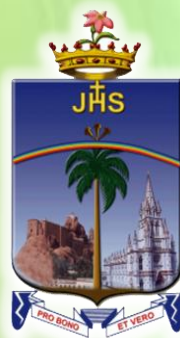


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RETELL

Research Teaching Learning Letters
(An inter-disciplinary Research Journal)

Vol. 15, December 2015



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From the Editorial Team

RETELL (Research Teaching Learning Letter) hits the stands with a bang, this time; heartening that the young scholars and postgraduates are taking the plunge. It is commendable to see their thirst to announce their arrival on the publishing arena. The articles are hosted in the College website (www.sjctni.edu) for easy and open access.

Open access is portrayed these days as an inevitable model for research publishing as against the current *subscription-based* system. Agreement in the academia on the best route forward remains distant, and *open access* may not be the last word on new modes of access to published results. *Open access* will benefit scholars and society in general, for the benefits of research are derived principally from access to research results and their full dissemination. Hence, publishers are in the midst of adjusting to the new possibilities offered by the Web and the online journal articles for scholarly communication. Payment for publication could create conflicts of interest and have a negative impact on the perceived neutrality of peer review, as there would be a financial incentive for journals to publish more articles. Hope we would be able to read a scholarly discussion on the subject in the next issue.

Dr Melchias Gabriel
For the Editorial Board

Epistle

It gives me immense joy to note that *RETELL* brings out the innate research aptitude of the scholars. We are proud of the scholars who have contributed articles to this issue of *RETELL*. As I was going through the manuscripts I could see quality in them. It is just to encourage the research scholars to cultivate the habit of writing research articles; the college has come forward to publish their articles - almost free of charge. At this juncture, I must also thank the research guides who motivated and embellished the articles of their scholars. St. Joseph's can proudly boast that it has very good research guides in almost all the disciplines.

I also take this opportunity to thank Dr G. Melchias, Dean - School of Biological Sciences for his dedicated service in bringing out this journal. Along with a team of committed Editorial Board, he managed to bring out this issue after so much of struggle. I thank him for his hard labour.

With all good wishes to the scholars and authors.

With warm regards,
Rev. Dr. F. Andrew SJ
Principal

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A Comparative Study on the Effects of Ethanolic and Aqueous Extracts of *Premna serratifolia* leaves in Hyperlipidemic Male Albino Rats

T. Antony Diwakar Chandran¹ and V. Vairammal²

¹Department of Biochemistry, St. Joseph's College (Autonomous), Tiruchirappalli

²Senior Process Executive, Dept of Medical Coding, AGS Healthcare Systems, Chennai

Introduction

Lipids are one of the major constituents of food and provide the major source of energy. This group of substances includes, triglycerides (TG), diglycerides, monoglycerides, free fatty acids, phospholipids, and cholesterol, but the triglycerides are the major component of most food. This represents ninety five to ninety nine percentage of the total lipids present in the body. The most important precursor of derived lipids is the cholesterol, the best known sterol, and it is a precursor of a large number of steroid hormones. Cholesterol is present mainly in blood in the lipoprotein fractions as low density lipoprotein (LDL) and high density lipoprotein (HDL) (Wierzbicki *et al.*, 2005).

Hyperlipidemia is an excess of fatty substances called lipids, largely cholesterol and triglycerides, in the blood. It is also called hyperlipoproteinemia because these fatty substances travel in the blood, attached to proteins. This is the only way that these fatty substances can remain dissolved while in circulation.

It is a highly predictive risk factor for atherosclerosis, coronary artery disease and cerebral vascular disease. Atherosclerosis of arteries is a generalized disease of the arterial network known as a progressive and silent killer disease characterized by the formation of large and or medium sized coronary arteries and which reduces blood flow to the myocardium called coronary artery diseases. Hyperlipidemia and hypercholesterolemia are not only secondary metabolic dysregulation associated with diabetes but also represent increased risk factors for development of diabetes. Several factors, such as, life style, as diet rich in cholesterol, age and hypertension, have been reported to cause heart failure (Schaefer *et al.*, 1995).

High levels of cholesterol, particularly low density lipoprotein cholesterol are mainly responsible for hypercholesterolemia. Recently, it has been found that hypercholesterolemia is also associated with enhanced oxidative stress related to increased lipid peroxidation. Increased generation of low density lipoprotein is a major factor in the vascular damage associated with high cholesterol levels. Hence the inhibition of hypercholesterolemia is considered to be an important therapeutic approach and efforts have been made to identify the antihyperlipidemic effects of various medicinal plants (Hu *et al.*, 2006).

Medications most commonly used to treat high LDL levels are statins, such as atorvastatin or simvastatin. These medications work by reducing the production

of cholesterol within the body. Although safe and effective, statins cause muscle damage, typically when used in combination with other medications.

As a result, phytotherapy has taken up new dimensions in its approach towards the betterment (progress) of mankind in the area of medicinal plants which are a rich source of vitamins, minerals, specialized substances that are of great value. This study aims to analyze the effects of ethanolic and aqueous extracts of *Premna serratifolia* in hyperlipidemic male albino rats.

Materials and Methods

Collection of plant material

Plants were collected from Kolli hills, Nammakal district in the month of January 2012. The plant was identified and authenticated by the taxonomist John Britto, Director, Rapinat Herbarium, St. Joseph's College, Trichy.

Preparation of Plant Extract

Leaves of *Premna serratifolia* were shade dried for a period of three weeks and then the dried leaves were powdered and used for extraction. 50 g of dried powder of *Premna serratifolia* leaves were taken in a Soxhlet apparatus and soaked in 300 ml of ethanol, and water separately. The separation process was carried out till complete extraction was achieved.

Preparation of 2% cholesterol diet

2 g of cholesterol (extra pure, Scharlauspain) and 500 mg of Cholic acid (min 98%, sigma aldrich) was thoroughly mixed and mashed with 97.5 g of rat pellet diet. The mixture was made into a pellet form (Rabiea Bilal *et al*, 2011).

Experimental animals

Male albino rats weighing 150-200 gm were used for experiment. These animals were reared, providing rodent pellet diet and water in the animal house, which was well ventilated and lighted. A total of healthy 30 albino rats were selected and acclimatized to the lab conditions for 15 days and then randomly divided into five groups of six each.

Experimental design

The Group I animals served as control and had free access to food and water for 21 days. The animals in Group II served as experimental and were provided with cholesterol rich diet and water for 21 days. The animals in group III were treated with Simvastatin at a dose of 10 mg/kg body weight along with the cholesterol rich diet and water for 21 days. The animals in group IV were treated with ethanolic extract of *Premna serratifolia* leaves 200 mg/kg body weight daily, along with the cholesterol diet and water for 21 days. Group V animals were treated with aqueous extract of *Premna serratifolia* leaves (200 mg/kg body weight orally) daily along with the cholesterol diet and water for 21 days. After the experimental period was over, the rats were sacrificed by cervical decapitation. The blood samples were collected aseptically and stored in a

sterile container. Serum samples were prepared and utilized for biochemical estimations. The tissues were removed surgically and subjected to histological studies using standard procedures.

The biochemical parameters studied were

1. Estimation of serum cholesterol (Zak's *et al.*, 1954)
2. Estimation of serum HDL cholesterol (Burnstein *et al.*, 1970)
3. Estimation of LDL cholesterol (calculation)
4. Estimation of triglycerides (Butler *et al.*, 1961)
5. Estimation of phospholipids (Fisk and Subbarow *et al.*, 1925)

Statistical Analysis

The data obtained from the biochemical estimations were subjected to student's t test. Test values of $p < 0.05$ were considered as statistically significant. Data were presented as mean \pm standard deviation.

Results and Discussion

The levels of various biochemical parameters are depicted in the following table.

Serum cholesterol level

The serum cholesterol level has significantly increased in cholesterol treated group (G-II) when compared with the normal group (G-I) ($p < 0.001$). A significant decrease in the levels of serum cholesterol was observed on administration of Simvastatin (G-III), when compared with the cholesterol treated group (G-II) (Table- 1).

Table 1

Groups	Serum cholesterol (mg/dl)	Serum HDL (mg/dl)	Serum LDL (mg/dl)
Group I (Normal)	116.6 \pm 14	45.31 \pm 8.2	82.25 \pm 2.89
Group II (High cholesterol)	171.3 \pm 8	23.64 \pm 2.6	137.92 \pm 1.96
Group III (Simvastatin + High cholesterol)	112.5 \pm 15	47.33 \pm 2.7	86.11 \pm 1.52
Group IV (Ethanol extract+ High cholesterol)	125 \pm 14	43.46 \pm 5	85.31 \pm 1.30
Group V (Aqueous extract + High cholesterol)	114.5 \pm 12	39.92 \pm 4.5	81.40 \pm 1.56

Table 2

Groups	Serum TGL (mg/dl)	Serum Phospholipids (mg/dl)
Group I (Normal)	66.25±2.33	51.87±1.8
Group II (High cholesterol)	100±4.4	96.25±5.33
Group III (Simvastatin + High cholesterol)	68.75±1.72	52.20±3.24
Group IV- (Ethanol extract+ High cholesterol)	71.25±5.9	53.12±3.72
Group V Aqueous extract + High cholesterol)	67.5±1.83	59.79±2.28

The level of cholesterol in group IV animals (High cholesterol + ethanolic extract treated) is brought back to near normal. The difference between the levels of cholesterol of the two groups namely group I and Group IV is not statistically significant ($p=0.32$).

The reduction in the cholesterol level during the treatment with lovastatin and plant extract have been documented in the literature. In an experiment, conducted to study the antihyperlipidemic effect, the *Tagetes erecta* extract at 200 mg/kg (G-V) caused a significant decrease in the serum cholesterol when compared to the cholesterol treated group (G-II) (Rodda Raghuveer *et al.*, 2011). The result of the present study also coincide with the observation of the above work.

Serum HDL level

The serum HDL cholesterol was significantly decreased in animals belonging to Group II when compared to those of Group I, III, IV and group V (Table -1). The animals of Group III, IV and Group V had significantly increased serum HDL cholesterol levels than Group II. The concentration of HDL cholesterol decreased during hyperlipidemia. The increase HDL cholesterol in Group III, IV and Group V than Group II shows that the extract of *Premna serratifolia* is capable of increasing HDL cholesterol levels thereby decreasing the levels of bad cholesterol (LDL) and exhibits hypolipidemic effect.

The rats fed with high cholesterol diet (G-II) showed a significant decrease in HDL levels when compared to the normal group (G-I). Group-III, receiving standard drug Simvastatin showed a significant increase in HDL levels when compared to the control group (G-II).

HDL cholesterol is the form in which cholesterol is transported back to liver from peripheral tissues for excretion. Reduction the HDL level represents

accumulation of cholesterol in the periphery. During elevated levels of LDL, reduction in the HDL level have been recorded in the previous studies.

In an investigation to find the cholesterol lowering effect of fruits, animals were fed with high cholesterol diet (HCD). High cholesterol diet significantly increased the level of liver TC-LDL-C and TG with less concentration of HDL-C compared to baseline. There was no statistically significant difference in liver lipid profile between groups at baseline. After 8 weeks of treatment with *Luffa aegyptiaca* fruits the concentrations of TC, LDL-C and TG were significant lower, with an increased HDL-C concentration in treatment group as compared to control group (Abdul *et al.*, 2011)

Serum LDL level

The Low density Lipoprotein were significantly increased in animals belonging to Group II when compared to that of Group I, III, IV, V (Table-1). The concentration of LDL increased during the hypercholesterolemia in the animals fed with high cholesterol diet. Decrease in the LDL level in Group IV (HCD+ ethanolic extract of *Premna serratifolia* leaves) and V (HCD + aqueous extract of *Premna serratifolia* leaves) could be due to the ability of the phytochemicals present in the extract of *Premna serratifolia*.

Similar results have been found in the literature. The rats induced with cholesterol (G-II) a significant increase in LDL levels was observed when compared to the normal group (G-I). Group-III animals, receiving standard drug showed a significant decrease in LDL levels when compared to the control group (G-II). Administration of *Tagetes erecta* extract at dose of 200 mg/kg (G-V) has shown a significant decrease in LDL levels (Rodda Raghuveer *et al.*, 2011).

In another clinical analysis, a rat fed with high cholesterol for 7 days exhibited significant increase in TC, TG, LDL-C and VLDL and significant decrease in HDL-C, HDL-C, HDL-C ratio as compared to the normal animals. Treatment with atorvastatin (10 mg kg b.wt., p.o.) showed significant decrease in elevated TC, TG, LDL-C and VLDL, with significant increase in HDL-C ($p < 0.05$) as compared to the high cholesterol diet control. Whereas treatment with hydroalcoholic extract of *Gymnema* leaves at a dose of 200 mg/kg b.wt., p.o showed significant decrease in the elevated levels of TC, TG, LDL-C and VLDL, with significant increase in the HDL-C ($p < 0.05$) as compared to the high cholesterol diet control (Rachh *et al.*, 2010).

Serum triglyceride (TGL) levels

The serum triglycerides were significantly increased in animals belonging to Group II when compared to that of Group I, III, IV and V (Table-2). The difference is statistically significant at 95% confidence level ($p < 0.001$) The concentration of triglycerides increased during the hyperlipidemia in the animals fed with high cholesterol diet. Decrease in the triglycerides level in Group IV (HCD + ethanolic extract of *Premna serratifolia* leaves) and V (HCD

+ aqueous extract of *Premna serratifolia* leaves) could be due to the antihyperlipidemic effect of *Premna serratifolia* leaves.

There is no statistically significant difference existing between the levels of triglycerides of group III and group IV animals ($p=0.259$). So, it is understood that the efficacy of ethanolic extract of *Premna serratifolia* is comparable to that of simvastatin.

Group-II animals receiving cholesterol showed a significant increase in triglyceride levels when compared to the normal group (G-I). Rats treated with standard drug (G-III) had significantly lowered triglyceride level when compared to the cholesterol treated group (G-II).

Similar observations have been documented already in the literature. The oral administration of high fat diet for 28 days to rats produced a significant ($p < 0.01$) increase in serum TC, LDL-C, VLDL-C and triglycerides as compared to normal control rats. These significant rises were accompanied by significant ($p < 0.01$) decline of serum HDL-C as compared to normal control rats. The treatment with HC (200 mg/kg) and standard drug atorvastatin (10 mg/kg/day p.o.) to high fat rats resulted in significant ($p < 0.01$) decline in serum TC, LDL-C, VLDL-C and triglycerides as compared to hyperlipidemic control rats. Further, atorvastatin treated group significantly increased the serum HDL-C level in high fat induced rats. Whereas, treatment with HC extract did not modulate the reduced serum HDL-C level (Shivali *et al.*, 2010).

In another work of the same kind, A significant decrease in serum triglycerides was observed in animals treated with *Hibiscus sabdariffa* Linn extract at 200 mg/kg dose (G-V) (Pooja *et al.*, 2009).

Serum phospholipid levels

In lipid profile, the serum phospholipids were significantly increased in animals belonging to Group II when compared to Group I, III, IV and V (Table-2). The concentration of phospholipids increased during the hypercholesterolemia in the animals fed with high cholesterol diet. Decrease in the phospholipids level in Group IV (HCD+ ethanolic extract of *Premna serratifolia* leaves) and V (HCD + aqueous extract of *Premna serratifolia* leaves) its shows that the extract of *Premna serratifolia* is capable of reducing level of phospholipids.

Group-II animals receiving cholesterol showed a significant increase in phospholipids levels when compared to that of the normal group (G-I). Rats treated with standard drug (G-III) had significantly lowered phospholipids level when compared to the cholesterol treated group (G-II).

The reduction in the levels of phospholipids in the animals of group IV could be due to the action of the phytochemicals presents in the ethanolic extract of *Premna serratifolia*. The reduction in the levels of phospholipids, by treatment with plant extracts have been documented in the literature.

Lowering high cholesterol levels significantly reduce the risk of heart attacks, strokes, and death. Normally hepatocyte initiate synthesis of triglycerides and cholesterol during states of increase free fatty acid flux to the liver (e.g., after the fatty meal or in the situation of increased lipolysis) but due to anti-hyperlipidemic drug, there may be inability of hepatocytes to increase cholesterol synthesis and decrease hepatocyte cholesterol concentration by increase in the catabolic conversation of cholesterol to bile acids in liver. High cholesterol diet increased serum cholesterol and LDL-C level significant. A rise in LDL may cause deposition of cholesterol in arteries and aorta and hence it is a direct risk factor for coronary heart disease. A significant decrease in serum phospholipids was observed in animals treated with *Terminalia chebula* extract at 200 mg/kg dose (G-V) (Dipaet *al.*, 2010).

From the above analysis, it is also obvious that the efficacy of both the extracts in reducing the elevated levels of lipid parameters is nearly the same.

Histopathology

The liver of group I shows regular pattern of arrangement of cells whereas the liver of group II animals fed with high cholesterol shows increased vacuolation. The liver of simvastatin treated animals in group III is not affected to a greater extent. The architecture of liver tissue in animals of group IV and V are protected due to the inhibitory effect of ethanolic and aqueous extracts of *Premna serratifolia* respectively.

Hence it is obvious from this study that the leaves of *Premna serratifolia* is capable protecting the liver against hypercholesterolemia in damage. Alteration of architecture of liver tissue in the conditions of elevated lipid levels have been documented in the literature. The high cholesterol diet fed rats shows fatty cytoplasmic vacuolated cells as compared to normal control. Treatment with aqueous extract of *T.chebula* shows less fatty cytoplasmic vacuoles as compared to high cholesterol diet fed rats. Combination of *T. chebula* along with high cholesterol diet shows focal area of cytoplasmic vacuoles (Dipa *et al.*, 2010).

Conclusion

Hyperlipidemia though causes clinical manifestations, can be managed if properly handled. The present study reveals that the extracts of *Premna serratifolia* is capable of bringing down the elevated levels of lipid parameters like LDL, TG and Cholesterol. Hence it requires that further work need to be carried out using human subjects, such that the results can be extrapolated to human beings. It is also necessary to find the dose of the extract required for human use.

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***In vitro* Antimicrobial Activity of Callus Extracts of *Micrococca mercurialis* (L.) Benth. on Western Ghats**

M. Bastin¹, R. Jeyachandran², P. S. Chinnasamy³

^{1 & 2}Department of Botany, St. Joseph's College (Autonomous), Trichy - 620 002

³Department of Botany, Government Arts College (Autonomous), Karur - 639 005

Introduction

Micrococca mercurialis is a perennial uncommon herb and the plant has flowering and fruiting throughout the year. The plant is used to treat children with fever and the plant-sap is instilled into the nose, eyes or ears to treat headache, filariasis of the eye or otitis, respectively (1). It has 14 species, native to tropical Africa. Most are herbs, but some, especially in the tropics, are also shrubs or trees. Some are succulent and resemble cacti (Jeyachandran *et al.*, 2013).

