए।

रात पड़ गयी थी। वे दोनों एक गुफा में रात काटने बैठ गए। आधी रात पड़ गयी। रूप सो गया तथा बसंत बैठा रहा। वहाँ पेड़ पर तोता और मैना आपस में बोल रहे थे। मैना ने कहा, “जो हम दोनों को एक तीर से मारे तथा मुझे खाए वह वजीर बनेगा। उसे कष्ट भी बहुत होंगे, जो तोते को खाएगा — वह राजा बनेगा।” बसंत ने मैना को यह कहते हुए सुना। उसने एक ही तीर से तोता—मैना को मार दिया। उसने तोता—मैना को आग में भूना और रूप को भी जगाया। रूप ने तोते को खाया तथा बसंत ने मैना। कुछ समय के बाद बसंत को नींद आ गई। सुबह हो गई थी, रूप ने जब बसंत को जगाया। वह ठण्डा हो गया था। उसे सांप ने काट लिया था। रूप भी रोते—रोते वहाँ से नगर की ओर चल पड़ा।

नगर में उसे सिपाहियों ने पकड़ लिया और राजमहल को ले गए। वहाँ उसे राजा बनाया गया। उस

रियासत में राजा नहीं था, वहां शर्त रखी थी कि — जो युवक सबसे पहले सुबह मिलेगा। उसको राजा बनाया जाएगा। बसंत को मरा हुआ देखकर वहां से जाने वाले महात्मा ने देखा, उसने उसका उपचार किया। जब बसंत को चेतना आई तो वह भी भाई-भाई चिल्लाता नगर की तरफ निकल पड़ा। घूमते-घूमते बसंत किसी दूसरे प्रदेश में पहुँच गया। वहाँ उसे एक साहूकार के पास तेली का काम मिला। विपत्ति में कष्ट झेल रहे बसंत को कोई नहीं पहचान सका। बसंत दिनभर कोल्हू से तेल निकालता। बसंत धनोटू भी बजाता था। सुबह-शाम वह उस पर मधुर तान बजाता था। साहूकार की बेटी उस मधुर धुन पर मुग्ध हो जाती थी। एक बार अचानक साहूकार की बेटी का कंधा तेली के पास गिरा। तेली ने जब उस कंधे को हाथ लगाए वह सोने का बन गया। साहूकार की बेटी ने आश्चर्य से देखा। वह तेली पर आकर्षित हो गयी। उसने तेली के पास विवाह का प्रस्ताव रखा।

बसंत ने साहूकार की बेटी के पास आपबीती सुनाई। वह साहूकार राजा का वफादार था। उसने बसंत के बारे में राजा से कहा। रूप उस रियासत का राजा था। जब उसे बसंत के बारे में पता चला, तो उसे पूरे राजसी शान के साथ राजमहल लाया गया। रूप ने तुरन्त उसे अपना वजीर नियुक्त किया। साहूकार की बेटी का विवाह बसंत के साथ किया गया। दोनों भाई सुखपूर्वक रहने लगे।

यह लोककथा बसंत एवं साहूकार की बेटी के प्रणय को प्रस्तुत करती है। साहूकार की बेटी बसंत के गुण एवं रूप पर मुग्ध हो जाती है। संगीत कला में निपुण होने पर बसंत से उसका आकर्षण बढ़ जाता है। इस लोककथा में बसंत नायक व साहूकार की बेटी नायिका के रूप में चित्रित हुए हैं। संयोग प्रेम को 'डेरा और चन्दू' की ऐतिहासिक लोककथा भी प्रस्तुत करती है। लोक कथा इस प्रकार है —

सिराज घाटी में वीणा ठाकुर रहता था। उसके दो पुत्र थे। एक का नाम डेरा व दूसरे का नाम चन्दू था। पिता की मृत्यु के बाद उनके चाचा ने उनकी पूरी सम्पत्ति हड़प ली। जब दोनों भाई बड़े हुए तो उन्होंने अपने चाचा से बदला लिया। उनकी चाची ने दोनों भाइयों को चुनौती दी और कहा — यदि आप कैँदड़ा से विवाह करोगे, तभी तुम ठाकुर कहलाओगे। जलोड़ी जोत में उस समय उदू राय रहता था। उसकी बेटी का नाम कैँदड़ा था। वह उस समय इस इलाके में सबसे सुन्दर युवती थी। डेरा और चन्दू भी कैँदड़ा के रूप-गुण सुनकर उससे विवाह करने के लिए उदू राय के घर गए। डेरा ने कैँदड़ा को देखा। कैँदड़ा का जैसा रूप-गुण सुना था। वह बिल्कुल ही वैसी थी। डेरा और चन्दू ने उदू राय के घर नौकरी की। कैँदड़ा भी डेरा को बहुत चाहती थी। डेरा ने कैँदड़ा से विवाह करने का प्रस्ताव रखा। कैँदड़ा ने डेरा से कहा — मेरे पिताजी बहुत निर्दयी हैं, आप इस बात को स्वयं पिता के पास रखना। उन्हें सात वर्ष उदू राय की सेवा में हो गए थे। एक बार चन्दू ने उदू राय के पास डेरा और कैँदड़ा के विवाह का प्रस्ताव रखा। उदू राय ने कहा, “यहां मुदू राय भी रहता है, उससे मेरी पुरानी शत्रुता है। यदि कोई मुदू राय का सिर मेरे चरणों में रखेगा, उससे ही मैं कैँदड़ा का विवाह करूँगा।” चन्दू ने यह शर्त डेरा को बताई। वे दोनों भाई रात को ही गणांसे को कमर में बांधकर मुदू राय के घर पहुँच गए। डेरा भी चुपके-चुपके मुदू राय के कक्ष में पहुँचा। मुदू राय सोया हुआ था। डेरा ने भी मुदू राय पर प्रहार किया और उसका सिर लेकर बाहर आ गया। दुर्भाग्य से वह गणांसा वहीं भूल गया। चन्दू ने डेरा से कहा, “भाई गणांसे को रहने देते हैं, अब चलते हैं।” लेकिन डेरा नहीं माना। उसने चन्दू को वहीं रोका और स्वयं फिर से मुदू राय के कक्ष में गया। वापिस आते हुए उसे मुदू राय के सेवक ने देख लिया। सेवक ने तीर डेरा पर छोड़ा। तीर डेरा को चुभ गया। लेकिन वह