Micrococca mercurialis wild food plants contribute to local household food and livelihood security especially for the economically disadvantaged, the young or the elderly. They are important to local food security because they are free and are easy to access by the local communities. (FAO, 1988; Banana and Turiho-Habwe, 1997; Shackleton *et al.*, 1998; Somnasang and Moreno-Black, 2000). There are more than 30 000 plant species known to man as food (FAO, 1996). The majority of these are harvested locally and are not widely used at the global level. Raju and Rao (1977) reported paracytic, anisocytic, anomocytic and diacytic type in 50 species of the family. They also recorded tetracytic and cyclocytic types. Rao and Raju (1975) observed paracytic, anomocytic, anisocytic and diacytic type in case of *Micrococca mercurialis*, however paracytic type is predominant. Wild food plants also provide nutritional security by adding essential nutrients as well as variety to diets, making staples more appealing to the taste. In addition, they also contribute to household economies (Ladio, 2001). Wild relatives of crop plants are important to plant breeding because they are a source of genes which can be used to improve existing crop varieties (Iltis, 1988; Frisvold and Condon, 1998; Smith, El Obeid and Jensen, 2000).

Medicinal plants are resources of new drugs. It is estimated there are more than 250,000 flower plant species. Studying medicinal plants helps to understand plant toxicity and protect human and animals from natural poisons (13). Wild food plants also provide nutritional security by adding essential nutrients as well as variety to diets, making staples more appealing to the taste. In addition, they also contribute to house hold economies (Ladio, 2001). Wild relatives of crop plants are important to plant breeding because they are a source of genes which can be used to improve existing crop varieties (Iltis, 1988; Frisvold and Condon, 1998; Smith, El Obeid and Jensen, 2000).

Materials and Methods

The aim of this study was planned to evaluate fresh leaves of *Micrococca mercurialis* were cultured on tissue culture MS media and fortified with different concentration of plant growth regulators using standard tissue culture techniques.

Procurements of plant material

The fresh explants materials were collected in the month of September 2012 from the plants growing in Kolli Hills in Namakkal district in Tamil Nadu, India. They were identified and authenticated from the Rapinat Herbarium, at St. Joseph's College (Autonomous), Tiruchirappalli, Tamil Nadu. The voucher plant material was deposited in the same herbarium (No: RHT-10480). The collected fresh plant material were further maintained in department green house harden.

Explants sterilization

The explants were washed with running tap water to remove the traces of soil particles. They have been further washed with Teepol liquid detergent under running tap water and may treated with 0.1% (w/v) Mercuric chloride (Hi Media) for 40 sec. After these, explants were then thoroughly washed 2-3 times sterilized with double distilled water to remove the traces of mercuric chloride and an again washed with fungicide 0.2% (Bavistin) for 1-2 minutes under aseptic conditions. After surface sterilization, the explants were then thoroughly washed 3-4 times sterilized with double distilled water to remove the traces of Bavistin. They already developed in the green house fresh plant was cut into shoot tip only for induction of callus culture. The leaf explants were washed with Teepol liquid detergent under running tap water to departure of dust particles. Further surface-sterilization treatment was conducted in the inner side of the laminar air flow chamber.

Preparation of MS medium

The explants of leaf were inoculated in the MS medium (Murashige and Skoog, 1962) fortified with different concentrations of plant growth regulators 2,4-D (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0 mg/l) and BAP (1.0, 0.9, 0.8, 0.7, 0.6, 0.5, 0.4, 0.3, 0.2, 0.1 mg/l) in combinations (Table 1) and sucrose (3%) was added in the MS medium. Before adding the agar (8%) to set the pH was adjusted to 5.6-5.7 with help of acidic (0.1 N HCL) and basic (0.1 N NaOH) solution. MS medium was separated by aliquot in ten different beakers (100 ml) and was added with different concentrations of plant growth regulators. The preparation of MS salt with agar solution was boiled and poured into culture tube around 30- 40 ml of the medium which was dispensed into 25×55 mm (Borosil, India) culture vessels before being media and apparatus are rendered sterile by autoclaving at 15 lbs/inch² (121°C) for 15 minutes.

Callus induction

Callus initiation is the primary stage in many tissue culture processes for the establishment of cell suspension cultures (Kumar and Kanwar, 2007; Ngara *et al.*, 2008), indirect somatic embryogenesis (Kulkarni *et al.*, 2002; Rahman *et al.*, 2006) and other application. In the present study, MS medium was supplemented with different concentrations of 2,4-D, and BAP hormones were tested for initiation of green friable, white friable and vigorous growing green callus from leaf explants to be used as inoculation. The leaf explants of *M. mercurialis* were brought from our department green house harden for inoculation of callus induction. Aseptically excised leaf explants of various sizes (3-5cm) were placed on the MS medium. The MS medium supplemented with different concentrations of plant growth regulators (2,4-D: 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0 mg/l) and (BAP: 0, 0.9, 0.8, 0.7, 0.6, 0.5, 0.4, 0.3, 0.2, 0.1 mg/l). After the seventh week of inoculation they were well developed green callus was appeared in the culture medium. All the callus cultures were incubated at a suitable controlled temperature at $25 \pm 2^\circ\text{C}$ with cool white fluorescent tubes (Philips, India) $25 \mu\text{mol m}^{-2} \text{s}^{-1}$ under the photoperiod (16/8 hrs) daily. The growth pattern of callus induction was noted regarding quantity of callus colour, type and number of days to formation of callus was observed and results were recorded.

Table 1
Effect of different concentrations of 2,4-D (mg/l) and BAP (mg/l) for induction of callus on leaf explants of *Micrococca mercurialis*

S. No.	Plant growth regulators (mg/l)		Productivity of callus in leaf explants of <i>Micrococca mercurialis</i>		
	2,4-D	BAP	Yellow friable callus	Green friable callus	% of explants producing callus (Mean \pm SE)
1.	0.1	1.0	0.44 \pm 0.10	0.71 \pm 0.08	0.67 \pm 0.09
2.	0.2	0.9	0.84 \pm 0.10	0.74 \pm 0.09	0.64 \pm 0.17
3.	0.3	0.8	0.72 \pm 0.08	0.75 \pm 0.10	0.72 \pm 0.10
4.	0.4	0.7	0.52 \pm 0.10	0.79 \pm 0.99	0.75 \pm 0.09
5.	0.5	0.6	0.51 \pm 0.11	0.76 \pm 0.96	0.76 \pm 0.10
6.	0.6	0.5	0.76 \pm 0.11	0.73 \pm 0.13	0.72 \pm 0.11
7.	0.7	0.4	0.73 \pm 0.10	0.62 \pm 0.16	0.80 \pm 0.10
8.	0.8	0.3	0.55 \pm 0.13	0.72 \pm 0.11	0.57 \pm 0.09
9.	0.9	0.2	0.56 \pm 0.12	0.73 \pm 0.10	0.80 \pm 0.07
10.	1.0	0.1	0.58 \pm 0.14	0.71 \pm 0.12	0.57 \pm 0.09

Statistical analysis

All the data were presented in the average of three replicates and expressed as Mean \pm SD. The statistical analysis of all the data were carried out using SPSS 16.0 version. Callus formation was recorded at percentage level on each explant after 7th weeks of cultivation. Data present the average of triplicate experiments (means \pm S.D) and significant different at $p < 0.05$) using t-Test.

Antimicrobial activity

The antimicrobial activity was determined by callus extracts of *Micrococca mercurialis* against four different solvents by ethyl acetate, ethanol, hexane, and chloroform extracts were tested by the disc diffusion method (NCCLS).

Preparation of callus extracts

The callus was washed under running tap water for remove their unwanted debris medium and their air dried under shade to fine powder with help of mixer grinder which was particle sieve size 40 to 70 mm. The fine powder of callus was extracted under soxhlet apparatus with using various solvents i.e., ethyl acetate, ethanol, hexane, and chloroform.

Preparation of Inoculum

The appropriate microorganisms were inoculated aseptically with the Muller-Hinton (Hi media, Mumbai) broth for testing of antibacterial studies. The suspension of inoculum was perfectly suited for culture of bacterial strains. The bacterial strains were incubated at 37°C and reached to the stationary phase of growth during 18-24 hr. The colony forming units (CFU/ml) of bacteria are approximately corresponding to 10⁵ (CFU/ml) in the inoculum suspension.

Disc diffusion method

Disc diffusion experiment was performed by the method of NCCLS (1993). The plant extracts of *M. Mercurialis* were tested by human pathogenic bacteria with the commercially available antibiotics. The commercially purchased Muller Hinton Agar (Hi-Media, Mumbai) was prepared by sterile conditions and medium was poured (30 ml/plates) on to the autoclaved Petri dishes (150 \times 20 mm) and allowed to solidify. For the purpose of inhibiting the fungal pathogens, 2 ml of antifungal agent (fluconazole) per 100 ml of medium was added. After solidification, the test strains were seeded on the surface of agar plates with help of sterile cotton swab. The sterile impregnated (plant extract 100 mg/ml) paper disc was placed on the agar petridishes. The plates were incubated under anaerobic condition at 37°C for 48 h. After the completion of incubation period, the diameter of the zone of inhibition was measured in mm and also was recorded.

Antifungal Activity

The four types of callus extracts of *Micrococca mercurialis* were tested for antifungal studies using three types of fungal species by disc diffusion method.

The Sabouraud Dextrose Agar (SDA) (Hi-Media, Mumbai) plates were prepared and inoculated in each fungal inoculum with help of sterile cotton swab over the surface of the Sabouraud Dextrose Agar (SDA) plates. The sterilized filter paper discs (5 mm in diameter) impregnated with plant extracts (100 mg/ml) were placed on swabbed test organism-seeded on the plates. The sterilized paper disc was impregnated with DMSO solvents were used as negative controls. The impregnated disc was completely evaporated the solvents before introduced into the test plates. The commercially purchased Nystatin (10 µg/ disc) compound was used as positive control. All the plates were incubated at 28°C for 72 h under incubator. After the incubation period the activity was determined and the diameter of inhibition zone was measured in mm.

Results and Discussion

The induction of callus was initiated from leaf explants of *Micrococca mercurialis* on MS medium fortified with 1.0 mg/l 2,4-D and 0.1 mg/l BAP. The yellowish and green nodular callus culture was showed a good number of result and optimized at the concentration of 2,4-D (1.0 - 0.1 mg/l), and BAP (1.0-0.1 mg/l) in the 3rd weeks of culture. The high content of callus was initiated from the concentrations of 2,4-D (0.79 ± 0.99) on yellow friable callus and green friable callus was initiated from the concentrations of BAP (0.80 ± 0.07). Three differences have been observed during the initiation of callus 1. a single organ was successively developed into leaf; 2. a complete leaf primordial was formed; 3. shoot was successively developed from the single organ. Shoot buds developed and elongated from callus culture on the same medium. The high morphogenic efficiency of nodal segments derived callus may be due to the presence of some internal components from the pre-existing axillary buds for induction of caulogenesis (Martin, 2002).

The well developed callus culture was subculture onto fresh MS medium and supplemented with 2,4-D and Kinetin plant growth regulators which was carried out after an interval third weeks. The shoot bud was regenerated on the subcultured callus after the first week of inoculation. Best shoots appeared in the concentration of plant growth regulators was achieved in 2,4-D (1.4 mg/l) and Kinetin (0.8 mg/l). As the potentiality of shoot multiplication from callus continued for a long time, regenerates may be characterized by somaclonal variation. Several species of *Amaranthus* (Bennici *et al.*, 1997), *Ananas comosus* (Akbar *et al.*, 2003), *Cuphea* (Millam *et al.*, 1997), *Dubosia* (Lin and Griffin, 1992) and *Salvia* (Liu *et al.*, 2000) produced regenerates through callus-mediated adventitious shoot differentiation. Such regenerates may prove to be a potential source of somaclonal variants, giving birth to traits agronomic importance. The regenerated plants of *Paedaria foetida* L. are currently being screened for agronomically useful genetic variants.

Among the four extracts the chloroform extract as it was clearly exhibited in (Table 2) *Bacillus subtilis*, *Escherichia coli*, *Serratia marcescens*, and *Staphylococcus aureus* are exhibited no activity against among the tested bacteria. The maximum inhibition zone exhibited against *Bacillus subtilis*, *Vibrio cholera* and *Proteus vulgaris*. The maximum zone of inhibition was observed using positive control, chloramphenicol against *E.coli* (2.00+0.33), *Bacillus subtilis* (1.99+0.33) and *Pseudomonas aeruginosa* (1.98+ 0.32). The negative control of DMSO solvent showed clearly a significant activity against certain types of bacteria *Salmonella typhi* (0.39+0.15), *Vibrio cholera* (0.42+0.13) and *Serratia marcescens* (0.40+0.14). Callus extract of hexane was showed good for inhibition zone against much number of tested strains. On other hand Ethyl acetate, Ethanol, and Chloroform extracts were showed better zone of inhibition activity against the certain types of bacterial species. They did not show any zone of inhibition activity against the following bacterial species *Serratia marcescens*, *Salmonella typhi*, *Pseudo-monas aeruginosa*, *Staphylococcus aureus*, and *Salmonella typhi* among the four types of callus extracts.

Table 2
Effect of different concentrations of 2,4-D (mg/l) and Kinetin (mg/l) for induction of callus on leaf explants of *Micrococca mercurialis*

S. No.	Plant growth regulators (mg/l)		Productivity of callus in leaf explants of <i>Micrococca mercurialis</i>		
	2,4-D	Kinetin	Green friable Callus (Mean±SE)	Yellow friable callus (Mean±SE)	% of explants producing callus (Mean±SE)
1.	0.2	2.0	0.58+0.12	0.52+0.17	0.54+0.08
2.	0.4	1.8	0.60+0.11	0.48+0.16	0.55+0.08
3.	0.6	1.6	0.62+0.10	0.53+0.08	0.57+0.09
4.	0.8	1.4	0.60+0.08	0.51+0.06	0.62+0.09
5.	1.0	1.2	0.57+0.08	0.52+0.08	0.55+0.10
6.	1.2	1.0	0.58+0.08	0.55+0.12	0.61+0.10
7.	1.4	0.8	0.61+0.10	0.56+0.12	0.57+0.12
8.	1.6	0.6	0.56+0.10	0.53+0.08	0.60+0.10
9.	1.8	0.4	0.57+0.12	0.55+0.07	0.56+0.07
10.	2.0	0.2	0.56+0.12	0.53+0.08	0.55+0.08

Table 3
Determination of antibacterial activity of callus extracts in *Micrococca mercurialis*

Test micro-organisms (Bacteria)	Diameter of inhibition zone (mm) in using various solvents					
	Ethyl acetate	Ethanol	Hexane	Chloroform	Positive Control	Negative Control
<i>Bacillus subtilis</i>	0.10+0.09	0.09+0.08	0.27+0.09	NA	1.99+0.33	0.37+0.17
<i>Escherichia coli</i>	NA	0.30+0.13	0.29+0.09	NA	2.00+0.33	0.31+0.15
<i>Pseudomonas aeruginosa</i>	0.09+0.07	NA	NA	0.21+0.08	1.98+0.32	0.34+0.14
<i>Proteus vulgaris</i>	0.12+0.11	0.30+0.13	NA	0.19+0.08	1.95+0.31	0.37+0.12
<i>Serratia marcescens</i>	NA	NA	0.29+0.12	NA	1.93+0.33	0.40+0.14
<i>Vibrio cholera</i>	0.10+0.08	0.25+0.13	0.26+0.08	0.22+0.07	1.86+0.34	0.42+0.13
<i>Salmonella typhi</i>	NA	0.26+0.12	NA	0.23+0.09	1.88+0.33	0.39+0.15
<i>Staphylococcus aureus</i>	NA	0.28+0.11	0.26+0.09	NA	1.84+0.32	0.37+0.14
<i>Klebsiella pneumoniae</i>	0.11+0.09	NA	0.09+0.08	0.22+0.11	1.79+0.28	0.31+0.16
<i>Streptococcus mutans</i>	0.12+0.10	NA	0.24+0.08	0.21+0.11	1.77+0.24	0.35+0.12

NA-No activity.

All the results are measured by mean of inhibition zone in mm \pm S.D of three replicates.

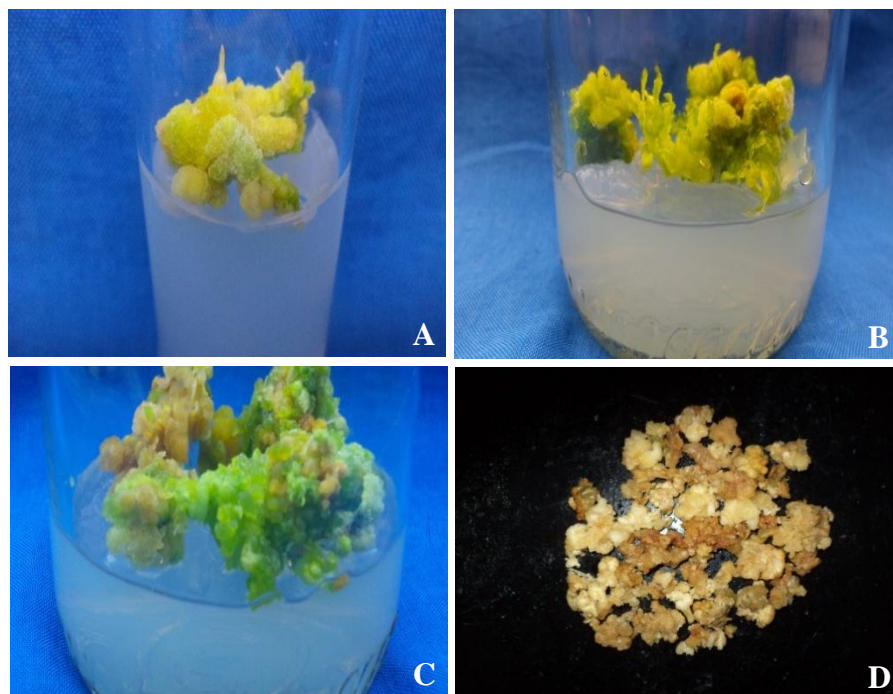
Table 4
Determination of antifungal activity of callus extracts *Micrococca mercurialis*

Test micro-organisms (Fungi)	Diameter of inhibition zone (mm) in using various solvents					
	Ethyl acetate	Ethanol	Hexane	Chloroform	Positive Control	Negative Control
<i>Aspergillus flavus</i>	0.21+0.07	0.26+0.12	0.21+0.09	NA	1.62+0.17	1.04+0.46
<i>Candida albicans</i>	NA	0.22+0.10	0.18+0.07	NA	1.67+0.17	1.13+0.38
<i>Trichophyton mentagrophytes</i>	0.21+0.07	NA	0.19+0.07	0.25+0.11	1.75+0.14	1.24+0.14

NA-No activity.