हिम्मत लेकर उदू राय के पास गया।

उदू राय डेरा की वीरता पर खुश हुआ। उसने कैंदड़ा का विवाह डेरा से कर दिया। दोनों भाई अब घर आना चाहते थे। कैंदड़ा को लेकर वे घर को चल पड़े। रास्ते में डेरा को घाव में अधिक पीड़ा होने लगी। तीर उसके सीने में चुभा था। सिकन नामक जगह में डेरा ने चन्दू से कहा, “भाई मैं अब जी नहीं सकता हूँ। आपने माँ से कहना – कि मैं वैशाख मास को घर आऊँगा।” इतना कहते-कहते डेरा ने प्राण त्याग दिए। कैंदड़ा भी डेरा के साथ सती हो गई।

चन्दू उदास होकर घर पहुँचा। माँ ने जब डेरा व कैंदड़ा के बारे में पूछा तो चन्दू ने कहा, “माँ! भाई-भाभी अभी वहीं उदू राय के घर में हैं। उन्होंने कहा है कि हम वैशाख की सक्रान्ति को आएंगे। दिन-प्रतिदिन चन्दू उदास रहने लगा। वैशाख मास की सक्रान्ति का दिन आ गया। माँ अपने पुत्र व बहू को देखने के लिए उत्सुक थी। पेड़ पर बुलबुल पक्षी मधुर संगीत गाने लगा। उसके साथ मादा बुलबुल भी थी। चन्दू ने माँ से कहा – माँ! भाई-भाभी आ गए हैं। माँ ने बात समझ ली और यह देखते-देखते माँ ने भी अपने प्राण त्याग दिए।

यह लोक कथा कैंदड़ा और डेरा के प्रणय भाव को प्रस्तुत करती है। कैंदड़ा के सौन्दर्य की बातों को सुनकर डेरा उसे प्राप्त करने के लिए जिन्दगी कुर्बान कर देता है। डेरा की शूरवीरता को देखकर उदू राय उसका विवाह कर देता है। यह लोककथा भाई व माँ के कारुणिक भावना को भी प्रकट करती है। पति की मृत्यु का वियोग कैंदड़ा नहीं सह सकी और वह भी पति के साथ अमर हो गई। यह कथा हृदय की आंतरिक अनुभूति एवं वेदना के द्वारा संयोग प्रेम को अपनी चरम सीमा तक पहुँचाती है।

कुल्लू जनपद में परकीय संयोग को उद्घाटित करने वाली लोक कथाएं प्रचलित हैं, जिनमें परकीय संयोग को प्राथमिकता प्राप्त हुई है। इन लोक कथाओं में ‘भोडू नेगी’ की लोक कथा प्रचलित है –

भोडू नेगी नाम का एक आदमी था। वह अच्छे परिवार से था। अन्न-धन उसके पास बहुत था। ढालू नाम की युवती से उसका विवाह हुआ था। लेकिन वह दखणू सनारटी से प्रेम करता था। वह उसके प्रेम पाश में इतना पड़ गया था कि वह अपने घर-परिवार को भी भूल गया। भोडू की माता ने कहा “बेटा! इस दखणू कुलटा को छोड़, यह अच्छी नहीं है।” भोडू नेगी उन सबकी बातों पर कोई ध्यान नहीं देता था।

दखणू सनारटी का चरित्र अच्छा नहीं था। उस इलाके में जंगलात विभाग का एक कर्मचारी भी था। दखणू सनारटी के उसके साथ भी प्रेम सम्बन्ध थे। उस कर्मचारी ने भोडू नेगी को षड्यन्त्र के द्वारा जेल की सजा दिलाई। भोडू नेगी का परिवार दुःखी रहने लगा। जिस दिन भोडू नेगी को जेल के लिए भागसू जाना था, तो उसकी माँ कहती है – हे बेटे! मैंने आपको बहुत समझाया। इस दशा दखणू को छोड़ दे। लेकिन आपने मेरी बातों पर कोई ध्यान नहीं दिया। भोडू नेगी जेल के लिए तैयार हो गया। अपनी माँ से कहता है, “हे माँ! चाहे मेरा घर, जमीन व पूरा धन भी खत्म हो जाए। मैं जेल की सजा काटकर ही आऊँगा। मैं तो दखणू सनारटी से ही विवाह करूँगा।” भागसू जेल जाते ही रास्ते में भोडू नेगी ने प्राण त्याग दिए। प्रेम की पराकाष्ठा को बनाए हुए भोडू नेगी ने सदा-सदा के लिए इस लोक जन क्षेत्र में अपना नाम अमर कर दिया।

यह लोक कथा परकीय संयोग को प्रकट करती है। विवाहित होने पर भी वह दखणू सनारटी से प्रेम

सम्बन्ध रखता है। माता—पिता के लाख समझाने पर भी वह दखनू सनारटी से ही प्रणय करता है। अपनी जिन्दगी में शत्रुता मोल लेता है। प्रेमी सज्जन प्रेम पाने के लिए लालायित रहते हैं। अतः इस लोक कथा में परकीय प्रेमभाव की स्पष्ट अभिव्यंजना प्रकट हुई है।

वियोग प्रणय का दूसरा पक्ष है। वियोग का मुख्य कारण प्रेमियों का विछोह होता है। विरह में प्रियतम की छवि बार—बार सम्मुख आने लगती है। विरह में वियोगी मन विभिन्न प्रकार की कल्पनाएं संजोता है। लोक कथाओं में वियोग प्रेम सम्बन्धी व्यंजना सहज एवं सरल ढंग से हुई है।

आधुनिक हिन्दी शब्द कोश में वियोग का शाब्दिक अर्थ है, “योग न होने की अवस्था अर्थात् ऐसी अवस्था जिसमें दो प्रेमी एक—दूसरे से दूर हो, जुदाई, विछोह, विरह, विच्छेद, विप्रलम्भ, वियोग आदि।”⁶ अतः वियोग में नायक—नायिका विरह की आग में जलते हैं, उन्हें एक—दूसरे का विछोह असहनीय लगता है। ज्ञान शब्दकोश के अनुसार, “विच्छेद, पार्थक्य, विरह, अभाव, छुटकारा, व्यवकलन, घटाव, शृंगार रस का वह विभाव जिसमें प्रेमियों के विरह का वर्णन होता है।”⁷ नायक एवं नायिका के विछोह पर होने वाली तड़प वियोग कहलाता है। वियोग शृंगार के चार भेद हैं — पूर्वराग, मान, प्रवास और करुण। इसी प्रकार दस दशाएं — अभिलाषा, चिन्ता, स्मृति, गुण—कथन, उद्वेग, प्रलाप, उन्माद, व्याधि, जड़ता, मूर्छा और मरण है। प्रिय का प्रियतम से मिलन की तड़प विरह की अन्तिम अवस्था है। विरह को ही वास्तव में प्रेम की कसौटी माना गया है।

लोक जीवन में प्रायः अपनी आजीविका कमाने के लिए घर से बाहर जाना पड़ता है। किसी काम अथवा अन्य प्रकार से विदेश चले जाना, नायक—नायिका के लिए असहनीय होता है। अतः नायक—नायिका के हृदय में विरहानुभूति की स्वाभाविक पीड़ा निहित रहती है। स्वकीय वियोग में नायक या नायिका अकेलेपन में जीवन जीते हैं। विवशता में कभी—कभी पत्नी को यौवन के स्वर्णिम वर्ष अकेले ही काटने पड़ते हैं।

वियोग प्रेम के विषय में रामधारी सिंह दिनकर लिखते हैं, “विरह में हृदय के फटने और सूर्य के अधिक उत्तप्त हो उठने का मज़मून होता है। प्रेम के मार्ग पर वही चल सकता है, जो शीश की दक्षिणा चुका सके, जो मस्तक को काटकर उस पर पाँव रख सके।”⁸ स्पष्ट है, विरह में तड़प होती है। एक—दूसरे के लिए मर मिटने की लालसा रहती है।

सामाजिक मर्यादा से परिपूर्ण नायक—नायिका का जब किसी कारणवश विछोह हो जाता है, तो प्रेम करने वालों में जो बिछुड़न होती है, स्वकीय वियोग कहलाता है। इस वियोग में स्वजन का ही वियोग जीवन को तड़पाता है। कुल्लू जनपद में ऐसी कई लोक कथाएं प्रचलित हैं, जो स्वकीय वियोग को प्रस्तुत करती हैं। ‘राजा भरथरी’ की लोक कथा प्रस्तुत है —

राजा भरथरी जंगल में शिकार खेलने चला गया। रानी पिंगला उसे बार—बार समझाती है। वह कहती है, “हे महाराज! हिरण को मारना पाप है, वह जंगल का सरदार होता है। इसलिए राजा हिरण को मारकर कई हिरणी विधवा हो जाएगी।” राजा भरथरी ने पिंगला के कथन पर कोई ध्यान नहीं दिया। पिंगला भरथरी राजा के अनिष्ट न होने के लिए सदा बेचैन रहती।

एक बार पिंगला ने राजा भरथरी से पूछा — महाराज! जब आप राजमहल में नहीं होते हैं तो मैं आपके विरह में चिन्तित रहती हूँ। राजा ने कहा — महारानी, आंगन में जो वट वृक्ष है, जब इसमें एक भी पत्ता नहीं दिखेगा, तब आपने समझ लेना राजा कष्ट में है। अगले दिन राजा भरथरी अपने

सिपाहियों के साथ शिकार खेलने जंगल को चल पड़ा। राजा भरथरी रानी पिंगला के प्रेम की परीक्षा लेना चाहता था। राजा ने अपने साथियों से कहा, "वट वृक्ष से सभी पत्तों को गिरा दो। उसमें एक भी पत्ता दिखाई नहीं देना चाहिए।" राजा का आदेश पाकर वृक्ष के सारे पत्ते गिरा दिए। सुबह वे लोग रानी पिंगला के पास गए और बड़े कारुणिक भाव से बोले, "महारानी, राजा अब संसार में नहीं रहे।" रानी वट वृक्ष के पास गई। उसने समझा अब संसार में रहकर मेरा कोई औचित्य नहीं है। उसने राजा के वियोग में तत्क्षण प्राण त्याग दिए।

रानी पिंगला के वियोग में राजा भरथरी पागल हो गया। वह रानी पिंगला-पिंगला कहता हुआ योगी बनकर घूमने लगा। उसने राजपाट छोड़ दिया और पिंगला रानी के वियोग में संन्यासी बन गया।

इस लोक कथा में स्वकीय वियोग को प्रमुखता मिली है। राजा भरथरी ने अपनी प्रिय रानी खो दी। रानी पिंगला ने राजा के वियोग में प्राण त्याग दिए। रानी पिंगला के वियोग में भरथरी का दिल जल रहा होता है। जिस प्रकार से प्यासा पपीहा पीहू-पीहू करता हुआ पानी के लिए तड़पता है, उसी प्रकार वियोग में राजा भरथरी पिंगला-पिंगला चिल्लाता हुआ विरह की तपिश को झेल रहा होता है। राजमहल के वैभव को त्यागकर अपनी प्रिया के लिए योगी बन जाता है।