All the results are measured by mean of inhibition zone in mm \pm S.D of three replicates.

Fig.1: Showing different types of callus culture developed on MS medium using leaf explant of *Micrococca mercurialis*.



- A. Yellowish green nodular callus expansion on MS after three weeks of culture.
- B. Initiation of shoot buds from the same callus on MS after 7th weeks of culture.
- C. Showed that the shoot differentiation from callus on MS medium after 10th weeks of culture.
- D. Fresh callus was used for antimicrobial studies.

The antifungal studies clearly exhibit minimum inhibition zone against the four types of callus extracts. The hexane extracts was showed a significant activity against all the fungal species. The *Trichophyton mentagrophytes* was showed moderate activity against the extracts i.e., ethyl acetate, hexane and chloroform except ethanol extract. The *Candida albicans* also exhibited least inhibition zone activity against ethanol and hexane extracts. This broad spectrum of antimicrobial activity may be due to the presence of some novel secondary metabolites in the callus culture. Callus of *Micrococca mercurialis* is found to possess pharmaceutically important bioactive principles which can be commercially exploited for the benefit of mankind.

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Influence of *Aloe vera* Extract on Corrosion Inhibition of Mild Steel in Well Water

R. Epshiba, A. P. Pascal Regis, R. Betsy Clarebel,
S. Philomina Mary and J. K. Alphonsa

Department of Chemistry, St. Joseph's College (Autonomous), Trichy - 620 002

1. Introduction

Plant extracts are viewed as an incredibly rich source of naturally synthesized chemical compounds that can be extracted by simple procedures with low cost and are biodegradable in the environment. Plant extracts have become important as environmentally acceptable, readily available and renewable source for wide range of inhibitors.^[1] In general, the plant extracts are inhibitors with high inhibition efficiency and of non toxicant. Natural products are nontoxic, biodegradable and readily available. They have been used widely as inhibitors. Several plant extracts^[2-6] and eco-friendly inhibitors^[7,8] attracted the researchers. Natural products such as caffeine^[9,10] have been used as inhibitors. Corrosion inhibition of steel by plant extracts in acidic media has been reported^[11,12].

Corrosion inhibition by beet root extract has been studied^[13]. Aqueous extracts of Onion^[14] and *Androgaphis panizulata*^[15] have been used as corrosion inhibitors. *Opuntia* extract^[16] was investigated for the corrosion of Aluminium in acid medium and vanillin^[17] for the corrosion of mild steel in acid media. Extracts of tobacco from twigs, stems, and leaves can protect steel and aluminium in saline solutions and strong pickling acids^[18,19]. Extract of *Hibiscus sabdariffa* can be used as corrosion inhibitor for mild steel in 2M HCl and 1M H₂SO₄ solution^[20]. Anthony et al. have studied the effect of caffeine against chloride corrosion of carbon steel.^[21] Bo yong *et al.* Investigated the corrosion inhibition of mild steel in acidic media by garlic^[22, 23], Eddy *et al.*^[24] was studied the corrosion inhibition of ethanol extract of *Aloe vera* on mild steel in acid media. Sribharathy *et al.* investigated the corrosion of mild steel in sea water by *Aloe vera* extract^[25]. Through these studies, it is agreed that the inhibition performance of plant extract is normally ascribed to the presence of their composition of complex organic species such as tannins, alkaloids and nitrogen bases, carbohydrates, amino acids and proteins as well as hydrolysis products. These organic compounds contain polar functions with N, S, O atoms as well as conjugated double bonds or aromatic rings in their molecular structures, which are the major adsorption centres.

Aloes have abundant organic components in which N, S, O atoms are the main constituent atoms. The present work investigated the inhibition efficiency of an aqueous extract of plant material, *Aloe vera* (L) Burm f. (Liliaceae) extract, in controlling corrosion of carbon steel immersed in well water in the absence and presence of inhibitor, using weight loss method, analyzed the protective film by

Fourier transform infrared (FTIR) spectroscopy and proposed a suitable mechanism of corrosion inhibition, based on the results of the above studies.

2. Experimental

2.1 Preparation of plant extract and specimens

An aqueous extract was prepared by grinding 10 g of fresh extract of aloe vera gel, filtering and making up to 100 ml using double distilled water. Carbon steel specimens (0.0267% S, 0.06% P, 0.4% Mn, 0.1% C and the rest iron) of dimensions 1.0 cm × 4.0 cm × 0.2 cm were polished to a mirror finish and degreased with trichloroethylene.

2.2 Weight loss method

Carbon steel specimens were immersed in 100 ml of the well water, containing various concentrations of the inhibitor in the absence and presence of Zn^{2+} for 3 days. The weights of the specimens before and after immersion were determined using a Digital Balance Model AY 62 SHIMADZU. The corrosion products were cleaned with Clarke's solution. It can be prepared by dissolving 20 g of Sb_2O_3 and 50 g of $SnCl_2$ in one litre of conc. HCl of specific gravity (1.9)^[26]. The corrosion IE was then calculated using the equation.

$$IE = 100 [1 - (W_2/W_1)] \%$$

where W_1 is the corrosion rate in the absence of inhibitor and W_2 is the corrosion rate in the presence of inhibitor. Corrosion rate was calculated using the formula:

$$\text{Millimetre per year} = 87.6 W / DAT$$

W = Weight loss in milligrams

D = Density of specimen $g/cm^3 = 7.87 g/cm^3$

A = Area of specimen = 10 cm^2 and

T = Exposure in hours = 72 hr

2.3 Synergism Parameter

The synergism parameter can be calculated by using the equation indicates the synergistic effect existing between the inhibitors^[27-29]. S_1 value is found to be greater than one suggesting that the synergistic effect between the inhibitors is $S_1 = 1 - I_1 + 2 / 1 - I'_{1+2}$. where I_1 = inhibition efficiency of substance 1, I_2 = inhibition efficiency of substance 2, I'_{1+2} = combined inhibition efficiency of substance 1 and 2. If synergistic effect exists between the inhibitors, S_1 value will be greater than one.

2.4 Analysis of Variance (F-Test)

An F-test was carried out to investigate whether the synergistic effect existing between inhibitor systems is statistically significant^[30]. If F-value is greater than 5.32 for 1, 8 degrees of freedom, the synergistic effect proves to be statistically significant. If it is less than 5.32 for 1, 8 degrees of freedom, it was statistically insignificant at a 0.05 level of significance.

2.5 Determination of the biocidal efficiency

The biocidal efficiency of the system was determined using Zobell medium and calculating the numbers of colony forming units per ml using a bacterial colony counter. The biocidal efficiency of sodium dodecyl sulphate (SDS) and SM-Zn²⁺ - *Aloe vera* system was determined. Various concentrations of SDS such as 50 ppm, 100 ppm, 150 ppm, 200 ppm and 250 ppm were added to the formulation consisting of the inhibitor system. Polished and degreased mild steel specimens in triplicate were immersed in these environments for a period of 3 days.

After 3 days, 1 ml each of test solutions from environments was pipetted out into sterile petri dishes each containing about 20 ml of the sterilized Zobell medium. The petri dishes were then kept in a sterilized environment inside the laminar flow system fabricated for 48 hours. The total viable hydrotropic bacterial colonies were counted using a bacterial colony counter. The corrosion inhibition efficiencies of the formulation consisting of the inhibitor in the presence of various concentrations of SDS were also determined.

2.6 Surface Examination Study

The carbon steel specimens were immersed in various test solutions for a period of one day, taken out and dried. The nature of the film formed on the surface of the metal specimen was analyzed by FTIR spectroscopic study.

These spectra were recorded in a Perkin-Elmer-1600 spectrophotometer using KBr pellet. The FTIR spectrum of the protective film was recorded by carefully removing the film, mixing it with KBr.

3. Result and Discussion

3.1 Analysis of Result of the weight loss method

The physicochemical parameters of well water are given in Table 1.

In order to examine the role of *Aloe vera* in the ternary inhibitor formulation, experiments were conducted with *Aloe vera* alone, with SM and with SM-Zn²⁺ in a wide concentration range. The inhibition efficiency (IE) of *Aloe vera* in controlling corrosion of carbon steel immersed in well water for a period of three days in the absence and the presence of Zn²⁺ and SM is given in Table 2.

It can be seen from the data that *Aloe vera* alone shows some IE. The inhibition efficiency of *Aloe vera* and Zn²⁺ are shown in Table 3.

The Zn²⁺ ion acts as one synergist and *Aloe vera* acts as the other. When *Aloe vera* is combined with Zn²⁺ ions it is found that the IE increase with concentration of *Aloe vera*. For example, 10 ml of *Aloe vera* extract has only 32% IE and 25ppm of Zn²⁺ has only 5% IE their combination shows 51% IE. This suggests a synergistic effect between the binary inhibitor formulation of *Aloe vera* and Zn²⁺ ion.

Table 1. Physico-Chemical Parameters of Well Water

Parameter	Value
Appearance	Clear
Turbidity NT units	1.4
Ph	7.73
Conductivity	5820 $\mu\text{mhos/cm}$
Chloride	1450 ppm
Sulphate	73 ppm
TDS	4034 ppm
Total hardness	880 ppm
Total Alkalinity	548 ppm
Calcium	304 ppm
Magnesium	29 ppm
Sodium	820 ppm
Potassium	40 ppm
Iron	0.30 ppm
Nitrate	2 ppm
Fluoride	0.64 ppm
Phosphate	0.08 ppm

Table 2. Corrosion Rate (CR) and IE of Carbon Steel in Well Water, in the Absence and the Presence of Inhibitors and IE Obtained by Weight-Loss Method Immersion period: 3 days

<i>Aloe vera</i> ml	SM ppm	Zn ²⁺ ppm	IE %	CR mmy^{-1}
0	0	0	-	0.1174
2	0	0	15	0.0995
4	0	0	19	0.0950
6	0	0	23	0.0903
8	0	0	28	0.0845
10	0	0	32	0.0798

Table 3. Corrosion Rate (CR) and IE of Carbon Steel in Well Water, in the Absence and the Presence of Inhibitors and IE Obtained by Weight-Loss Method (Immersion period: 3 days)

<i>Aloe vera</i> ml	SM ppm	Zn ²⁺ ppm	IE %	CR mmy^{-1}
0	0	25	5	0.1115
2	0	25	23	0.0903
4	0	25	29	0.0833
6	0	25	33	0.0786
8	0	25	42	0.0680
10	0	25	51	0.0575

The synergistic effect in the SM- Zn^{2+} - *Aloe vera* system is evident from the data in Table 4. The Zn^{2+} ion acts as one synergist and *Aloe vera* acts as the other. From the data in Table 4, it is seen that at relatively higher concentrations of SM, Zn^{2+} and *Aloe vera*, 87% IE was obtained. However, such efficiency is not obtained with combinations of SM and *Aloe vera*, even at relatively high concentrations. Thus, it may be concluded that Zn^{2+} is the primary synergist and *Aloe vera* is the secondary synergist and both play a significant synergistic role in inhibiting corrosion. Hence, the highest IE is obtained at such low concentrations of each of the components in the ternary inhibition formulation.

Table 4. Corrosion Rate (CR) and IE of Carbon Steel in Well Water, in the Absence and the Presence of Inhibitors and IE Obtained by Weight-Loss Method (Immersion period: 3 days)

<i>Aloe vera</i> ml	SM ppm	Zn^{2+} ppm	IE %	CR $mm\ y^{-1}$
0	100	25	23	0.0903
2	100	25	61	0.0457
4	100	25	65	0.0410
6	100	25	73	0.0316
8	100	25	83	0.0199
10	100	25	87	0.0152

3.1.1 Influence of immersion period on the SM- Zn^{2+} -*Aloe vera* system

The influence of immersion period on IE of SM (100 ppm)- Zn^{2+} (25 ppm)-*Aloe vera* (10 ml) is given in Table 5. It is found that as the immersion period increases, the inhibition efficiency decreases^[31]. This is due to the fact as the immersion period increases the protective film is ruptured by the continuous attack of the Cl^- , present in the solution. The iron complexes of SM and *Aloe vera* film formed on metal surface is converted into iron chloride which goes into solution and hence, the IE decreases as the immersion period increases.

Table 5. Influence of immersion period on the IE of SM (100ppm)- Zn^{2+} (25 ppm) -*Aloe vera* (10ml) system. Inhibitor system: SM- Zn^{2+} -*Aloe vera*

System	Immersion Period (Days)			
	1	3	5	7
Well water (WW) CR ($mm\ y^{-1}$)	0.0432	0.1174	0.1484	0.1607
WW + SM (50 ppm) Zn^{2+} (10 ppm) <i>Aloe vera</i> (10 ml) CR ($mm\ y^{-1}$)	0.0058	0.0152	0.0281	0.0387
IE (%)	95	87	76	67

3.1.2 Synergism parameter

The values of synergism parameters are shown in Table 6. The values of S_I are greater than one, suggesting a synergistic effect. S_I approaches 1 when no interaction exists between the inhibitor compounds. When $S_I > 1$, this points to the synergistic effect. In the case of $S_I < 1$, the negative interaction of inhibitors prevails (i.e., corrosion rate increases).

Table 6. Synergism Parameter of Carbon Steel Immersed in Well Water in the Presence and Absence of Inhibitor

Aloe vera (I ₁) IE (%)	SM+Zn ²⁺ (I ₂) IE (%)	SM-Zn ²⁺ -Aloe vera (I' ₁₊₂) IE (%)	S _I
15	23	61	1.67
19	23	65	2.80
24	23	73	3.60
28	23	83	5.68
32	23	87	7.38

3.1.3 Analysis of variance (ANOVA)

F-test is used if the synergistic effect exists between inhibitors and is statistically significant^[32]. The results are given in Table 7 and 8. Influence of various concentrations of *Aloe vera* (2, 4, 6, 8 and 10 ml) on the inhibition efficiencies of SM (100ppm) -Zn²⁺ (25 ppm) is tested in Table 7. The calculated F-value is 12.94. It is statistically significant, since it is greater than the critical F-value (5.32) for 1, 8 degrees of freedom of 0.05 level of significance. Hence, it is concluded that the inhibition efficiencies of the SM-Zn²⁺-*Aloe vera* system is statistically significant.

Table 7. Distribution of F Value between the Inhibition Efficiencies of SM-Zn²⁺ and *Aloe vera* Systems

Source of variance	Sum of squares	Degrees of freedom	Mean square	F	Level of significance of F
Between	4984.41	1	4984.4	12.94	P > 0.05
Within	3080	8	385		

Inhibition efficiencies of SM (10ml) - Zn²⁺ (25ppm) system on the various concentrations of SM (100 ppm)-Zn²⁺ (25 ppm) - *Aloe vera* (250 ppm) systems are tested in Table 8. The calculated F-value is 10.65. It is statistically significant, since it is greater than the critical F-value (5.32) for 1, 8 degrees of

freedom at 0.05 level of significance. Hence, it is concluded that the inhibition efficiencies of SM- Zn^{2+} system and SM- Zn^{2+} and *Aloe vera* system is statistically significant.

Table 8. Distribution of F Value between the Inhibition Efficiencies of SM- Zn^{2+} and SM- Zn^{2+} - *Aloe vera* Systems

Source of variance	Sum of squares	Degrees of freedom	Mean square	F	Level of significance of F
Between	3630.48	1	3630.48	10.65	P > 0.05
Within	2726.5	8	340.75		

3.1.4 Effect of sodium dodecyl sulphate (SDS) on the inhibition efficiency of SM- Zn^{2+} - *Aloe vera*

The biocidal efficiency of SM- Zn^{2+} in the absence of SDS was found to be 23 percent. The number of colony forming units/ml was 6×10^3 this is objectionable. When 150ppm of SDS was added, nil CF μ /ml is obtained. The biocidal efficiency is 100%. Hence the optimum concentration of SDS is 150ppm. Thus it is seen in Table 9, that the formulation consisting of 100ppm of SM, 25ppm of Zn^{2+} and 10ml of *Aloe vera* extract and 150 ppm of SDS has 97% of corrosion inhibition efficiency and 100% of biocidal efficiency.

Table 9. Corrosion Rates of Carbon Steel in Well Water in the Presence and Absence of Inhibitors and the Corrosion Inhibition Efficiencies, Biocidal Efficiencies of Various Environments Obtained by the Weight-Loss Method

SM ppm	Zn^{2+} ppm	AV ml	SDS ppm	CR mmy^{-1}	IE %	Colony forming units/ml	Biocidal Efficiency (%)
0	0	0	0	0.1174	-	8×10^3	-
100	25	0	0	0.0903	23	6×10^3	25
100	25	10	0	0.0152	87	5×10^3	38
100	25	10	50	0.0140	88	3×10^3	63
100	25	10	100	0.0117	90	2×10^3	75
100	25	10	150	0.0035	97	Nil	100
100	25	10	200	0.0082	93	Nil	100
100	25	10	250	0.0117	90	Nil	100

3.2. FTIR spectra

FTIR spectra have been used to analyze the protective film formed on the metal surface^[33,34]. FTIR spectrum of pure sodium molybdate is given in Figure 2a. The Mo-O stretching frequency appears at 824 cm^{-1} . The active principle in an

aqueous extract of *Aloe vera* is shown in Figure 1. It contains phenolic-OH group and carboxyl (C=O) group.

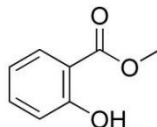


Fig 1. *Aloe vera*

A few drops of an aqueous extract of *Aloe vera* was dried on a glass plate. A solid mass was obtained. Its spectrum is shown in Figure 2b. The hydroxyl (-OH) group appears at 3312 cm^{-1} and carboxyl group (C=O) appears at 1626 cm^{-1} .

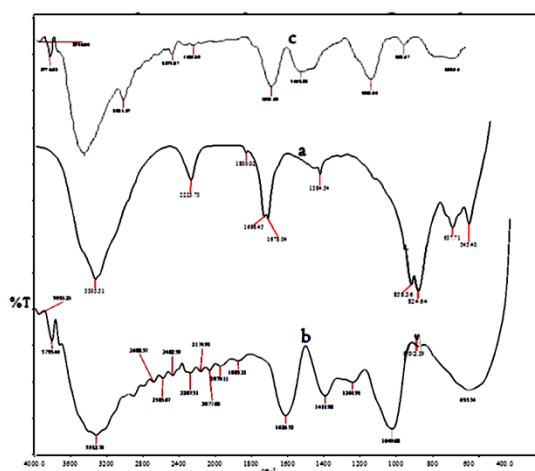


Fig. 2. FTIR Spectrum (a) Pure sodium molybdate (b) Pure *Aloe vera* (c) Film formed on metal surface after the immersion in well water containing 100 ppm SM - 25 ppm of Zn^{2+} and 10 ml *Aloe vera*

The FTIR spectrum of the protective film formed on the metal surface after immersion in the solution containing 10 ml of *Aloe vera*, 100 ppm of SM and 25 ppm of Zn^{2+} is shown in the Figure 2c. The MoO_4^{4-} stretching frequency of SM shifted from 824 cm^{-1} to 853 cm^{-1} . This suggests that MoO_4^{4-} of SM is coordinated with Fe^{2+} on the anodic sites of the metal surface, also resulting in the formation of Fe^{2+} - MoO_4^{4-} complex.

The phenolic -OH stretch shifted from 3312 cm^{-1} to 3385 cm^{-1} . The C=O stretching shifted from 1626 cm^{-1} to 1613 cm^{-1} . These shifts confirm the formation of Fe^{2+} -*Aloe vera* complex on the anodic sites of the metal surface^[35, 36]. The Zn-O stretching frequency appears at 569 cm^{-1} and the stretching frequency due to -OH appears at 3385 cm^{-1} . Therefore, it is concluded that $\text{Zn}(\text{OH})_2$ is formed on cathodic sites of the metal surface^[37].

4. Mechanism

In order to explain the experimental results, the following mechanism of corrosion inhibition is proposed. The mechanistic aspect of the inhibition of carbon steel in well water by SM-Zn²⁺ and *Aloe vera* can be explained in terms of complexation and adsorption.

- Before immersion of carbon steel in well water environment, SM, Zn²⁺ and *Aloe vera*- Zn²⁺ form complexes, viz., Zn²⁺-SM, Zn²⁺-*Aloe vera*, and Zn²⁺-SM-*Aloe vera*. These complexes are in equilibrium in the solution with free Zn²⁺, SM, and *Aloe vera* ions.
- During the dissolution of iron, the pH increases at the metal/electrolyte interface due to oxygen reduction. Thus, Zn(OH)₂ precipitate may take place at cathodic sites^[38,39], thus decreasing the rate of further oxygen reduction.
- Addition of *Aloe vera* reduces metal dissolution; this may be due to adsorption and complex formation at the surface with the combined application of Zn²⁺ and *Aloe vera*. The corresponding anodic and cathodic reactions of the metal can be generalized as follows. Zn²⁺ inhibits the local cathodic region and the local anodic region was inhibited by *Aloe vera*.
- The Zn-AV complex diffuses from the bulk solution to the surface of the metal and is converted into a Fe-AV complex^[40]. The released Zn²⁺ causes Zn(OH)₂ precipitation at the local cathodic sites. Thus, the protective film consists of an Fe-AV complex and Zn(OH)₂.
- The film formed on the metal surface of the carbon steel consists of oxides/hydroxides of iron and zinc. It is also likely to comprise complexes of Fe²⁺/Fe³⁺ and Zn²⁺ with SM as well as with *Aloe vera*. The FTIR spectra of the surface film suggests the formation of these complexes and the presence of Zn(OH)₂ in the surface.

5. Conclusion

A formulation consisting of Zn²⁺, SM, and *Aloe vera* can be used as a potent inhibitor to prevent the corrosion of carbon steel in well water. *Aloe vera* plays an excellent synergistic role in the SM- Zn²⁺-*Aloe vera* system. The ternary system SM (100 ppm)- Zn²⁺ (25 ppm)-*Aloe vera* (10ml) is effective and has 87% IE. Significant synergism was attained by the combined application of SM-Zn²⁺-*Aloe vera*. The concentrations of both SM and Zn²⁺ are reduced, and *Aloe vera*, which is environmentally friendly, is required only at low concentrations.

Thus, this new inhibitor formulation is more environment-friendly. Both SM and *Aloe vera* form stable complexes with metal ions in the metal surface. The protective film consists of Zn (OH) 2 and complexes of Fe²⁺/Fe³⁺ and Zn²⁺ with SM as well as with *Aloe vera*.

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Synthesis and Characterisation of Biologically Active Metal Complexes of N-Phenyl Anthranilic Acid

R. T. Rajalakshmi,¹ S. R. Bheeter² and N. Vasanth³

¹PG & Research Department of Chemistry, St. Joseph's College (Autonomous), Trichy

²PG & Research Department of Botany, St. Joseph's College (Autonomous), Trichy

1. Introduction

Interest in coordination chemistry is increasing continuously with the preparation of organic ligands containing a variety of donor groups^[1,2] and it is multiplied many fold when the ligand have biological importance^[3,4]. A large number of metal ion complexes of anthranilic acid and its derivatives of N-phenyl anthranilic acid have been reported in the literature^[5-8]. Some metal ion complexes of N-phenyl anthranilic acid have stimulated extensive research in biology, organic chemistry and medicine due to their antibiotic, antifungal and anti-inflammatory pharmacological properties^[9]. Transition metals have varying utility and are important due to their role in biological and chemical system in various ways. So that the transition metal complexes of N-phenyl anthranilic acid and its derivatives have been of considerable interest. Furthermore the coordination behaviour of the ligand also noted by the use of Infrared spectroscopic method.

Generally carbonyl group in N-phenyl anthranilic acid is a potential donor due to the large dipole moment (5.8 D) and strong basic character. In this investigation, an attempt is made to study the coordination behaviour of N-phenyl anthranilic acid. An extensive survey had been carried out in chemical literature to investigate the work done so far on the metal complexes of anthranilic acid but not much work has been done on the synthesis and characterization of derivatives of N-phenyl anthranilic acid as a ligand with transition metal ions. The most prominent metal ions which are biologically important in the 3d-series namely, Co(II), Ni(II) and Cu(II) were chosen for the present study^[10].

Sveta Zhiroslovna Ozkan *et al.* reported the Synthesis and analgesic activity of 2-Phenoxybenzoic acid and N-Phenyl anthranilic acid Hydrazides, Oxidative Polymerization of N-Phenyl anthranilic Acid in the Heterophase System^[11].

Elizabeth Yohannes *et al.* reported the Silver (I) complexes of anthranilic acid, N-phenyl anthranilic acid, 1-Nitroso-2-Naphthol and 2-Nitroso-1-Naphthol^[12].

Bharat Parashar *et al.* reported the synthesis of some novel N-arylhydrazone derivatives of N-phenyl anthranilic acid and also he reported the Microwave synthesis and antimicrobial activity of some N-aryl hydrazones^[13].

From the literature it is found only a few of the N-phenyl anthranilic acid metal complexes had been prepared, especially that of Silver, copper and Zinc and characterised by physicochemical methods. The present research reports the preparations and characterisation of some biologically active metal complexes of Co(II), Ni(II) and Cu(II) with N-phenyl anthranilic acid in non-aqueous medium which were characterised by physico-chemical methods and suitable structures were assigned on the basis of spectral measurements.

2. Experimental Techniques

2.1 Materials and Methods

All the chemicals used were of Analar grade. N-phenyl anthranilic acid were obtained from sigma Aldrich. Co (II), Ni (II) and Cu (II) were purchased from Merck. Solvents were purified and distilled before use.

2.2 Preparation of metal complexes of N-phenyl anthranilic acid

The ligand N-phenyl anthranilic acid (2 mmol) dissolved in ethanol, Co (II)/ Ni (II) / Cu (II) chloride (1 mmol) dissolved in ethanol was added drop wise. The above mixture was refluxed for 6 h. The complexes obtained were filtered, washed with ethanol and dried. (Yield: 65-70%).

2.3 Physical measurements

Melting points were determined by open capillary method and are uncorrected. Conductivity measurements were made on freshly prepared 10^{-3} M solutions in DMSO at room temperature. The room temperature magnetic moment measurements were carried out using Guoy method. The IR spectra were recorded on Perkin-Elmer RX I in the range $4000-400\text{ cm}^{-1}$ using KBr disc method. The electronic spectra were recorded on Perkin Elmer Lambda-35 UV/Visible spectrometer in the range 190-1100 nm.

2.4 Antimicrobial activity

The ligand and its complexes were tested against the bacterial species: *Shigella sonnei*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Salmonella typhi*, *Proteus mirabilis* and the fungal species *curvularia lunata*, *Aspergillus niger*, *Atternaria solani*, *Bipolaris sps*, *Aspergillus fumigates*. These studies were carried out using Kirby Bayer Disc diffusion method (Bayer *et al.*, 1966). Streptomycin and Nystatin were used as the standard for antibacterial and antifungal agents. The test organisms were grown on Nutrient Agar medium in petri plates for bacterial species and PDA broth medium for fungal species. The compound was dissolved in DMSO solution and soaked in filter paper disc of 5mm diameter and 1mm thickness. The discs were placed on the previously seeded plates and incubated at 37°C and the diameter of inhibition zone around each disc was measured after 24 h for bacterial species and 48 h for fungal species.

3. Results and Discussion

The analytical data and physical properties of the ligand and its complexes are listed in (Table-1). The ligand N-phenyl anthranilic acid is soluble in acetone, ethanol, chloroform, DMF and DMSO and insoluble in ether and acetonitrile.

Table-1: Electrical conductance, Magnetic moments and Electronic Spectral Data of complexes

Complex	Λ_c ($\Omega^{-1}\text{cm}^2\text{mol}^{-1}$) in DMSO	μ_{eff} (BM)	Electronic spectra		Stereo Chemistry
			Energy max. cm^{-1}	Assignments	
[CoL ₂ Cl ₂]	22	4.86	19,377	$^4T_{1g}(F) \rightarrow ^4T_{1g}(P)$	Octahedral
[NiL ₂ Cl ₂]	18	3.10	15,337 27,932	$^3A_{2g} \rightarrow ^3T_{1g}(F)$ $^3A_{2g} \rightarrow ^3T_{1g}(P)$	Octahedral
[CuL ₂ Cl ₂]	21	1.91	15,221	$^2E_g \rightarrow 2T_{2g}$	Distorted Octahedral

The solubility of the metal complexes was examined in common organic solvents. The complexes were found to be insoluble in ethanol, diethyl ether and acetone^[14]. However, the complexes were found to be soluble in DMSO.

The analytical data (Table- 1) indicates that the metal to ligand ratio is 1:2 for all the complexes. The molar conductance of all the complexes was measured in DMSO using 10^{-3} M solutions at room temperature. The low molar conductivity values of the metal complexes suggest the non-electrolyte nature. The magnetic moments, μ_{eff} of the complexes are given in (Table-1). The magnetic moments of Co (II), Ni (II) and Cu (II) suggest that octahedral geometry.

3.1 Infrared spectra of the complexes^[15-17]

IR spectrum of the complexes is very useful in determining the coordinating groups of the ligand. The shifts in the bands indicate the mode of linkage in the complexes. The IR spectral data of the ligand and its complexes were given in (Table-2).

Table-2: Infrared spectral data of ligand and its metal complexes (cm^{-1})

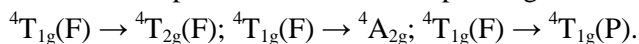
Compounds	$\nu_{\text{N-H}}$	$\nu_{\text{C=O}}$	ν_{OH}	$\nu_{\text{M-O}}$	$\nu_{\text{M-N}}$
L	3311	1682	1409	-	-
CoL ₂ Cl ₂	3334	1658	-	535	491
NiL ₂ Cl ₂	3335	1659	-	534	491
CuL ₂ Cl ₂	3334	1660	-	534	492

The band at 3311 cm^{-1} is assigned to the NH- stretching of the ligand and 3191 cm^{-1} assigned to the OH- stretching of COOH group. In the IR spectra of metal

complexes NH- stretching is shifted to 3335 cm^{-1} and the decrease in the stretching frequency is due to hydrogen coordination. The NH stretch found at 3300 cm^{-1} should decrease in coordination. However it depends upon the stretching of hydrogen bonding in the ligand and the M-N bond. Since the M-N bond is weaker than the hydrogen bonding we found increase NH stretching for nitrogen coordination. The spectrum of N-phenyl anthranilic acid shows a band at 1682 cm^{-1} which is the C=O stretch of the acid group is shifted to 1658 cm^{-1} in the complexes. In the IR Spectra of all the metal complexes, the carbonyl frequency of the acid group is shifted to lower frequency of about 20 cm^{-1} . Absence of asymmetric and symmetric stretch of carboxyl ate ion in the spectra of the complexes suggest that the acid group is not ionised and the C=O of oxygen is coordinated. Presence of anion in the complex and shift of CO stretching to lower level confirm the coordination furthermore. The band at 1156 cm^{-1} (due to C-N stretching of aromatic amine in the spectrum of the ligand) is slightly shifted to 1159 cm^{-1} in the spectrum of the complex. These further suggests that nitrogen of (-NH) group is involved in coordination. The appearance of new bands at 535 cm^{-1} and 492 cm^{-1} in the spectrum of the complexes are assigned to M-O and M-N stretching's respectively. Accordingly, one can deduce that the ligand binds the metal ion as a bidentate fashion through N of -NH group and neutral C=O of COOH group.

3.2 Electronic Spectra and Bonding^[18]

The electronic spectra of cobalt (II) complex consist of three spin allowed transitions although it will not always be possible to observe all the three transitions. In the electronic spectra of high spin octahedral complexes of Co(II), one should expect three bands corresponding to the transitions,



The electronic spectra of Co(II) chloride complex shows the characteristic band of octahedral geometry having a band at $19,377\text{ cm}^{-1}$ due to ${}^4T_{1g}(F) \rightarrow {}^4T_{1g}(P)$ transition.

In the electronic spectra of octahedral Ni(II) complexes one should expect three bands corresponding to ${}^3A_{2g} \rightarrow {}^3T_{2g}(F)$; ${}^3A_{2g} \rightarrow {}^3T_{1g}(F)$; ${}^3A_{2g} \rightarrow {}^3T_{1g}(P)$ transitions at $10,000\text{ cm}^{-1}$, $14,000\text{--}18,000\text{ cm}^{-1}$, and $25,000\text{--}30,000\text{ cm}^{-1}$ respectively.

The electronic spectra of Ni(II) chloride complex shows the characteristic bands of octahedral geometry having a band at $15,337\text{ cm}^{-1}$ and $27,932\text{ cm}^{-1}$ due to ${}^3A_{2g} \rightarrow {}^3T_{1g}(F)$ and ${}^3A_{2g} \rightarrow {}^3T_{1g}(P)$ transitions respectively.

In the electronic spectra of Cu (II) complex one should expect three transitions ${}^2B_{1g} \rightarrow {}^2A_{1g}$; ${}^2B_{1g} \rightarrow {}^2B_{2g}$; ${}^2B_{1g} \rightarrow {}^2E_g$ for tetrahedral copper(II) complexes. The Cu (II) chloride complex displays a band at $15,221\text{ cm}^{-1}$ due to ${}^2E_g \rightarrow 2T_{2g}$ transition suggesting distorted octahedral geometry.

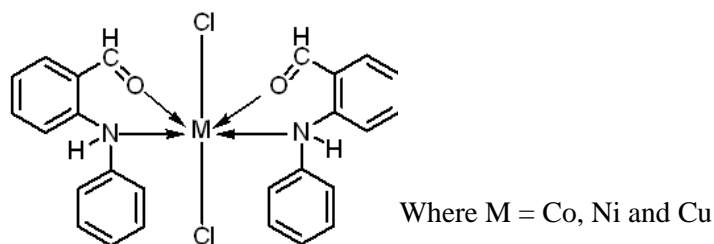
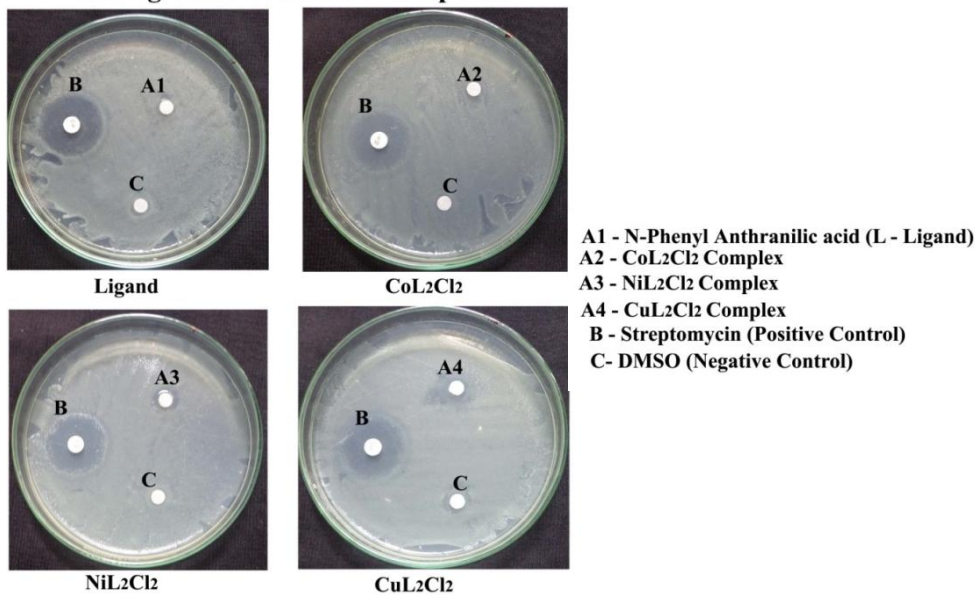


Figure-1: Proposed structure of N-Phenyl Anthranilic acid metal complexes of Co (II), Ni (II) and Cu (II)

3.3 Antimicrobial activity^[19,20]

The *in vitro* antifungal and antibacterial investigation results are given in (Tables 3 and 4) respectively. DMSO is used as negative control and streptomycin is used as positive control for antibacterial and Nystatin for antifungal activities. These observations show that the majority of the metal complexes are more active than the free ligand. Among the above species all the metal complexes show better antifungal activity against *Curvularia lunata* and antibacterial activity against *Shigella sonnei*. The antifungal activity of *Curvularia lunata* against by the ligand and its metal complexes shown in Figure 2 and Antibacterial activity of *Shigella sonnei* against by the ligand and its metal complexes shown in Figure 3. The results are tabulated. The *In vitro* fungal activity results (Table-3) revealed that all the metal complexes are more active than the ligand. The Co (II) complex was found to be highly active towards *Curvularia lunata*. Similarly the *In vitro* antibacterial activity of *Shigella sonnei* the ligand and its metal complexes were given in (Table-4). In this case Cu (II) complex was found to be more active than the other metal complex. Figure 2 shows the Antifungal activity of *Curvularia lunata* against by the ligand and its metal complexes and Figure 3 Shows the Antibacterial activity of *Shigella sonnei* against by the ligand and its metal complexes

Antibacterial activity of *Shigella sonnei* against by the Ligand and its Metal Complexes



Antifungal activity of *Curvularia lunata* against by the Ligand its Metal Complexes

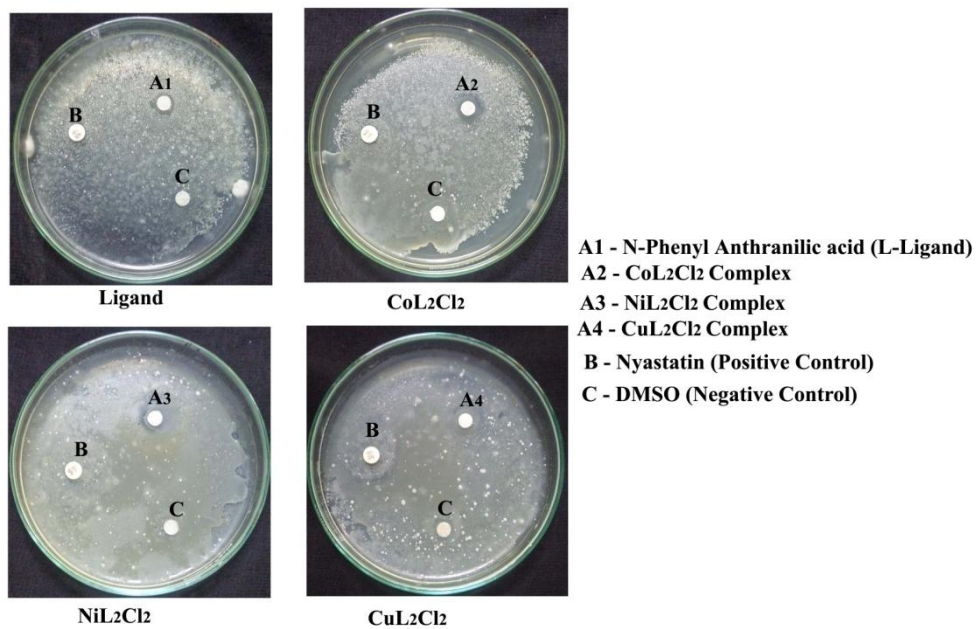


Table-3: Antifungal activity of *Curvularia lunata* against by the ligand and its metal complexes

Compound		Zone of inhibition (in mm)		
		M	B	C
A1	L	10	-	-
A2	CoL ₂ Cl ₂	13	-	-
A3	NiL ₂ Cl ₂	12	-	-
A4	CuL ₂ Cl ₂	12	11	10

Table-4: Antibacterial activity of *Shigella sonnei* against by the ligand and its metal complexes

Compound		Zone of inhibition (in mm)		
		M	B	C
A1	L	10	23	11
A2	CoL ₂ Cl ₂	12	21	-
A3	NiL ₂ Cl ₂	14	16	10
A4	CuL ₂ Cl ₂	15	12	11

Conclusion

Metal complexes of N-Phenyl anthranilic acid were prepared and characterised using the conductance, magnetic, electronic and vibrational spectral analysis. IR spectral data demonstrates the ligand to act as a bidentate mode, coordinating through NH- group N atom and carbonyl group oxygen atom. Magnetic and electronic spectral studies reveal octahedral geometry for Co (II) and Ni (II) complexes while Cu (II) complex posses distorted octahedral geometry. The antimicrobial activities of the ligand and its complexes indicate that the complexes show higher activity than the ligand.