परकीय वियोग में नायक-नायिका पति-पत्नी न होकर किसी पर-पुरुष या स्त्री के वियोग में विरह को झेलते हैं। इस प्रकार के प्रणय में परकीय वियोग होता है। इसमें नायक-नायिका सामाजिक मर्यादा, रीति-रिवाजों एवं जाति बन्धनों के कारण एक-दूसरे से मिल नहीं पाते हैं। इस स्थिति में उनके मनोभावों को व्यक्त करने वाली लोक कथाएं परकीय वियोग के अन्तर्गत आती हैं। प्रणय के विषय में लोकसाहित्य के विद्वान श्रीराम शर्मा लिखते हैं, "प्रेम कथाओं में प्रेमी-प्रेमिका का प्रेम ही अधिक स्वच्छन्द, उन्मुक्त तथा साहसपूर्ण होता है। प्रेम-पात्र को प्राप्ति के लिए लोग परम्पराओं, जाति-बन्धनों, रीति-रिवाजों तक को भी तोड़ देते हैं।" अतः प्रेम में ऊँच-नीच व अन्य सामाजिक मर्यादाओं को भी तोड़ा जाता है।

वियोगावस्था में नायिका का करुण क्रन्दन पाषाण हृदय को भी पिघला देता है। वियोग के विषय में हरबंश लाल शर्मा लिखते हैं, "प्रेमी से संवेदनशील कोई दूसरा होता ही नहीं। वह अपने प्रेमी की पीठ फिरना भी सहन नहीं कर सकता, स्थान्तर तो बहुत बड़ी बात है।" अतः स्पष्ट है, अनुराग जब अपनी पराकाष्ठा को पहुँच जाता है, तो वह अच्छे-बुरे की उपेक्षा कर देता है।

कुल्लू जनपद में प्रचलित परकीय वियोग से सम्बन्धित लोक कथाओं में विरह का अथाह सागर हिलौरे मारता हुआ प्रतीत होता है। 'राधा-कृष्ण' लोक कथा में नायक-नायिका की मनोवृत्तियाँ, मिलनोत्कंठा, व्याकुलता, असहाय यातना, वेदना और पीड़ा की कसक ही सहज एवं स्वाभाविक रूप से अभिव्यक्त हुई है। 'राधा-कृष्ण' लोक कथा प्रस्तुत है -

राधा और कृष्ण बाल सखा थे। वे बचपन से ही एक-दूसरे को जानते थे। वे वृंदावन में गाय को चराने जाते थे। राधा का अधिक साथ कृष्ण के साथ था। वे दोनों एक-दूसरे से प्यार करते थे। एक बार वृंदावन में खूब वर्षा हुई। चारों तरफ पानी ही पानी हो गया। राधा-कृष्ण उस पानी में खेलने लगे। शाम को राधा बीमार हो गई। वह दो-तीन दिन तक गाय चराने वृंदावन नहीं आ सकी।

कृष्ण को राधा के बिना अच्छा नहीं लगा। दिन में कृष्ण के साथ अन्य ग्वालिन भी खेलती थीं। उनमें से किसी सखी ने राधा के पास कृष्ण की शिकायत की। सखी ने राधा से कहा, "आप यहां घर में हो,

आजकल तो कृष्ण अन्य गोपिकाओं के साथ काम-केलि करते हैं।" राधा को जलन होने लगी। वह कृष्ण से रूठ गई। वे कृष्ण को कोई सन्देश भी नहीं भेजती। कृष्ण ने किसी ग्वालिन को राधा के पास दूती बनाकर संदेश भेजा और कहा, "राधा तुझे अपनी सुन्दरता पर बड़ा घमण्ड है। मैं भी देख लेता हूँ कि मुझसे अच्छा आपका कौन सखा होगा।" राधा भी कृष्ण को संदेश देती है, "कृष्ण अब मेरे बारे में मत सोचना। अब आप तो मुझसे बात भी नहीं कर सकते।"

राधा वृंदावन नहीं आ रही थी। कृष्ण को राधा से न मिलना अखर रहा था। उसने एक दिन माता यशोदा से कहा, "माँ! राधा के पास मेरे खिलौने हैं।" यशोदा माँ कृष्ण के बारे में सब जानती थी। उसने कृष्ण को वहाँ जाने के लिए मना किया। एक बार कृष्ण लड़की बनकर राधा के घर गया। राधा के माता-पिता कृष्ण को नहीं पहचान सके। वह राधा से बात करने लगा। राधा कृष्ण को पहचान गई थी। परन्तु राधा कृष्ण से बात भी नहीं कर रही थी। कृष्ण ने बहुत कोशिश की लेकिन राधा कृष्ण की तरफ देख भी नहीं रही थी।

उदास होकर कृष्ण घर को वापिस आ गया। बाद में राधा को बहुत पछतावा हुआ। वह अपने आपको कोसने लगी — कि मैंने प्राण प्रियतम को उदास किया। अब मैं भूलकर भी यह गलती नहीं करूँगी। कृष्ण अगले दिन किसी और सखी के पास राधा को संदेश भेजता है। वह कहता है, "मैंने कौन सी भूल कर दी राधा।" कृष्ण की दूती संदेश में कहती है, "कृष्ण तो तेरे बारे में सोचता रहता है, राधे!" अगले दिन राधा कृष्ण से मिलने चली जाती है।