Acknowledgement

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Molecular Interaction Studies on Binary Liquid Mixtures of 1,2-Dichlorobenzene and Toluene at 308.15K

S. P. Steevi Felixa, K. Uma Sivakami and A. Rose Venis

PG & Research Department of Chemistry, St. Joseph's College (Autonomous), Trichy

Introduction

Binary liquid solutions are the solution containing only two liquids. Both the liquids are supposed to be volatile, so in liquid solution the molecules are very close to each other. The thermodynamic properties of solvents such as density (ρ) and viscosity (η) are the two important physical properties of solvent system. These are used to explain the medium effect of solvent on transport phenomena. The nature of interaction in binary liquid mixtures of 1,2-dichlorobenzene and toluene from density and viscosity measurements at 308.15K.

When two or more liquids are mixed together, some changes in physical and thermodynamic properties^[1,2]. Excess thermodynamic properties of mixtures are useful in the study of molecular interaction^[3]. Thermodynamic parameters derived from the measurement of density, viscosity are useful in understanding the nature and type of molecular interaction. From these values excess volume, excess viscosity and Gibb's free energy have been calculated with the Redlich-Kister type polynomial equation to estimate the interaction parameter and standard deviation^[4,5].

The liquids were chosen in the present investigation on the basis of the industrial application. 1,2-dichlorobenzene is an organic compound. It is used in softening and removing carbon base contamination on metal surfaces. Toluene is an organic solvent. It is widely used as an industrial feedstock.

Materials and Methods

1,2-dichlorobenzene and toluene were dried using suitable drying agents and distilled based on standard method^[6,7]. Liquid mixtures of various concentrations were prepared by taking AR grade chemicals. Binary liquid mixtures of various compositions were prepared by mixing fixed amount of pure liquids in air tight stoppered bottles of 50mL capacity. The density of pure liquids and liquid mixtures were determined using a 10 ml relative density bottle. Viscosities were measured using Ostwald viscometer. All measurements were made with the help of digital thermostat at 308.15K.

Results and Discussion

The experimental densities (ρ/kgm^{-3}) and viscosity ($\eta/\text{kgm}^{-1}\text{s}^{-1}$) for the pure liquids and binary mixtures are presented in Tables 1 and 2.

Table 1: Comparison of experimental densities (ρ) and viscosities (η) of pure liquids at T=308.15K with literature data

Liquid	Temp. (K)	Density($10^{-3} \text{ kg m}^{-3}$)		Viscosity(cP)	
		Exp	Lit	Exp	Lit
1,2-dichlorobenzene	308.15	1.2875	1.2287	2.3168	2.3172
Toluene	308.15	0.8528	0.8528	2.6325	2.6431

Excess volumes (V^E) have been calculated by using the following relation^[8].

$$V^E = (X_1M_1 + X_2M_2/\rho_m) - (X_1M_1/\rho_1) - (X_2M_2/\rho_2) \quad \dots(1)$$

where X_1, M_1 and X_2, M_2 are the mole fraction and molecular weight of component 1 and 2, ρ_1, ρ_2 are the densities of the pure liquid and ρ_m is the density of the liquid mixture.

Viscosities of pure liquid and liquid mixtures have been calculated using the following relation^[2].

$$\eta = (At - B/t) \rho \quad \dots(2)$$

where A and B are the characteristic constants of viscometer, ' ρ ' the density of the liquid and ' t ' is the time of flow of the liquid.

The deviation in viscosity have been calculated by the following relation^[9],

$$\Delta \ln \eta = \ln \eta_m - (X_1 \ln \eta_1 + X_2 \ln \eta_2) \quad \dots(3)$$

where η_m is the viscosity of liquid mixtures and η_1 and η_2 are the viscosity of the pure liquids.

The Gibb's free energy G^{E*} of activation have been calculated by the following relation^[10].

$$G^{E*} = RT [\ln \eta_m V_m - (X_1 \ln \eta_1 V_1 + X_2 \ln \eta_2 V_2)] \quad \dots(4)$$

where ' R ' is the gas constant, ' T ' is the temperature, η_m is the viscosity of the mixture, V_m is the molar volume of the mixtures and $X_1 \eta_1 V_1$ and $X_2 \eta_2 V_2$ are the mole fractions and molar volume of the liquid mixture.

Calculated excess values were fitted to Redlich-Kister type polynomial equation^[11].

$$\Delta A = X_1 X_2 [a + b (X_1 - X_2) + c (X_1 - X_2)^2] \quad \dots(5)$$

By this method of least squares the adjustable parameters a,b,c were found out. From the a,b,c values theoretical values of all the excess parameters were calculated.

Standard deviation values were calculated using the following equation^[12].

$$\Sigma = [(\Delta A_{exp} - \Delta A_{cal})^2 / (n - m)]^{1/2} \quad \dots(6)$$

where 'n' is the number of measurements and 'm' is the number of adjustable parameters.

Table 2: Density (ρ), Excess volume (V^E) and viscosity (η) for the binary liquid system of 1,2-dichlorobenzene and toluene at 308.15 K

S. No.	X_1	ρ ($10^{-3} \text{ kg m}^{-3}$)	V^E ($10^{-3} \text{ m}^3 \text{ mol}^{-1}$)	η (cP)	$\Delta\eta$ (cP)	$\Delta \ln \eta$ (cP)	ΔG^*E (KJ mol^{-1})
1.	0.0000	0.8528	0.0000	2.3176	0.0000	0.0000	0.0000
2.	0.8872	0.8656	0.1886	2.5828	0.2288	-0.7602	-92887
3.	0.7792	0.8743	0.2515	2.5727	0.1835	-0.7608	-92811
4.	0.6921	0.8833	0.3899	2.5628	0.1452	-0.6803	-92795
5.	0.5279	0.9067	0.4507	2.5558	0.0847	-0.6686	-92751
6.	0.3886	0.9240	0.5243	2.1833	0.3310	-0.7353	-96055
7.	0.2546	0.9464	0.5238	2.5909	0.0307	-0.7577	-93102
8.	0.2071	0.9720	0.4106	2.5791	0.0034	-0.7891	-92968
9.	0.1508	0.9949	0.3115	2.5789	0.0047	-0.8298	-93171
10.	0.0724	1.0191	0.1021	2.6197	0.0001	-0.8977	-93141
11.	1.0000	1.2287	0.0000	2.6431	0.0000	0.0000	0.0000

Table 3: Values of a, b, c and standard deviation

Parameters	A	B	C	Σ
V^E	1.9834	-0.8327	0.3938	0.0005
η	0.7063	0.6921	0.0564	4.40×10^{-5}

The calculated excess volume values are positive over the entire mole fraction values. This may be due to the greater repulsion that occurs between the mixing liquids. The strong repulsive force is acting between $-\text{Cl}-\text{Cl}-$ in 1,2-dichlorobenzene, due to the presence of electron cloud in the benzene ring and $-\text{Cl}$ atom in 1,2-dichlorobenzene. But the excess volume values are low positive values, so it may cause low repulsive force exists between the liquids. The attraction occurs between the methyl group and the electron cloud present in methyl benzene, that is within the toluene molecule and also attraction exists between $-\text{CH}_3$ and $-\text{Cl}$ atoms present in dichlorobenzene. The toluene is polar because of methyl group electron donating character. Through such attractive force exists repulsive force dominates which leads to positive excess volume values. The liquid mixtures contain two polar compounds which results in the formation of polar-polar type of repulsion which leads to the repulsive force existing in between the mixing liquids.

Conclusion

Density, viscosity and excess volumes of the binary mixture of 1,2-dichlorobenzene and toluene at various mole fractions at 308.15K have been

studied. It is found that there predominates the formation of polar-polar type of repulsion, which leads to repulsive force.

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Engaged Employees - Critical Asset of an Organisation

G. John¹ and N. Remya²

¹Associate Professor, Department of Commerce, St. Joseph's College, Tiruchirappalli

²PhD Research Scholar, Department of Commerce, St. Joseph's College, Tiruchirappalli

Introduction

What makes one organization more successful than the others? Is it their services, strategies or perhaps technologies? In reality, these factors contribute to the superior performance; however, one thing that creates sustainable competitive advantage for the organization is employee engagement. It increases the organizations value and plays a vital role for every organization to attain its uniqueness in this world.

In today's fast-paced competitive world, securing and sustaining loyal employees is the top most priority for all the organizations. So Employee Engagement continues to be a hot button for all the organizations to hold their talented employees. Hence understanding employee engagement is the most valuable and critical factor for every organization, as the engaged employees are capable of taking their organization to a greater heights. Employee engagement is not something that exists only in papers to follow or a contract. It is something like a marriage, in which the relationship between the employer and employee should be fully committed. "When the marriage is solemnized both the parties feel a commonality they can share. The employer and employee also choose each other based on their possibility of sharing such a stake"¹

Employee Engagement

There is no commonly accepted definition for 'employee engagement'. Different authors give different definitions. The simple definition for Employee engagement is: "*It is the degree of emotional commitment that an employee has to their job and organization as a whole.*"²

The concept of employee engagement has been with us a coon's age. More than 30 years ago Gallup and other companies pioneered the concept of "Engagement Survey". The root of these surveys started in late 1900s by the pioneering industrial engineer Fredrick Taylor³, finally it was refined by William Khan and he framed the first formal definition for employee engagement in 1990 thus the term 'engagement' began to be used in academic literature.

Though employee engagement plays a pivotal role for the success of organizations, the concept of engagement was hidden somewhere due to the lack of importance given for human resource. Again, the conception of engagement regenerated only at the beginning of 2000. For all these past decade defining employee engagement was like nailing jelly to the wall because the

definitions for engagement varied in the weight given to the individual than against organization.

Significance of Employee Engagement

Engaged employees are the real asset of an organization. It is all about rational and the emotional connection an employee has to the organization, combined with his or her willingness to extend discretionary effort. Therefore, employee engagement is a necessary tool, which overcomes all growth hurdles and helps the organization to attain its vision and mission sustainably. For instance, the jewellery giant Titan has used employee engagement as the keystone to manage challenges. Titan had to manage aspirations of two sets of utterly diverse kinds of employees: one from the manufacturing pool and the other from its retail pool. Employees at the plant were heartened to form a forum to symbolize the various needs and ambitions, which led to the creation of an internal union.⁴

The importance of 'engaged employees' came to the fore during 26/11 attack in Mumbai Taj Hotel. During this Taj attack 31 people died and 21 were hurt. But the guests were full of gratitude at the service and support given by Taj employees during the incident. They were besieged by the employees' dedication to duty and dedication without regard to personal safety and their emergency handling skills⁵. These two instances bear ample testimony to the crucial role played by 'engaged employees'. "Employee Engagement is the most important factor that can drive organization's success and organization's effectiveness."⁶

Employee Engagement and Organizational Performance

There is always a positive relationship between Employee Engagement and Organizational Performance. Its outcomes are: employee retention, productivity, profitability, customer loyalty and safety. It also indicates that the more engaged employees tend to have enthusiasm, high energy levels and willingness to learn new things, sense of belonging to the organization, involvement in the job, adaptability to change, and openness for innovative ideas and so on⁷. It is also observed that engaged employees report less absenteeism, stay with the organization longer and happier being proactive, and more productive⁸.

Engaged employees consistently demonstrate three general behaviours, which improve the organizational performance:

- a) Sayers - Engaged employees act as advocates for the organization spreading positive information to co-workers, prospective employees and customers.
- b) Stayers - Engaged employees stay longer in the organisation and feel proud to be part it despite opportunities of work elsewhere.
- c) Strivers - Engaged employees are always ready to go an extra mile, work extra time, exert extra effort and take extra initiative to contribute to the success of the organization.

On other hand what will happen if the employees are disengaged? The disengaged employees are the '*Cave dwellers*' of an organization. They are likely to waste their effort and talent on tasks that may not matter much. They do not show full commitment to their work^{9,10} and they often sow seeds of negativity at every opportunity. This disengaged employees will craft inordinate damage to the organizations' interest and functions.

What's the main drive of Employee Engagement?

There are many drives for Employee Engagement like "career opportunities, managing performance, pay, communication, employer employee relation, innovation and so on."¹¹ But the empowerment of employees plays a pivotal role to make employees engaged. Everyone wants to feel that his or her opinion counts.¹² That is where empowerment comes into play.

When the employees are empowered they will feel motivated and become responsible. Empowering the employees does not mean they are completely out of loop. It makes them feel that the organization is always available for them by giving them some degree of ownership over their work; organizations help them to bring forward their good ideas. It will create a healthy relationship between the organizations and employees.

The Current scenario of Employee Engagement in Indi

Kelly Global Workforce Index (KGWI) reveals that across APAC (Asia-Pacific), the most engaged employees are in India and Indonesia. About half the Indian workers in a survey have said that they feel fully committed or engaged with their current employer. But still there is a major challenge for employers to rebuild confidence and trust among employees who have been impacted by economic slowdown and job uncertainty.¹³ Another survey conducted by Dale Carnegie Training, a leader in improving workplace performance, revealed a report on employee engagement in India. It elicit that Indian employees are significantly more engaged than their global counterparts , with 46 per cent employees fully engaged compared to the global average of 34 per cent.

Though Indian employees are more engaged than their global counterparts, still 54 per cent of them remain somewhat dissatisfied in their jobs signalling an urgent need for organization to take proactive steps to reduce the disengagement proposition¹⁴.

Conclusion

Employee Engagement carries a great significance for both the organizations and employees. An organization should recognize its employees more than any other variables, as influential contributors to an organization competitive position. Employee Engagement is not a single process. It is a continuous process of learning, improvement, measurement and action. When an organization gives priority to Employee Engagement it will help the organization to increase its productivity, retention, customer loyalty, innovation

and profitability, which in turn will help the organizations to attain its sustainable competitive advantage.

Endnotes

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Employer Branding of Hospitals: Recruitment and Retention of Employees

T. Joseph Rex¹ and P. Aruna Devi²

¹Associate Professor, Department of Commerce, St. Joseph's College, Tiruchirappalli

²PhD Research Scholar, Department of Commerce, St. Joseph's College, Tiruchirappalli

Introduction

Ambler and Barrow's defined the 'employer brand' as "the package of functional, economic and psychological benefits provided by employment, and identified with the employing company"¹. According to Barrow, "great employer brands are built from inside out and the process starts at the top."² Employment branding is "the package of functional, economic and psychological benefits provided by employer and identified with the employing organisation"³. Employer Branding is not about positioning one specific product or positioning the organisation as a whole. It is about the organisation as a place to work. It is about attracting new and suitable employees to the organisation and retaining the current employees.

In today's highly competitive job market, employer branding is a crucial tool for attracting and retaining the right kind of talent. It helps you to recruit highly skilled and promising new employees and it enhances their loyalty by increasing their identification with the organisation. It also raises an organisation's visibility in the job market and makes it stand out from the competition. Employer branding describes how an organisation markets what it has to offer to potential and existing employees. Employer branding involves applying a similar approach to people management.

Employer branding is the 'image of the organisation' as perceived by the employees as well as their customers. It helps the organisation to differentiate from its competitors. It involves promoting both within as well as outside the firm and makes a firm different and desirable as an employer. The main objective of employer branding is to convince the employees that their organisation is a good work place, to retain them and to ensure their understanding of the organisation's goals and commitment is in harmonization with the organisation's vision and mission. The employer branding focuses on the obligations of the employer to the benefit of the employees without spelling out any proportionate return in terms of positive outcomes for the organisation. "Organisations are increasingly competing to attract highly skilled personnel in various professional areas."⁴

Employer Branding communicates your identity as an organisation to others. It is the essence of what your organisation stands for and should specify the fundamental nature of the organisation. Essentially, it is the process of placing

an image of being a “great place to work” in the minds of existing and prospective employees. HR managers in the hospital sector are challenged by a rise in the shortage of skilled workforce and competition from within the hospital sector. Both these factors, combined with the inability of new comers to deal with the work pressure, are contributory to the high attention level in the hospital sector. To overcome this challenge, the HR managers in the hospital sector tend to make use of ‘employer branding’ as a strategy to appeal to desired current and future ideal talent. There are a lot of branding practices that are adopted by the hospitals to develop a good brand image and attract better employees as well as increased customers.

Objectives of Employer Branding

- To attract and recruit relevant employees in hospitals.
- To understand the impact of employer branding in hospital.
- To know the factors influencing employer branding in hospitals.
- To increase the level of job satisfaction among the employees.
- To enable higher levels of reputation as a result of greater employee commitment.
- To improve the retention rate.
- To improve employee engagement, commitment and performance.

Key Benefits of Employer Branding

- Recruiting the right people is essential for any business success and is a significant competitive advantage.
- A strong employer brand will help to differentiate the organisation in the market place and attract the best people.
- All businesses are unique, so by identifying and communicating the organisation’s employer brand, the organisation are more likely to attract candidates who are an ideal ‘fit’.
- Employees with the right ‘fit’ or match to your company’s culture will be more likely to thrive in your organisation and are likely to have a higher retention potential.
- When used successfully, a strong employment brand should lower turnover and reduce hiring costs. It should also, by association, increase productivity.
- A strong employer brand creates a sense of pride in people working for the organisation.

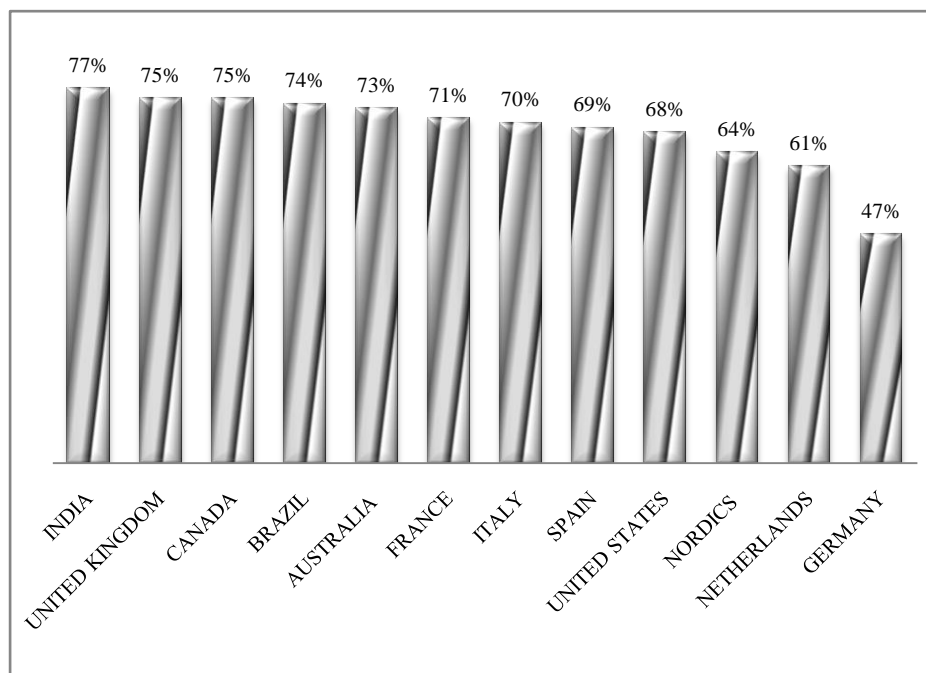
Recruitment of Employees

Due to an ongoing demographic change and increasing job mobility in the labour market, the recruitment of key employees has become a challenge. Employer branding offers the best way to redefine and improve the way a company recruits. Employer branding as a tool for recruitment finds it effective. Employer branding is a crucial tool for attracting and retaining the right kind of

talent. The recruitment process plays an important role in building the employer brand. The process of employer branding can be viewed as a holistic one, which presents the way in which the organisation develops its employees positive attitude and commitment towards the organisation. The employees are the most important ambassadors, and therefore it is vital to have the best employees. The shortage of skilled labour, due to an ongoing demographic change and the increasing demand for skilled personnel, organisations have to face growing job mobility among their talented work force. In hospital sector, branding plays an important role in the recruitment of right kind of talented employees.

Employer branding is a top priority for companies worldwide

Talent Acquisition leaders who agree brand is a top priority (by country)



Source: A global report on the talent acquisition⁵

The above figure shows the employer branding is a top priority for companies worldwide. It shows that Indian organisations significantly give prioritize to the employer brand. The German organisations furnish fewer significant to the employer brand.

Attraction and Retention of Employees

The concept of attraction and retention of skilled personnel leads to employer branding, which has become more and more popular in recent years. The concept of employer attractiveness provides another approach to branding an

organisation in relation to recruitment through the identification of attributes which positively influence its perception in the eyes of job applicants. It helps the hospital sector in the process of profiling themselves in the labour market as an employer of choice for future employees as well as ensure organisational identification among the current employees. Employer branding contribute to an improvement of the attraction and retention approach in the hospital sector and thus enhance the hospital sector's competitiveness in the labour market in its 'battle for talents'. As skills shortages continue to test candidate sourcing and attraction strategies, and competition for the best possible staff remains high, the issue of employment branding continues to gain attention. This war for the right talent is placing pressure on organisations to become an employer of choice. A strong employer branding might have the capability to tip the scale in the competition of talented job applicants and the retention of key employees. The strength of the corporate brand has an immediate impact on the employer brand. An organisation with a weaker corporate brand will have to do a lot more work on its employer brand to attract and retain talented employees.

Satisfaction and Commitment of Employees

Employee satisfaction and commitment are not the ends in themselves but rather mediating variables between identification with the employer brand and outcomes such as retention and job performance. While it is acknowledged that there is a link with product brand identification and employee commitment to delivering the brand promise (Boone, 2000),⁶ the relationship between employer brand, employee satisfaction and commitment and job performance is yet to be supported empirically.

Establishing the employer brand is highly dependent on the health sector's ability to communicate its values and expectations to employees. This can be done through formal process associated with HRM activities like training and development, compensation and performance management. Employee satisfaction and commitment will be considered as definitive outcomes of employer branding in hospital sector. Employer branding is an important area in the hospital sector as there is a high level of interaction between employer and employee.

Conclusion

Employer branding is an emerging topic, and the hospital sector is trying to formulate practices to implement the same in the hospitals. Branding plays a special role in services such as hospital sector because strong employer branding increases trust among the customers. In order to keep brand successful, trust must be standard which hospitals and employees offer their customers. When customer complains, both the hospital and its employees must do their best to respond to the complaints, and thereby maintain or rebuild trust.

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Trend of Development and Non-development Expenditures in the Pre-reform and Reform Periods

P. Stanly Joseph¹ and P. Prarthna

¹Assistant Professor, Department of Economics, St. Joseph's College, Tiruchirappalli

²PhD Scholar, Department of Economics, St. Joseph's College, Tiruchirappalli

In India, the Public expenditure has been assigned a key role in the economic development and growth process. As an instrument of Fiscal Policy, Government expenditures can have greater influence on the economic growth depending on how it is utilised and managed by the Government. The Keynesian view defends this by stressing on Government expenditure as a tool for achieving long run growth rate.¹ In developing countries like India, the size and pattern of the Public spending has great relevance in the growth process and in the reduction of economic disparities. The development of the economy depends upon the nature of expenditures and its social impact. The best way to look at the structure of Government expenditure is to examine the distribution of development and non-development expenditures.² The role of development expenditures is much commendable due to its direct impact on the growth of the economy. But after the inception of the New Economic Policy in India, the priorities given to various categories of expenditures including the development expenditure have undergone a structural change and thereby on the economic development of the nation. This study analyses the role and distribution of development and non-development expenditures for the last forty five years inclusive of Pre-reform and Reform periods. Development expenditures are broadly defined to include all items of expenditure that are designed directly to impact economic development and social welfare. It mainly includes spending on economic services (agriculture, industry, energy, communication, transport, science and technology and environ-ment), social services (education, health, employment, nutrition, housing and others) and grants to states. On the other hand, Non-development expenditures include expenditures pertaining to the general services rendered by the Government such as interest payments, defence services, provision of subsidies, etc...

Objectives of the Study

This study intends to analyse the following two objectives:

1. To study the growth rates of development and non-development expenditures over previous year in the Pre-reform and Reform periods, and
2. To compare the percentage share of development and non-development expenditures in the Pre-reform and Reform periods.

In order to examine these objectives, this study has taken into account secondary data sourced from Indian Public Finance Statistics (IPFS), Ministry

of Finance, Government of India and the respective Annual Budget Statements. Simple percentage and growth rate have been computed to highlight the trend.

Share and Growth Rate of Development and Non-development Expenditures of the Central Government of India (Rs. in crores)

Year	Development			Non-Development			Total Amount
	Amount	GR	%	Amount	GR	%	
Pre-Reform Period							
1970-71	4716	-	57.46	3491	-	42.54	8207
1975-76	11574	21.75	61.13	7359	19.02	38.87	18933
1980-81	24426	20.34	66.29	12419	14.71	33.71	36845
1985-86	53397	11.05	63.60	30564	23.54	36.40	83961
1990-91	34565	-64.91	41.37	48979	-17.83	58.63	83544
Reform Period							
1991-92	36049	4.29	38.86	56707	15.78	61.14	92756
1992-93	39172	8.66	36.03	69545	22.64	63.97	108717
1993-94	41316	5.47	33.48	82076	18.02	66.52	123392
1994-95	77786	88.27	49.02	80883	-1.45	50.98	158669
1995-96	47761	-38.60	31.60	103362	27.79	68.40	151123
1996-97	52925	10.81	31.57	114743	11.01	68.43	167668
1997-98	62410	17.92	32.10	132015	15.05	67.90	194425
1998-99	72682	16.46	30.49	165687	25.51	69.51	238369
1999-00	84542	16.32	31.22	186261	12.42	68.78	270803
2000-01	91885	8.69	31.49	199886	7.32	68.51	291771
2001-02	101531	10.50	31.82	217524	8.82	68.18	319055
2002-03	117972	16.19	32.82	241488	11.02	67.18	359460
2003-04	134483	14.00	34.72	252849	4.70	65.28	387332
2004-05	143010	6.34	33.73	280934	11.11	66.27	423944
2005-06	174952	22.34	37.16	295823	5.30	62.84	470775
2006-07	219086	25.23	40.19	326066	10.22	59.81	545152
2007-08	304293	38.89	45.13	369942	13.46	54.87	674235
2008-09	383107	25.90	45.56	457717	23.73	54.44	840824
2009-10	413852	8.03	42.38	562609	22.92	57.62	976461
2010-11	525019	26.86	45.84	620199	10.24	54.16	1145218
2011-12	580896	10.64	46.79	660551	6.51	53.21	1241447
2012-13	619280	6.61	45.71	735643	11.37	54.29	1354923
2013-14	758799	22.53	49.74	766643	4.21	50.26	1525442
2014-15	700043	-7.74	45.44	840449	9.63	54.56	1540492
2015-16 (B.E)	756852	8.12	44.89	929008	10.54	55.11	1685860

Source: 1. Indian Public Finance Statistics (IPFS) 2013-14.
2. Annual Budget Statements.

The above table depicts the percentage share of development and non-development expenditures of the Central Government of India from 1970-71 to 2015-16. The Pre-reform period from 1970-71 to 1990-91 has been taken in order to capture the trend of these expenditures in comparison with the Reform period and hence they have been taken at an interval of five years.

Pre-reform Period

It could be observed from the table that the share of development expenditures has been high when compared to non-development expenditures. This trend is conforming to the theoretical base of higher share of development expenditures as it directly relates to the growth of the economy. The percentage share of development expenditure was around 60 per cent throughout the Pre-reform period and the growth rates also signify a healthy trend.

During the Pre-reform era, the main focus of the Government was infra-structural improvement and therefore the expenditures on developmental activities like rural electrification, irrigation, flood control and rural upliftment were higher.³

During 1984-85, the higher share of development expenditures was due to the increased expenditure on social services such as anti-poverty programmes, crop insurance schemes and various other social security measures.

In the late eighties, the share of non-development expenditures started increasing owing to higher percentage of external debts and large portion of borrowed funds being loaned to weaker sections of the society at subsidized rates. This increasing trend of non-development expenditures necessitated the introduction of reforms on the fiscal front.

Reform Period

Since 1991, the Central government carried out number of fiscal sector reforms. With the introduction of these reforms, the structure of development and non-development expenditures underwent a drastic transition. The overall impact of these reforms on expenditure policy had been quite encouraging over the early 1990s. However, the rising share of expenditure in late 1990s and early 2000s without commensurate increase on the revenue share reduced the overall quality of the Government finances. Given the serious concern expressed on the fiscal position of the country, the Government passed the Fiscal Responsibility and Budget Management (FRBM) Act in 2003. However, the Government continuously failed to achieve the targets of the FRBM Act.⁴ In the Reform period, the development expenditures started declining and hovered between 30 and 40 percents. It could be observed that the trend had just reversed from the Pre-reform period. This trend of decreasing share of development expenditures is not preferable as it would have an impact on the development of the economy. Though the actual amount of development expenditure had risen over a period of time, its proportion towards total expenditures had been declining.

The percentage of development expenditure was higher than non-development expenditure from the year 1970-71 to 1989-90 in the total. In 1970-71, the percentage of development expenditure was 57.46 and it went up to 63.6 per cent in 1985-86. But in the Reform period, a reverse trend has taken place regarding the percentage share of development expenditure over the non-development expenditure. From 1991-92 onwards, the share of non-development expenditure has been much higher when compared with development expenditure.

In 1991-92 the percentage share of development expenditure was 38.86 per cent which declined to 31.22 per cent in 1999-2000. From 2006-07 to 2014-15 the percentage share of development expenditure has been ranging from 40.19 to 45.44 per cent.

Thus, it could be observed from the table that the proportion of non-development expenditure has been higher than the development expenditure in the Reform period. It increased from 61.14 per cent in 1991-92 to 69.51 per cent 1998-99. Upto 2005-06, the percentage share of non-development expenditure hovered around 60 per cent. In 2014-15, the share of non-development expenditure was 54.56 per cent.

Thus, it could be inferred that during eighties the percentage share of development expenditure have been more than non-development expenditure because of the development programmes launched by the Government and increased expenditures on social services. Then in 90s, non-development expenditures percentage share was more than the development expenditure and have continued to increase till 2003-04.

With the implementation of FRBM Act in 2004, the share of non-development expenditures started declining and the percentage share of development expenditure started improving, thus putting the economy on the path of recovery. From a look at the trends in expenditure at the central level, it could be concluded that the total expenditure has been rapidly growing and it increased throughout the study period.

The main reason behind this increase in the total expenditure is the continuous increase in the share of non-development expenditure which created serious fiscal imbalance in the economy. As a result of reform measures, non-development expenditure has grown at a lower rate in the Reform period than the Pre-reform period.

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**Quest to Reclaim Self-Identity in the Face of Calamity in Margaret
Atwood's Poem *The Animals in that Country***

S. Selvakumar

M.Phil. English, St. Joseph's College (Autonomous), Tiruchirappalli

Margaret Atwood as a prolific writer encompasses with in herself versatile character and multifarious dimension of being a renowned scholar, a prodigious poet, an accomplished novelist, acclaimed short story writer, a literary critic and an environmental activist. As a deep core Canadian, in all her writings either directly or indirectly she has invariably delved into matters that deal with the Canadian society and its well being at large and in particular the natural environment, species, animals and the original inhabitants of the country. She is the custodian of many medallions and honorary titles.

The term "Identity" according to *Merriam Webster's Dictionary* refers to "the distinguishing character or personality of an individual". Identity discloses belief systems, culture, food habits, uniqueness and way of life of an individual and community at large. Hence, Identity marks out the distinctiveness and turns out to be the hallmark of any ethnic community, race, tribe or a nation. It is a binding force that connects human with the society and the natural world to which he or she belongs.

The poem "The Animals in that Country" is taken from Margaret Atwood's collection *The Circle Game*. The author of the poem deserves our compliments for courageously disclosing the callousness, the indifferences and the cruel acts of her own ancestors to the natives of the Canada through this poem. The term "that country" refers to England from where people flooded into Canada and established their colony. The so called invaders who intruded into the heart of Canada did not enrich the culture, traditions, rituals and the identity of the natives rather they were determined to abolish all that belonged to the natives. It was a heart breaking scenario. The sons and daughters of the mother land become homeless; their pain and predicament is excruciating; they have become victims of injustice. The poem prompts to raise numerous questions in the mind of the readers while reading the text. Who will stand by them? Who will wipe away their tears? Who will be there to narrate their glorious history? Who will feel their pain and who will make their darkness bright?

Invariably every human person desires to reiterate his or her cultural identity because it is that which marks out his or her uniqueness. Thus the centrality of any ethnic community is to keep alive their identity and culture. When a community is entrapped by a dominant force its life, identity, traditions and culture ceases to exist. A community which has long tradition and history and which has the will power to withstand the tempest of the times will survive. The author as a witness to the colonial power explicates systematically the

impending danger that is posed to the animals and natives of Canada through her poem. Margaret Atwood is concerned about prominence of self-awareness, self-consciousness and self-assertion of the natives. She voices the concern of the natives and their quest for identity. Shakti Batra emphasizes this in her analysis about the poem in *Neruda, Walcott and Atwood Three Contemporary Poets: A Critical Study* as, “Self awareness and issues of identity are explored in a manner that could make the descendants of the white settlers extremely restless, even uncomfortable” (127).

The author has arranged her poem into eleven stanzas, employing free verse, poetic devices like metaphor, personification, repetition, irony, alliteration and indented the last four stanzas. The purpose is to present the matter vividly and capture the attention of the readers to every line and explore the intricacies embedded in it. Atwood uses the images of several animals in her poems like cats, fox, bull and wolves in order to explain the importance of their existence and the qualities inherent in them and aptly apply their nature and qualities to the oppressive forces and natives of the country respectively. The English settlers in Canada oppressed or sprang upon the natives and made them to become victims like “the ceremonial/cats possessing the streets”.

The term ‘cats’ refer to the supremacy and the royalty of the English while the term ‘fox’ refers to the victim, the oppressed native. The author gradually unfolds the selfish attitude of the settlers and their sadist approach in settling scores with the natives. Like predators and huntsmen they look to eliminate the animals and the natives. The author compares them to ‘hunting’ which was a royal, feudal sport in England and ‘bull fight’ which is a bloody sport in Spain. The hunters never realize the pain and the agony of the hunted creatures rather they are interested only in killing and experiencing euphoria in taking away lives. Their cruel nature is further exposed where they do not stop relishing the pain of an animal personally but invite the spectators to watch the bull die joyously.

Whom does this bull refer to? Although conspicuously, it refers to the animals that become prey to the greed of the English, it also makes reference to natives as well. Their attitude of ‘might is right’ renders our hearts bleed at the atrocities and the brutality meted out to the natives. It raises numerous questions and leaves us out to look for answers. Can human take the life of a fellow human? Is killing justifiable? Is killing the act of civility? If so, how do we call and label the so called civilized nation that invaded Canada and aimed at destroying the flora and fauna and the natives? One can only become just speechless and mute spectator at the enormous horrors and pain inflicted upon the natives.