प्रस्तुत लोक कथा में राधा-कृष्ण के प्रेम को प्रस्तुत किया गया है। राधा का प्रेम आज भी संसार में अमर है। इस प्रकार के प्रणय में लोक मर्यादा का पालन करना होता है। कृष्ण भी वेश बदलकर राधा से मिलने जाता है। प्रेमान्ध होने पर ही एक-दूसरे से शिकायत रहती है। अतः स्पष्ट है कि रात-दिन के क्रम के साथ-साथ सुख-दुख, मिलन-बिछुड़न, तकरार-इकरार यह प्रकृति का नियम है, इसमें जीवन की वास्तविक अनुभूति रहती है।

कह सकते हैं कि परकीय वियोग में जहां एक ओर नायक को विरहावस्था में अपने प्रणय को छुपाना पड़ता है, वहीं दूसरी ओर परिवार की मर्यादा का भी संकोच रहता है। इस स्थिति में प्रेम करने वाले अत्यन्त व्याकुलता अनुभव करते हैं। उनका मानसिक संतुलन बिगड़ जाता है। ये लोक कथाएं परकीय वियोग में आलिप्त नायक-नायिका की मानसिक उद्विग्नता, क्षोभ, प्रलाप, जड़ता एवं शोक विह्वलता का भावमय वर्णन प्रस्तुत करती हैं।

अतः प्रणय सम्बन्धी इन लोक कथाओं में जन-जीवन से जुड़ी संयोग एवं वियोग की पराकाष्ठा प्रस्तुत हुई है। नायक-नायिका के प्रेम में सुख और दुख दोनों की अनुभूति इस प्रकार बढ़ जाती है जैसे — आयु के बढ़ने से तृष्णाएं। संयोग की अवस्था में जो प्रेम सृष्टि की सब वस्तुओं से आनंद का संग्रह करता है, वहीं वियोग की दशा में सब वस्तुओं में दुःख का संग्रह करने लगता है। अतः अनुराग और निष्ठा की सदैव विजय होती है।

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आध्यात्मिक लक्ष्य का श्रेष्ठ साधन है संगीत

परमानन्द बंसल

समस्त सृष्टि में सूक्ष्मातिसूक्ष्म एक जगमगाता हुआ ज्योति स्वरूप तत्त्व है जिसकी परिधि में सभी लोक तथा उन लोकों में रहने वाले समाविष्ट हो जाते हैं। इसी अविनाशी तत्त्व को ब्रह्म कहते हैं। यही ब्रह्म तत्त्व हमारे भीतर प्राण, मन और वाक् जैसी शक्तियों में परिणत होता है यही परमसत्य है और इसी को अमृत कहते हैं।

माया, ब्रह्म, परमात्मा इस जगत का निमित्त और उपादान कारण है। सारे जगत में वह व्यापत है। सारे जगत का वह आधार है। नाना रूपों में हम उसी को देखते हैं उसी का अनुभव करते हैं। उसने प्रतीयमान जगत के आरम्भ में आकाश का रूप धारण किया। जिसका गुण शब्द है। स्वयं श्रुति कहती है कि 'एत्सस्मात् आत्मनः आकाश सम्भूतः'। वह शब्द मुख से उच्चारित नहीं हो सकता न कान से सुना जा सकता है उसका अनुभव तो योगी को समाधिवस्था में होता है। उसका ही नाम वेद में अहस्त्राक्षर वाक् है। व्याकरण के पंडित उसी को स्फोट कहते हैं उसी को प्रणव ऊँकार भी कहते हैं। योगाचार्य कहते हैं 'अस्ये वाचक प्रणव' प्रणव ही ईश्वर का वाचक है यही मूल नाद है। नाद के बाद की सृष्टि, बिन्दु के नाम के विख्यात है।

मनुष्य जब भगवत् साक्षात्कार के पीछे लगता है और वह अपने को सम्पूर्ण विनाशशील पदार्थ से मुक्त बनाने के लिए संघर्षरत होता है तभी उसकी मानवता का पूर्ण सौन्दर्य, उसके अस्तित्व का पूर्ण गाम्भीर्य तथा प्रकृति की महिमा व गरीमा प्रकट होती है। आध्यात्मिक धरातल पर स्थित होने के कारण जीवन का उद्देश्य आत्मबोध है।

आध्यात्मिकता में नाद का स्थान सर्वप्रथम, सर्वश्रेष्ठ व उत्कृष्ट माना गया है। नाद ब्रह्म के अन्तर्गत दो शब्द हैं, प्रथम नाद जिसे ध्वनि, आवाज़ और स्वर नाम से जाना जाता है तथा द्वितीय शब्द ब्रह्म है जो नाद को गतिशील करता है। गति प्रदान करने का कार्य लय करती है। लय ही वह शक्ति है जिसे शिवा कहा गया है। अतः यह कहना अतिशोक्ति न होगा कि नाद के बिना अध्यात्म के अस्तित्व की कल्पना करना असम्भव प्रतीत होता है। पुराणों व शास्त्रों में वर्णित है कि सृष्टि की रचना से पूर्व यदि कुछ था तो वह था नाद और तत्पश्चात् अन्य भौतिक परा भौतिक व सांसारिक वस्तुएँ।

वैज्ञानिकों ने भी आज स्वीकार किया है कि विश्व के समस्त अणु-परमाणु जो आज भी भाग रहे हैं चाहे जड़ या चेतन हो उसी नाद ब्रह्म की सपन्दन का परिणाम है। इस नाद को शब्द ब्रह्म, नाद ब्रह्म,

ओमकार तथा अनहद नाद आदि अनेक नामों से सम्बोधित किया गया तथा इसी से सृष्टि की कल्पना कल्पित की गई। योग रसायन ग्रन्थों में नाद योग का प्रत्यक्ष जीवन पर प्रभाव मानते हुए कहा है कि इन्द्रियों का स्वामी मन, मन का स्वामी प्राण है। प्राणों का स्वामी लय (प्रकृति, काल, नियति) तथा लय का स्वामी नाद है। समस्त कलाओं में संगीत ही एक ऐसी कला है जिसे अपना स्वरूप प्रकट करने के लिए मात्र संतुलित नाद बिन्दुओं की अपेक्षा होती है। **“यो वै नाद सवै बिन्दुः”** जो नाद है वही बिन्दु है। योगियों और महर्षियों ने इसे निगुण ब्रह्मरूप का सगुण रूप कहा है। बिना नाद इस धरा पर तो क्या देव व पाताल लोक में भी देहधारी होना असम्भव है। यह नाद कितना संगीतमयी व रहस्यमयी है इसे हम अपने प्राणों की धड़कन के रूप में सुन सकते हैं, अनुभव कर सकते हैं। नाद साधना से मानव सांसारिक बन्धनों से मुक्त होकर मोक्ष की राह पर आता है। नाद की महिमा के विषय में कहा गया है।

ना नादेन बिना ज्ञानं, ना नादेन बिना शिवः।

नाद रुपं पर ज्योतिनाद रुपो परो हरि॥

योग तरंगणी

बिना नाद के ज्ञान सम्भव नहीं तथा सभी प्रकार की अनुभूतियों का केन्द्र नाद है क्योंकि इसके बिना कल्याण नहीं। नाद के प्राकट्य होने पर आत्मदर्श, आत्म चिन्तन एवं ज्योति रूप परब्रह्म की सिद्धि के मूल तत्व की प्राप्ति होती है। इसी नाद को संगीत व अध्यात्म का मूलाधार कहकर सर्वमान्य रूप से उपास्य तत्व स्वीकारा गया है।

नाद का अनाहत भेद आध्यात्मिकता और आहत नाद संगीत का द्योतक है। आहत नाद किसी टकराहट से उत्पन्न होता है जबकि अनाहत नाद स्वयं की चेतना या ब्रह्मरंध में दैवी सम्पर्क से स्वयंभू तथा दिव्य होता है। प्रणव या प्राणों के रूप में भी अनाहत नाद ही प्रकट है।

स्वर (आकार) और वर्ण (वाणी) के सुमेल का लक्ष्य आत्मा और परमात्मा का एकीकरण परमानन्द प्राप्ति है। वेदों में बीज रूपेण स्थित, उपनिषदों में अंकुरित तथा भाङ्गदर्शनों के रूप में पल्लवित परब्रह्म विषयक चिन्तन धारा भी संगीत की ही मीमांसा करती है। योगियों द्वारा नाद योग से शब्द और स्वर के गहन चिन्तन से ध्वनियों को समझने व जानने में सफलता अर्जित की जो परमात्मा का साक्षात्कार करने में सहायक है। संगीत में मुख्यतः दो प्रकार की शक्तियां काम करती हैं स्वर और लय तथा समस्त प्राकृतिक उपादान स्वर और लय के कारण गतिशील है।

संगीत को भगवान भक्ति का श्रेष्ठ साधन व आत्मा की सात्विक खुराक माना गया है। वेद, स्मृति एवं पुराण आदि ग्रंथों की तरह संगीत के आधार शास्त्रों में भी नाद की रंजन शक्ति को परमत्व प्राप्ति का कारण भूत तत्व स्वीकारा गया है। भारत रत्न स्व० पंडित रविशंकर जी का कथन कि संगीत का उच्चतम रूप आध्यात्मिक है जो व्यवसायिक एप्रोच से पृथक है। इससे जो असहमत होगा समझ लीजिए उसकी समझ में भारतीय संगीत का धर्म और मर्म आया ही नहीं। मन को शान्त रखना, प्रसन्नचित रखना, बुद्धि का उचित कल्याणकारी उपयोग कर आत्मा परमात्मा का ज्ञान कर लेना इसी का नाम अध्यात्म है। यही संगीत के आध्यात्मिक स्वरूप और संगीत व ध्यान के अन्योन्याश्रय सम्बन्ध को सिद्ध करता है।

हमारे मन में रहने वाले अहं भाव को नष्ट करने तथा निराकार प्रभु में रहने वाली निष्ठा का बाग हरा

भरा बनाने का सामर्थ्य हमारे संगीत में अवश्य है। संगीत में मन को एकाग्र करने की इतनी शक्ति है कि वह मन को एकाग्र करके इतना स्थिर कर दे कि हृदय की चंचल वृत्तियाँ केन्द्रीभूत हो जाए। गायन में स्वर साधना के लिए श्वास किया पर नियन्त्रण करना पड़ता है। श्वास किया नियन्त्रित करते ही व्यक्ति का अपने शरीर तथा अन्य गतिविधियों पर पूर्ण अधिकार हो जाता है। जिससे वह अपने विचारों को नियन्त्रित कर पाने में सफल हो पाता है।

आज के संगीतज्ञों को आत्म लोचन कर अपनी कला का प्रायोजन (प्रभु भक्ति या आजिविका) जानना होगा अन्यथा संगीत द्वारा अध्यात्म प्राप्ति का सम्बन्ध विवादास्पद हो सकता है। प्रयोग भिन्नता के कारण ही स्वामी हरिदास और तानसेन के संगीत में अन्तर था। एक का प्रायोजन प्रभु प्राप्ति था तथा दूसरे का जीविकोपार्जन। धर्म, संगीत और साहित्य के क्षेत्र में जितने भी सृजनात्मक कार्य हुए वे सभी अर्न्तज्ञान से उद्भूत हुए जिनका स्त्रोत अचेतन है। चेतन कहकर प्रयत्न करने से कोई तुकबन्दी भले ही कर ले परन्तु कवि नहीं हो सकता, इसी प्रकार शब्दों व स्वरों के हेरफेर से रचना भले ही कर ले परन्तु रचनाकार नहीं हो सकता इसी प्रकार तर्क एवं विचार से पंडित भले ही कहा जाए परन्तु ज्ञानी नहीं हो सकता। अतः वास्तविक कला का जन्म अर्न्तस्फूर्ति से होता है जो आत्मा से सम्बन्धित होता है तथा इसी से उत्पन्न होता है।