The author employs an oxymoron while referring the horrific phenomenon called ‘death’. She calls death as ‘an elegant death.’ According to Batra, “Even if she had not confirmed that the murdered animal ‘is really a man’, it would be instinctual to know that she wants to assert that the human beings are so brutal,

they kill their own kind for pleasure”(127). Could it be perhaps she wants the native not to suffer again in the hands of the oppressor rather get relieved from the pain once and for all? Could it be perhaps she wants to offer glorious tributes to dead who have been suffering for years? While using the term ‘wolves’ the author compares it with native Indians who had lived in the forest for years and who have been stripped of their natural habitat by the invaders.

In the first half of the poem she fixes her attention on the Indian tribes who become the victims of invaders and stripped of their natural habitat. It also spells out the maliciousness of colonizers who were determined to erase the cultural identity and value systems of the nature. At the outset the author used the word ‘that country’ and towards the end of the poem she uses the word ‘this country’. The word ‘this country’ refers to the country called Canada which had its natural beauty, wonders in all its radiance, richness in bounty and inhabited by the animals and native people. The word ‘that’ refers to the pretentiousness and artificiality of the invaders while the word ‘this’ refers to the originality and uniqueness of the original inhabitants.

The author claims that the thick forest and all the species with its variety including the ‘deer’ that dwell in their natural home have been wiped away mercilessly by the self proclaimed ‘civilized’ colonizers. As an environmentalist Margaret Atwood is able to augur the alarming consequences that will occur due to the invaders’ disruption of natural habitat of flora and fauna and the aborigines whose livelihood depends on nature. She echoes her concern for the importance of the natural world and turns out to be unforgiving on those who cause destruction. The description of their death as not being elegant spells out the volumes of torments, the haunting nightmare and the unbearable pain they faced. Their dead bodies remain unsung and unwept. They have lost their faces and their identity is gone. What else can narrate their conditions? It bleeds our heart profusely to listen to their pathos. The tragedy and the irony that unfolded at the end was that the native became an alien; the freed became a slave; the victor became a victim.

Though the author ends the poem with the note of death, we are able to infer from the text the anguish of the author and her longing to regain the identity of the natives in Canada. In spite of chaos and pandemonium, the agonizing ambience of doom and death, there is an insatiable thirst and quest to reclaim the identity and the history of the past among the natives. In *Post Colonial Literature: An Introduction* Pramod K. Nayar and asks, “Is native cultural identity is reclaimable? Is it possible to return to an authentic pre-colonial past?” (83) Is it unlawful to have the nostalgic experience? The journey continues amidst the oppressive forces and hope that one day they will reach their home land, reclaim their identity and be able to return to an authentic pre-colonial past.

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Nature and Man in Tagore's *Red Oleanders*

R. Vignesh

M.Phil. English, St. Joseph's College (Autonomous), Tiruchirappalli

Tagore's contribution as a playwright is remarkable. He has included various styles to bring out a new version in the writings of dramas. They are comprised of symbols, soliloquies, satire, songs and contemporary issues. The play "Red Oleanders" is known as *Rakta Karabi* in Bengali. Though the author represents mythological name of the town, king and his officers, the theme of the play is connected with the serious and contemporary issues. It also provides platform to discuss ecocriticism, ecofeminism, marxist environmentalism, modernism and post colonial aspects.

Nature and man are always interconnected. Ecological balance is possible with the right relationship between these two. Nature's influence on man is existed in such a way that it cannot be ignored. But the various conceptions regarding the global pollution traces out the rift between human beings and nature. The furious situation is present in the world with man's domination over nature.

Red Oleanders tries to discuss the increased exploitation of the natural resources. Tagore has noticed the issues of workers, mines and environment in the provinces of Assam. These are closely linked with the contemporary global capitalism and corporate greed. As a result of this, man is departing from human values, morality, spirituality and nature. Alienation is extending its shadow on the man's life and predicting the phase of disaster. Thus the writer stresses the sustenance of man with nature as inevitable.

The mining city Yaksha town is controlled and dominated in the name of a king. He wishes to grab the entire sources of gold and appoints the common people as labourers in the mine. His appearance is unknown to everyone and he always remains behind a curtain. His voice signifies the totalitarian administration over nature and men. Deputy Governors, officers and henchmen share this cruel task with the greedy king.

Tagore has made use of character like king and kingship. In spite of using the primitive administrative system, he touches the present political scenario with selfish politicians, deceitful activities, irresponsibilities and insensitive attitude towards the commoners. The king in Yaksha town ignores his citizens and escapes from all responsibilities. His system enforces rigid norms, slavery and inequality.

Modernity, Industrialism and materialistic desire turn the powerful class into a machine. Capitalist ideology annihilates the peaceful life of the citizens. It provokes anger, suspension and fear and they are speechless to claim their liberation and justice. If somebody tries to protest, they are punished with

imprisonment. Along with this, in the name of religion all mining workers are compelled to work endlessly. The word welfare is isolated from the lives of these workers. They are deprived to think of their happiness, individual life and peaceful existence. The dictators sale liquors to these workers and this intoxication spoils their ability of contemplation and misleads them.

Contrast to this suffocating system, the author makes entrance for two characters: Nandini and Ranjan. Living in the midst of the mining diggers, they have attempted to understand the critical structure of this town. As the play ends, the readers are surprised with the transformation in the king. He is upset with the plot of his own officers and is moved with the ideologies of Nandini. He comes out and wishes to establish a new administration.

Symbols in the play are effectively used. Red Oleanders symbolize love as well as revolution. "It inspires curiosity, distrust, dedication, anger and so on. All of these emotions guide the characters into acting out, eventually resulting in the revolt." With these, it is clear that red oleander flowers in the hands of Nandini have affected many characters in the play. Even the character, Nandini is symbolized as an agent of change with his partner Ranjan. Yashka town which is considered as the town of Kubera in the mythology, includes rich resources of gold. After the assassination of Nandini, Bishu gathers flowers and decides to continue the movement against the barbaric situation. The king stays inside his fort as a strong man and neglects the identity of his own citizen. He himself is a prisoner in his administrative system and a solitary person. Nandini is resembled as a red oleander flower. She drags attention of everyone with her beauty and brings change in them.

M.Kalaiarasan finds the same issues of man and nature in the finest Tagore's play, *Muktadhara* and states

Tagore has given a new dimension to the gamut of Indian writing in English translation. The plays *Muktadhara* (the Waterfall) and *Raktakarab* (Red Oleanders) show his liberal thoughts. These two plays centers on the conflict between machine and human freedom and deal with the other side of love and sacrifice (1).

Colonial discourse is visible in the play, *Red Oleanders*. Yakshapuri town has a class structure where the powerful class oppresses the other class. Human rights, individuality, identity and progress are curtailed to this marginalized section. The mining workers are the victims in the hands of the tyrannical rulers. The post colonial view allows to know that these diggers have accepted the humiliating condition as their fate. They are barred with the suppression and avoided to raise voice against the system. Utilization of sources of gold and labourers for the prosperous life of a particular group is visible. The rebellious stance is established only with the support of Nandini and Ranjan. They challenge the non-human treatment for the diggers and interrogate the imbalanced status in this society. The author introduces a twist with the king's

act of destroying his own created system and exploitative atmosphere. Thus, deliberately caution is offered to the Indians about the colonial rule and modernity.

Ecological disaster is making its appearance through global pollution. Man deserves the blame for this, who has involved himself in the increased exploitation of nature, individual development, materialistic obsession and capitalism. So, Ecocriticism proposes a theory to show our concern towards natural things, health and human values. In the play, a mechanical world opens before the readers and brings out the mechanical life of the diggers, who are disconnected from the green nature and joy. Entire earth of this town is like a dark deserted place with the continuous mining work. Chandra expresses,

Give us leave, sir governor, do give us leave, let us to just for once and see our waving fields of barleycorn in the ear and the ample shade of our banyan tree with its hanging roots. I cannot tell you how our hearts ache. Don't you see that your men here work all day in the dark and in the evening steep themselves in the denser dark of drunkenness? (194).

These words express the exploitation of man and nature. The conversation between Nandini and Kishore in the beginning of the play displays the barren region. Kishore with a great difficulty gets red oleanders to Nandini. The phase of materialistic desire is formed in contrast to the natural world. In the mode of profit, the powerful class pushes the earth to the miserable condition.

Mining problem in the urbanized area is familiar to everyone. The realization of the king at the end of the play extends the idea of careful exploitation of nature and less dependency on the capitalist mode of production. Workers always engage in digging in the underground tunnels. They are crushed into the dark world and resisted to visit their green covered village. Ranjan works with the diggers and inspires them to know the beauty of life and nature. Even Nandini with red flowers makes all these workers to give attention towards nature.

Human life is encountering sober situations in Yakshapuri. The king intends to collect the whole wealth and remains inside the palace. And the workers are deprived of love affection, merriment and sympathy for his sake. The accumulation of wealth is centered to the particular group. The play throws light on the contemporary capitalist mode of benefit and multicorporal world. Inequalities are also depicted with the realistic contexts. Administrators are not the victims of pollution in the town of Yakshapuri. But the diggers face various health problems and live in a distributed environment.

The ruling class has a kind of madness to exploit the gold. The workers like caged birds are degraded and dehumanized. The king, who is always engaged in amassing wealth with the destructive force, becomes victim at the end. It illustrates how the man's greediness towards money, power and materialistic things goes on increasing. The story ends with changes in the constructed social

system and in the attitudes of the characters. Nandini's song of autumn tries to create feelings and interests in the king towards nature.

The leading female character of the play is pointed as the representation of nature and beauty. In the view of ecofeminism, the constructed conventions attempts to destroy Nandini and nature. The process of extracting natural resources and oppression of women are provided with the instances of Nandini's death, disapproval of Chandra's requisition to visit her village, and workers' pathos. The digger class women and their deplorable conditions are not clearly discussed

In Yaksha town, the earth is limitlessly destroyed to gain riches. The beauty on the earth is greenery, which is eclipsed with the work of digging and deep tunnels. The digger class women and their deplorable conditions are rarely visible. Nandini sacrifices her life in the shackles of patriarchal society and reveals her strong personality. She tries to transform the imperialistic mode of social system with her knowledge. She is so influential that her thinking ideas are shared by other characters and continue the movement.

Critically appreciated literary work, *Red Oleanders* takes a stand to enlighten all human beings regarding the ecological imbalances. Every scene makes the readers to contemplate over the contemporary issues of ecology. The author advocates the people to understand the inadequacy of natural resources. Both positive and negative sides are discussed like beauty, nature, freedom, love, song, sympathy, happiness on the one side and oppression, ignorance, loss of identity and sorrow on the other side. Idealistic views are indicated for the administrators to create awareness to serve the citizens.

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The Struggle for Existence in John Green's *The Fault in Our Stars* in the Light of Existentialism

Roshini Peter

M.Phil. English Literature, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

In the novel *The Fault in Our Stars*, author John Green has created a soulful story that brings out the themes such as life, death, love and pain with heart wrenching emotion. However to me, this novel is a real page turner for its vision of existence and facticity. Sixteen year old Hazel Grace suffers from terminal thyroid cancer and thus lives with the fear of being a grenade. Augustus Waters suffers from a touch of osteosarcoma and is obsessed with Oblivion, the idea of being remembered for something after life. In this novel, the author tackles the themes of Choice and Commitment, and Dread and Anxiety. The objective of this research paper is to illustrate the philosophy of Existentialism and the facticity of Hazel and Augustus as they try to evaluate what meaning their lives have.

Existentialism

Existentialism is a philosophical movement that views human existence as having a set of underlying themes and characteristics such as anxiety, dread, freedom, awareness of death and consciousness of existing. Heidegger, the leading figure of Exist.; coined the term "thrown" human beings are "thrown into existence" and that "existence is prior to essence." The philosophers who influenced Existentialist writers are Kafka, Albert Camus and Hemmingway and maybe even author John Green.

One of the major themes of existentialist theory is facticity a concept defined by Sartre in his work *Being and Nothingness*. Facticity is said to be both a limitation and a condition of freedom. The idea of facticity is present in the title of the novel, *The Fault in Our Stars*. Author John Green takes the title from a line in Shakespeare's Julius Caesar:

"The fault, dear Brutus, is not in our stars, but in ourselves."(7)

The word "stars" here refers to fate. In Van Houten's return letter to Augustus, John Green brings out the theme of facticity by saying that, "even though Cassius seems to say that the problem is not fate but within oneself." Van Houten argues that that is easy to say when one is privileged but it's untrue when one lives through true adversity. As Green's title directly calls out, the fault for their (Hazel and Augustus) dying of cancer is not their doing but fate.

Hazel receives the answer to her question, that she always feared in her mind, through these lines: "I want you guys to have a life, I said. I worry that you won't have a life... After a minute, Mom said, I'm taking some classes. Online

... Imagining my mom as a Patrick. It made me think of Anna's mom. She would've been a good social worker, too"(24). The reason why Hazel was fixated on finding out what happened to the characters in the novel *An Imperial Affliction* after the protagonist Anna dies and Anna's mother is left abandoned after her death. Is that the situation of Anna's mother brought fear to Hazel on what will happen to her own parents after her death. But after Hazel's mother gives her the news that, she is studying to be a social worker to counsel families. Hazel receives the answer she was looking for in *An Imperial Affliction* and is thus greatly relieved.

Another aspect of facticity is that it entails anguish, both in the sense of freedom that produces anguish when limited by facticity. Existential anguish is a term that is generally held to be a negative feeling arising from the experience of human freedom and responsibility. The anguish that characterizes the existentialist vision of life is shown in the following passage: "And here it was, the great and terrible ten, slamming me again and again... The waves tossing me against the rocks then pulling me back out to sea so they could launch me again into jagged face of the cliff, leaving me floating face up on the water, undrowned"(21). Hazel uses the image of drowning, to describe the pain she feels having lost Augustus Waters. Here the symbol of water relates to Hazel's suffering of having fluid in her lungs not allowing her to breathe, it also connects to Augustus's last name "Waters" because; "He has become the source of her greatest pain." As with Augustus's death, Hazel seems to lose more than just Augustus, but also all of the memories they shared. Thus Hazel considers this of being smashed by waves and unable to drown, meaning there's no relief to her pain.

The Existential philosophy of the Absurd is a philosophical school of thought which states that the efforts of humanity to find an inherent meaning would ultimately fail. Because the sheer amount of information as well as the vast realm of the unknown makes total certainty impossible.

As per Kierkegaard, Soren, Journal, 1849:

What is the Absurd? It is, as may quite easily be seen, that I, a rational being, must act in a case where my reason, my powers of reflection, tell me: you can just as well do the one thing as the other, that is to say where my reason and reflection say: you cannot act and yet here is where I have to act... The Absurd, or to act by virtue of the absurd, is to act upon faith... I must act, but reflection has closed the road so I take one of the possibilities and say: This is what I do; I cannot do otherwise because I am brought to a standstill by my powers of reflection.

The support group meetings held in an Episcopal church shaped like a cross, introduces the theme of Absurd through these lines:

"We are literally in the heart of Jesus." he said. "I thought we were in a church basement, but we are literally in the heart of Jesus." "Someone should tell

Jesus,” I said. “I mean, it’s gotta be dangerous, storing children with cancer in your heart.” “I would tell Him myself,” Augustus said, “but unfortunately I am literally stuck inside of His heart, so He won’t be able to hear me.” (16)

The leader of the support group, Patrick mentions that the group meets in “*The heart of Jesus.*” As the church is shaped like a cross and he utilizes prayer at the end of the meeting. But Hazel and Augustus joke on Patrick’s comment. As the two consider this as a fairly meaningless ritual and turn towards different philosophical explanations to find meaning in their lives. Despite the name, Hazel Grace definitely isn’t the religious type. Hazel has a nihilistic view of life. She believes life has no meaning and it leads to death with nothing afterward. She sees her whole existence as a cancer’s perk. As Nihilism: ‘Nihil’ meaning Nothing, is a philosophical position arguing that the world and its human existence has no objective meaning, purpose, essential value, comprehensible truth or reality. It considers existence to be useless. But Hazel’s philosophical standpoint changes through her relationship with Augustus. She realizes that after death people live on through their relationships with their loved ones and the impacts they make on the lives of other people. Thus, the nihilistic philosophy she upholds at the beginning of the novel transforms.

Death is the key element of this novel. We all will die someday but it happens to Hazel and Augustus much sooner. Wrestling with the big issue of life and death as having cancer makes every moment potentially perilous for both of them. Although the two characters try to live by their support group mantra, “*Living our best lives today*”, every action, relationship, and experience is cast in the shadow of their impending mortalities.

The response to oblivion by the two main characters in the novel are unconnected. For instance, Augustus says: “Sometimes I dream that I’m writing a memoir. A memoir would be just the thing to keep me in the hearts and memories of my adoring public” (16). Augustus is afraid of fading into oblivion after he dies. He believes that, without doing something tangible that lives in people’s minds after he’s gone, he won’t have mattered. His significance, like his consciousness will simply be consumed by oblivion after his death. Augustus is obsessed with the idea of dying for something heroic and leaving behind a grandstory to tell of himself, in order to give his life and death a meaning. But as for Hazel, the fear of oblivion strikes her in a different note. Hazel views her approaching death as an event that will severely damage those around her. As Hazel compares herself to a grenade waiting to explode anytime, she is concerned in protecting those around her from the pain of her death. Hence she only wishes to know that those close to her, and her relationships with them, will carry on after her demise.

We can come across another aspect of the theme death, when Hazel reads these words from Augustus to Van Houten in the letter that Lidewij sends to her: “*I got my wish, I suppose. I left my scar*” (313). This brief quotation touches on separate ideas. First, it speaks out Augustus’s desire to be remembered after his

death, which is a main preoccupation of his throughout the novel. Here, he says he got his “*wish*.” Since Augustus, always dreamt of doing something heroic, he sacrifices his wish from “The Genie Foundation” to take Hazel to Amsterdam. This act allows him to survive after death and his legacy lives on with Hazel and her parents forever.

The quotation also emphasizes the dual nature of pain in the novel. The “*scar*” Augustus leaves is an emotional one, that brings pain to Hazel. It refers to the fact that Hazel will be hurt by Augustus’s death. This is the reason why Augustus wished Hazel would die before him so she wouldn’t have to be harmed by knowing he is going to die. But at the end, his death had left a scar on Hazel. But the pain that left this scar, wasn’t a harmful one to Hazel, as she genuinely loved Augustus and that he mattered a lot to her. She demonstrates this understanding during Augustus’s eulogy when she says, “*Without pain, we couldn’t know joy.*” (272) She realises that death is an event that allows us to live and love to the fullest. In the end it becomes clear that life is defined by our relationships with others, and the importance and meaning of these relationships is demonstrated through the pain felt when a loved one dies.