सृष्टि के आरम्भ से ही संगीत सत् चित तथा आनन्द का स्त्रोत बन कर अविरल गति से अध्यात्म की अनिर्वचनीय अनुगूँज रहा है। यह गूँज अन्तः तथा बाह्य प्रकृति से गुंजायमान होती है और अन्त काल तक बनी रहती है। अध्यात्म पक्ष की प्रधानता होने के कारण भारतीय संगीत कला आरम्भ से ही धर्म का आश्रय लेकर उसकी छत्र छाया में विकसित हुई। संगीत शास्त्रों, वेदों, पुराणों में इस सन्दर्भ में विस्तृत मीमांसा अनेक प्रकार से की गई है। इसका मूलभूत उदाहरण सामवेद की ऋचाओं व मन्त्रों को संगीत प्रवाह से जोड़ा गया है क्योंकि इसके द्वारा साधक अनायास ही अपने मन व इन्द्रियों का निग्रह करके स्वतः सिद्ध योग के द्वारा अध्यात्म की ओर पहुंच जाता है।

संगीत साधकों को नाद की चार अवस्थाओं परा, पश्यन्ति, मध्यमा तथा बैखरी की योग साधना की जानकारी का महातम्य है। इन्हे साधकर स्वरोत्पत्ति के रहस्यों से साक्षात्कार अत्यन्त महत्वपूर्ण है।

अध्यात्म को अनेक रूपों में विवेचित किया गया है। सभी का लक्ष्य आत्म ज्ञान प्राप्त कर परमात्मा (ईश्वर) से एकाकार हो जाना है। जिज्ञासावश एक अनुत्तरित प्रश्न का सपष्टीकरण आवश्यक है कि परमात्मा प्राप्ति से क्या अभिप्राय है? ईश्वर कहाँ है? ये पता कैसे चले कि कहाँ और किस रूप में है आदि आदि.....

आत्मा, परमात्मा, अध्यात्म, साधना, ईश्वर आदि—आदि से सम्बन्धित कोई भी सम्वाद गणनात्मक तथा लौकिक रूप से नहीं किया जा सकता। अध्यात्म तर्क—वितर्क की परिधि से मुक्त ऐसा आत्मतत्त्व है जो सम्पूर्ण भू—लोक में सामाजिक सरोकार व व्यवस्थानुसार प्रत्यक्ष या परोक्ष रूप में सर्वथा व्याप्त है। आध्यात्मिक मार्ग में केवल हृदय और भावना का स्थान है। यह केवल मनस्थिति, संवेदना व आस्था का विषय है। यह उपदेश का विषय नहीं स्वयं के आचरण का विषय है। अध्यात्म समाधि में नहीं व्यवहार में प्रकट होना चाहिए। यह मोक्ष, सामाजिक सामंजस्य का साधन है। यह मन्दिर, मस्जिद में नहीं स्वयं की चेतना में है। अतः यह कहना असंगत न होगा कि आत्मा और परमात्मासे संबंधित जो भी ज्ञान का विषय है सभी अध्यात्म में समाविष्ट है।

नाद को साध कर आत्म को जान ले

आत्म से ब्रह्म स्वरूप से परमात्मा का ज्ञान ले।

प्रसिद्ध शहनाई वादक भारत रत्न स्व० बिस्मिल्लाह खां साहब का कथन है कि हमें मालूम है कि ईश्वर, अल्लाह है, पूरा यकीन है लेकिन दिखता नहीं, उसकी कोई आकृति नहीं है। उसी तरह स्वर है, सुनाई देता है, दिखाई नहीं देता, न उसे हम छू सकते हैं।

यदि हम आध्यात्मिक शब्दकी विवेचना पर दृष्टिपात करें तो **“अधि आत्मनि”** अर्थात् आत्मा के अन्दर है इस अर्थ को विस्तृत रूप में समझते हुए ज्ञात होता है कि भौतिक संसार के बाहर एक ऐसी अदृश्य असीम शक्ति विद्यमान है जिसकी कल्पना करने में आध्यात्मिक के विविध विस्तृत आयाम दृष्टिगोचर होते हैं। कहीं अल्लाह, कहीं ईश्वर, कहीं धर्म कहीं संप्रदाय लेकिन सदैव स्मरण रहे कि धर्म, भक्ति आदि का बीज केवल मानव मन की भावभूमि पर ही अंकुरित होता है।

अध्यात्म स्वयं का उस सौन्दर्य से परिचित हो जाना है जो सौन्दर्य अपने केवल एक अंश के रूप में प्रकृति के कण-कण में विद्यमान है। बहिर्मुखी वृत्ति को आत्माभिमुखी बनाना ही अध्यात्म है। पाँच ज्ञानेन्द्रियां, पाँच कामेन्द्रियां और चार अन्तःकरण कुल 14 के समूह को जो शक्तियां संचालित करती हैं उन्हें **अधिदेव** कहते हैं। परमात्मा का अंश जो चेतन शरीर में है जिसे हम देख नहीं सकते लेकिन सच्चाई है कि कोई अलौकिक शक्ति संचालन कर रही है उसे ही आत्मा कहते हैं। आत्मा और बुद्धि की संतुलित दृष्टि अर्थात् आत्मा से सम्बन्धित ज्ञान को अध्यात्म कहते हैं। आत्म विद्या अध्यात्म विद्या है। इस देह और उसमें अव्यस्थित आत्मा के सम्बन्ध में ज्ञान आत्म क्रिया से ही लभ्य है इसलिए इस क्रिया साधना को आध्यात्म कहते हैं। ललित कलाओं में श्रेष्ठ संगीत की साधना भी अध्यात्म साधना है जहां संगीत साधक नाद ब्रह्म की साधना करता है। सशक्त आध्यात्मिक आधार की जड़े संगीत में बड़ी गहराई तक चली जाती हैं इसी प्रयोजन से अनेक साहित्यकारों ने परमात्मा के गुणगान का अथाह साहित्य रचा जिसे संगीत लहरियों में निबद्ध कर, आत्म ज्ञान, परमार्थ, सदबुद्धि तथा परमात्मा प्राप्ति का मार्ग सुनिश्चित करने का सफल प्रयास प्रत्येक काल में किया गया है।

संगीत की अपार महिमा के कारण ही विश्व के सभी धर्मों, सभी भक्तजनों, सभी उपासकों ने मनरंजक, जनरंजक और आत्मनिमज्जक संगीत को अपनाया जो सुखप्रद और आनन्दप्रद है। इन्द्रिय गोचर होते हुए भी इन्द्रियतीत है। अतः साधनावस्था में आहत नाद के माध्यम से अनाहत नाद की प्राप्ति कर साकार से निराकार की ओर ले जाने वाले अक्षर संगीत के माध्यम से साधक उपासना के माध्यम के रूप में अपनाकर ईष्ट से एकरूपता स्थापित कर लेता है। स्वर से तादतमय ही योग है इसलिए योग और संगीत दोनों ही नादात्मक विधाएं कही जाती हैं। जब साधक का चित नाद में स्थिर हो क्रीड़ा करने लगता है तब सब बाहरी विषय विस्मृत होकर नाद के साथ ही शान्त हो जाते हैं, यह ही लय है और यही समाधि है। यह आध्यात्मिक विद्या (संगीत) सत्यम्, शिवम्, सुन्दरम् को अन्तरतम में अनुभूतियों के स्तर पर लाकर साधक को तादात्म्य स्थापित करने की क्रियाओं का निर्देश करती है।

संगीत अनुभव की वस्तु है। अनुभव चेतना का फल है और चेतना का आधार प्राण है। पुनः प्राणवायु ही वाणी का कारण है।

अपने यहां संगीत देवताओं से अदभुत और परमपवित्र माना जाता है। नटराज आशुतोषनृत्य के आदि देवता, शिव पार्वती का ताण्डव तथा लास्य संहार और फिर निर्माण की प्रक्रिया प्रस्तुत करता है। विघ्नविनाशक गणेश अवनद्ध वाद्य मृदंग के प्रथम वादक तो विद्या बुद्धि की अधिष्ठात्री सरस्वती वीणा वादन करने के लिए वीणा वादिनी तथा संगीताचार्यों की अराध्य कहलाई। नारद ने वीणा वादन करते हुए ऊँ नर—नारायण गाकर पूरे विश्व को रसाप्लावित किया तो वेणु के जादूगर कृष्ण की चुम्बकीय प्रभावशाली धुन से संगीत ही क्या चित्र एवं काव्य कला भी अभिभूत हो उठी। स्थूल के माध्यम से सूक्ष्मता का साक्षात्कार भारतीय दर्शन की विशेषता है और इसी वैशिष्ट्य से संकलित होने के कारण संगीत कला का समादर महर्षियों, दार्शनिकों तथा भक्तजनों के द्वारा बराबर किया जाता रहा। शायद इस धार्मिक आध्यात्मिक पृष्ठभूमिके कारण भारतीय संगीत के साधकों में नारद, वाल्मीकि, तुम्बरु, याज्ञवल्क्य, भरत, शारंगदेव, मतंग, कोहल, दतिल आदि ऋषि मुनियों का नाम आता है। वल्लभाचार्य, सूर, स्वामी हरिदास, चैतन्य महाप्रभु, तानसेन, बैजू आदि सन्तों के संगीत प्रेम से कौन परिचित नहीं।

संगीत में रस निष्पादन की अद्भुत क्षमता सर्वमान्य व प्रमाणित है। भारतीय धर्म के अन्तर्गत प्रायः सभी सम्प्रदाय रसवाद के आधार पर ही अविलम्बित हैं। भारत की वैष्णव, शैव, शाक्त आदि परम्पराओं में अन्य मतभेदों के होते हुए संगीत का निरपवाद महत्व माना गया है। शैवों का शिवधर्म, सिर की जटाएं, कालरूपी सर्पों की माला, ललाट पर तृतीय नेत्र अद्भूत रस की प्रार्थना है। शाक्तों की शक्ति उपासना जिसमें अनेक पराक्रमी दैत्यों के किस्से हैं वीर रस की उपासना है। वैष्णव सम्प्रदाय श्री राधा—कृष्ण की लीलाओं का रसास्वादन करते हैं। राधा—कृष्ण संयोग श्रृंगार रस, राम द्वारा धनुष तोड़ना, रावण वध वीर रस के द्योतक हैं। संगीत के बिना इनके प्रस्तुतिकरण, मंचन की कल्पना भी नहीं की जा सकती। देवी—देवताओं के नाम पर रागों व तालों के नामकरण संगीत के आध्यात्मिक पक्ष के मुँह बोलते उदाहरण हैं।

आधुनिक युग में धार्मिक व आध्यात्मिक गुरु अपने अनुयायियों के मस्तिष्क को आकर्षित करने के लिए संगीत का उपयोग करते हैं। राधा स्वामी, निरंकारी बाबा, चिन्मयनंद, सत्य साईं बाबा, ओशो, श्री श्री रविशंकर, स्वामी रामदेव, श्री प्रभुपाद, अनेकों टी० वी० चैनल सभी अपने अपने विशिष्ट ढंगों से संगीत को धर्म, भक्ति व आध्यात्मिकता का सर्वोत्तम मार्ग व साधन बतलाते हैं।

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Book chapter: Randall, J.E. 1995. Groupers, seabasses and their allies. *In*: Paxton, J.R. and Eschemeyer, W.N. (eds). *Encyclopedia of fishes*. Academic Press, pp 197-201.

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