Conclusion

Author John Green brings out two main themes of the novel; facticity and death in the light of existentialism. The major characters of the novel, Hazel Grace and Augustus Waters who are involved in the daily basis of living with their cancer, finally find the meaning in their lives at the end of the novel. They provide us with thoughtful life lessons such as: It doesn’t matter how long we live in this world but what all are the good deeds we accomplish. In spite of the fault in their stars, Hazel and Augustus proved a happy existence within the limited span of time. Hence enjoy the little things in life within the span of existence. The novel in essence sides with this idea: “*No matter how little time we have, we can make an impact in others as well as in the world we live.*”

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An Archetypal Approach to Thakazhi Sivasankara Pillai's *Chemmeen*

J. Sridhar

M.Phil. English, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

One of the most renowned Malayalam novels *Chemmeen* by Thakazhi Sivasankara Pillai has been translated into more than nineteen languages. The theme of the novel is a myth among the fishermen community along the coastal of Kerala State in the Southern India. The myth is about chastity of women. When a married fisherwoman was infidel, her husband was taken into the sea by 'Kadalamma', the Sea Goddess (literally means Mother Sea). Here the sea is mythologized as 'Kadalamma' a generous goddess to the fisheries and to scare the people who is adulterous. Thakazhi Sivasankara Pillai wrote this beautiful tragic novel with this myth of the fisher folk using the Sea as an archetypal symbol. Generally the sea is well thought-out as the mother of all life, spiritual mystery and infinity, death and rebirth, timelessness and eternity. These assumptions are being found in the novel *Chemmeen*.

Similar kind of myth is also found in Greek Literature. The following example from the criticism of Fiona McHardy clearly shows the myth of *Odyssey* that "The idea that those who have displeased the gods will be drowned while voyaging at sea is apparent in a number of myths. The punishment is associated in particular with those who have insulted the gods in some way, but it is also connected to sexual offences"(6). Similar myth is clearly found in *Chemmeen* too. The following myth in *Chemmeen* clearly echoes that of *Odyssey*. While a fisherman goes to the sea for getting fortune, his faithful wife, facing the west should stand on the shore and wait for her husband's safe return. If she isn't loyal to her man, Mother Sea will get angry with her and she'll take the life of the woman's husband and will send many venomous creatures like snakes to the shore and there will be an enormous destruction to her place with her nature force. Karuthamma questions Nallapennu about a woman who had been punished by the Mother Sea in the shore there before. Nallapennu answers Karuthamma that there had been so in most tales of the old sea deities, which tell that when woman fell from grace caused the waves to rise as high as a mountain and climb onto the shore. "Dangerous serpents foamed and frothed as they slithered on the sands. Sea monsters with yawning mouths chased the boats to swallow them whole. It was an old story"(104).

The folk song often reminds Karuthamma about the myth of the sea shore. Pareekutti, the Muslim lover of Karuthamma also sings every night about the fallen woman who lived on this shore once. Karuthamma wakes up in sudden and she forgets herself and the rest whenever she happens to hear that song. She loves Pareekutti and his song too. She becomes a slave to the song of

Pareekutti. The song represents the memories of their love. House is considered as the symbol of power structure in the society. House as a symbol, plays a pivotal role in the lives of all human beings in search of Identity. Likewise, in the novel *Chemmeen*, Chemban Kunju and his daughter long to own a house. Chemban Kunju, the greedy father of Karuthamma plans to buy a new land to build a house for him after buying a boat and net of his own. In the same way, after getting married Karuthamma also proposes her husband that they should also have their own house. The archetype of the family set up is clearly depicted here however the married couples' desires to make their own identity in the society. Blue is usually positive, associated with truth, religious feeling, spiritual purity, security. The common belief of the fisher, when the colour of the sea is normal there will not be any problem but if it is changed, it is a bad omen. The change in the sea is portrayed beautifully in *Chemmeen*: "All of sudden the colour of the sea changed. A Denseness. The waters of the sea were tainted red. It was that time of the year for the mother sea. For some time hereafter she would be unable to bless them. The sea would be barren"(64). When the sea turns red other fishermen stay ashore believing that the Mother Sea is menstruating. Red stands for blood, sacrifice, violent passion and disorder. Black (darkness) signifies disorder, mystery, the unknown, death, primal wisdom, unconscious, evil and melancholy. When Palani, husband of Karuthamma goes to the sea with anger, the bad sign of black is portrayed as follows: "From the west, a giant wave that covered the horizon came rolling. He felt a great desire to cut through the heart of that wave and go across. But the wave.....Calm. But the sea was tinged with black" (230).

The entire life of the fishermen is set at the backdrop water and generally the water stands for the mystery of creation; birth-death-resurrection; purification and redemption; fertility and growth. Water is the most common symbol for the unconscious. As the water (sea water) is the living source of the fishing folk, the fishermen like Chemban Kunju and Palani unconsciously think of water and their catch. Serpent (snake or worm) signifies the symbol of temptation in Christianity; evil, corruption, sensuality; destruction; mystery. The symbol of destruction is given in the story of Palani when he moves towards the deep sea and the poisonous snakes enter into his boat. This is depicted in the novel through the following lines: "Sea snakes slithered into his boat. They were gliding over the silver talismans on the blue expanse. At the edge of the boat, they stood on their tails, dancing. And then they slithered back into the water again. Two snakes coiled around each other within the boat"(230). At the end of the novel some sea snakes move on the sea shore and the waves had come as far as the doorsteps of some houses. This happens after the reunion of the lovers Karuthamma and Pareekutti.

The sea waves signify the unlimited power of nature. When Palani is rowing his boat into the sea with pride, he is drowned by a giant wave. Whenever man tries to compete with Mother Nature out of his pride, he faces failure. The wave

could be a tool of 'Kadalamma' and it could be sent to stop his interior sea voyage in order to stop the destruction. But men do not realise the sign of nature now a days. The fish as a symbol of life, denotes man's struggle with nature. Palani baits a shark and he puts all his strength to control it amidst the sea. He struggles until his death into the whirlpool. He speaks to the shark and he becomes mad on the catch. Similar sequence is being found in Ernest Hemingway's *The Old Man and the Sea*. Santiago, the old man also goes alone into the sea and catches Marlin, a big fish and struggles with it. Santiago speaks with the fish in order to motivate himself. Likewise Palani in *Chemmeen* speaks with the shark when it draws him into the whirlpool. Palani shouts; "Stop it! It isn't time yet for you to take me to the sea mother's palace!...Ha... that is the way, my boy!"(235). But this speech is the outcome of the fear on death. Hemingway says through the character of Santiago that man is not made for defeat; a man can be destroyed but not defeated. In the same way even though Palani dies in the whirlpool, he is not defeated by the shark but his bait kills the shark at the end of the novel.

The boat and the net symbolise pride. After owning a boat and a net, Chemban Kunju becomes prejudiced. Having all wealth in a sudden, he forgets everything around him including his family, friends and Pareekutti who helped him to buy the boat. But when Pareekutti asks Chemban Kunju to sell his fish to him, Chemban Kunju demands money from him. Greed catches him tightly. All the people including his wife Chakki begin to hate him because of his insatiability. He feels shame on going to sea in other's boat.

The payment of bride price is in the Arayan community in the fisher folk. It should be paid to the bride's Shore Master which he determines it. Usually the bride groom will be given dowry by the bride's family. But it is just the opposite that the readers could find in *Chemmeen*. The capability of the bride groom will be calculated with this bride price. This will show whether he is in good economic condition or not. The Shore Master will take his share from the money and the rest will go to the bride's family. This is their custom they follow during their marriage ceremony. It brings out the cultural understanding of a particular mother-rooted society. The readers also find this custom in the conversation of Karuthamma and Pareekutti which gives a double meaning. 'When you have a boat and nets, will you sell us the fish?'; 'If you give us a good price, we will (59).'-Here 'a good price' signifies the bride price. Indirectly their conversation is about their dream on marriage.

Both Karuthamma and Pareekutti are described with the symbolic significance of their dress code in the first chapter of the novel. As a Hindu Arayan community woman Karuthamma wears with a sheer mundu; Pareekutti, a Muslim man wearing a pair of trousers and a yellow shirt, with a silk handkerchief knotted around his throat and a tasselled cap. The appearance itself signifies that they both are from different controversial religions. The dress code symbolises the tradition and practices of each other.

Clouds and the stars take part in the novel and the stars (Arundhati, a guiding star of fishermen and symbol of chastity) are considered as the navigating tool for the fishermen to find the way of shore. But on Karuthamma's reunion with her lover, the stars are covered over by the dark clouds. Far from the shore Palani finds no stars in the sky and he loses his way. After the whirlpool draws Palani into the sea the clouds uncover the stars. "One star was visible. It was the star that fishermen navigated by. The fisherman's guiding light. But its radiance seemed to have dulled"(238).

Out at sea, Palani struggles with a huge shark he has baited and looks in vain and a giant whirlpool forms and waves become mountainous. He cries out to his wife (the fisherman's traditional guardian angel) to pray for him: "And so it was to her he was appealing for prayers as that first fisherwoman had prayed for the safe return of her husband"(237). But Karuthamma is in the arms of Pareekutti, and Palani is dragged down to the abode of the Sea Mother. Karuthamma and Pareekutti, the lovers also face the death by the sea at the end of the novel. The secret meeting of those lovers in the moonlight is often being found almost in all the literatures of the world. Their meetings take place at the moonlight. The only witness of their secret meeting is the moon. Their love also symbolizes the desire to realize the primordial, cosmic union of Shiva and Shakti. Shiva Purana not only praises Shiva as "manifested light" but also says that Shiva and Devi (or Shakti) are identical and inseparable as moonlight from the moon. So it is that Pareekutti and Karuthamma consummate their long-denied love by moonlight.

Using myth and symbols, the archetypal pattern in the novel *Chemmeen* leaves a moral caution to the people that they have to keep individual morality, self-discipline with self-control. Though the punishment of Sea Mother is terrible, the purpose is to lead the men in a good path. Finally there is a dilemma in among the readers of the myth that 'Is the chastity meant for only the women? Is not to men?'

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Caesar and Cleopatra - clash for the real power: an analysis of the characters of Caesar and Cleopatra through the comic series “Asterix”

N. Meera

II M.A. English, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

A combination of images and ideas with oodles of humour is a comic. People get to know about politics and other current issues through comic strips that appear in editorials, gag cartoons and so on. The fun loving people are fond of comics because not only it delights them but also it carries ample of information about current issues. The versatility of comics is well known to everybody as it carries the news about the world today and it can also trace back the history of the world. A comic strip in newspaper is the best example of the former whereas the popular comic series and books are the examples of the latter.

Historical perspectives in the most celebrated comic series ‘ASTERIX’ is the main focus of this paper. The history of the valiant Gauls and the intervention of Roman kings are also part and parcel of this paper.

History of Gauls

Gauls refers to a particular group of people lived probably during the Iron Age in Western Europe (France, Luxembourg, Belgium, Switzerland). It is a general belief that the people of France are the direct descendants of Gauls. The Gauls lived happily in their own way till the invasion of many dominant emperors especially the Romans. The Gaulish people violently fought against all the invasions and they were dangerous enemies of Rome for centuries. During 2nd and 1st centuries BC, Gaul fell under Roman rule. The ambitious king Julius Caesar won over the kingdom within a short span of time through his campaigns. The Gauls were invincible and he could not impose his rules over them though he won the war. At the time of Caesar's invasion, Gaul was a region made up of warlike feudal states. There was trade, but each village kept to itself, running its own affairs with its own government. So Caesar could not impose his authority over them.

The invincibility of Gauls is the base for the comic series. The series follows the adventures of one particular village which was still restricting the Roman occupation. The hero, Asterix and his inseparable friend Obelix undergoes many adventures in this series. The valiant characters appear in this series are portrayed as models showcasing the true valour of Gaul people. Asterix is the hero of the comic and he is unconquerable. This series depicts the bravery of the real Gauls through the imaginary character Asterix.

Asterix and his adventures-the beginning

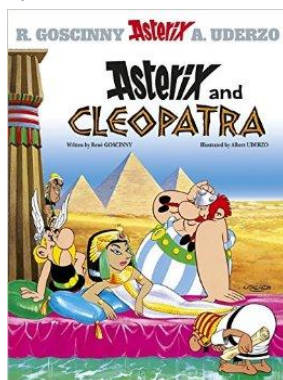
This popular French comic was first appeared in the Franco-Belgian comics' magazine PILOTE on 29 Oct. 1959. It was so popular that the series has been translated into over 100 languages and has been adapted into 12 films (eight animated films, four live action films). Rene Goscinny and Albert Uderzo gained popularity even before creating the Asterix series by another series named Onumpah-Pah, which was published in Tintin magazine. The success of Asterix series in Pilote magazine led to the publication of the book named *Asterix the Gaul* in 1961. It earned great name and fame, and then on Asterix books were released on a yearly basis till the death of Rene Goscinny. Uderzo felt a great blow after the death of his friend but he continued the series alone on the demand of the readers but on a less frequent basis.

Historical References

History was not only touched upon in this series but also traced effectively as one can easily recognise it by their names itself. The major characters like Asterix, Obelix, bear the suffix *-ix* behind their names. This suffix *-ix* alludes to the suffix *-rix* present in the names of many real Gaulish heroes like Vercingetorix, Orgetorix. Asterix, the protagonist was modelled upon the greatest national hero Vercingetorix. Vercingetorix was a real time hero who bravely opposed the invasion of Romans into their land but frustrated by his clansmen's acceptance of Roman occupation. He fought against them with fearless heart and there were a few supporters who also opposed the invasion. The Romans under the leadership of Caesar lost against Vercingetorix and nearly 746 Romans were killed in that battle. On the contrary, he had a high regard for Caesar though he won over him. This comic not only centres the valour of Gaulish people but also adds flavour to the love affair of Caesar and Cleopatra.

Asterix-The Comic

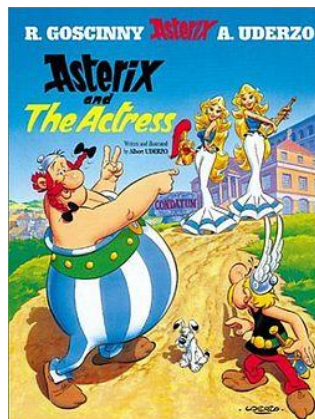
Asterix and Cleopatra, Asterix and the actress are the two comic series taken into consideration for this paper. The heroism of Asterix and the stereotypic mentality of Julius Caesar are the subject matter.



Asterix and Cleopatra is the sixth book in this series. This series describes the ego issue that prevailed between Julius Caesar and Cleopatra. They quarrel over the trivial issues and the quarrel ends up in a challenge. Cleopatra wins at the end with the help of Asterix and Obelix.

Story in a nutshell

Julius Caesar looks down upon the Egyptians and Cleopatra feels bad about it. Cleopatra, being the Queen of Egypt, makes a wager with Caesar promising to build a new palace in Alexandria within three months. She appoints Edifis to carry over this great job and Edifis in turn seeks the help of Gauls and their magic potion. Getafix prepares special potion and the people are working harder and faster that the work goes forward on schedule. Caesar because of his jealousy makes troubles to the workers by sending his legion. This legion interrupts the work and infuriated Asterix delivers the news to Cleopatra. She rushes to the construction site and rebuke Caesar. He feels sorry for his mistake and orders his legion to fix the damage and the palace was completed successfully within the stipulated time. Edifis gets a great fortune and Asterix, Getafix and other Gauls are also rewarded.

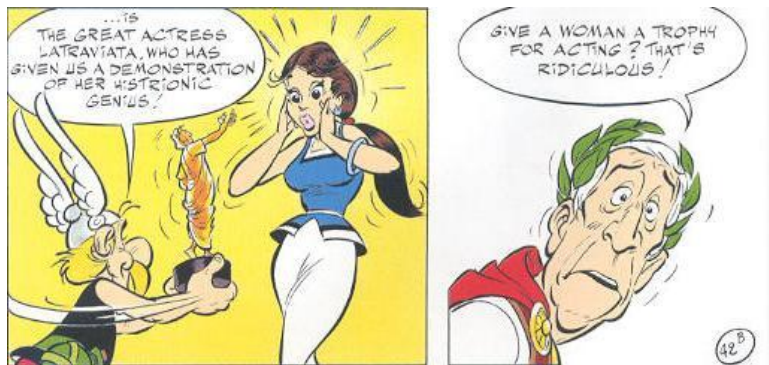


Asterix and the Actress is the first volume of this series to get released on 21st century. This story is based on the mistaken identity.

Story in a nutshell

Asterix and Obelix celebrate their birthday on the same day and they receive stylish Roman sword and helmet as gifts from their parents. These two precious gifts belonged to Pompey, the life time enemy of Julius Caesar. Pompey tries to retrieve his possession by sending an actress named Latraviata. She disguises as Panacea, the lady who was envied by Asterix as well as Obelix and she tries to seduce them both to recover the possession. Meanwhile the real Panacea who was living with her husband appears in the scene to warn Asterix and Obelix about the imprisonment of their fathers. The problem starts when Latraviata and

Panacea meets each other. At the end, Caesar appears in the scene and the actress was awarded for her outstanding performance and Pompey regains his possession.



Perspectives

“Absolute power corrupts absolutely”, is a popular saying and it is proved by these two comics. The power and ambition corrupts Caesar’s mind and it led to the downfall of his victorious life. The stories also portray the power of Gauls; the notable aspect is that they were not interested in dominating others whereas Caesar was interested. His stereotypical view is also caricatured in these two series and the above given picture is a perfect example for his mentality. He always views women as second sex. He even feels jealous of his own lover, Cleopatra. On the contrary people of Gaul respect both the gender.

The druids are the elderly people who advise about political issues to the kings or to the leader of the clan. Druid Getafix acts as an adviser and also a magician in this series. Vitalstatix is the leader of the village and his leadership is not very effective and it is clearly shown. Roman occupation was deferred for a certain period because of the magic potion and fearlessness of Asterix, not because of Vitalstatix’s leadership. In real time it was not so, the leader Vercingetorix was very brave and lion hearted.



Conclusion

The historical characters like Cleopatra, Caesar are all caricatured as humorous characters in the series and it provokes laughter instantly. Throughout the ages, Caesar and Cleopatra were shown as elegant and romantic couple but Goscinny mocks at their ego and he ironically comments over their ideologies. Uderzo through his illustrations gave life to these characters. People are familiar with the heroes like Napoleon Bonaparte and Alexander the Great but are unfamiliar with the heroes who struggled hard to save their own country like Vercingetorix. The history of this unknown hero is made known by the Asterix comic series. Although, there are some minor inaccuracies like the depiction of Asterix as a smaller one and his winged helmet, the Gaulish people are undoubtedly brave and the hero Asterix is the representation of his clan. This comic series is considered to be a significant and the most successful one which gives a lot of moral values and showcases the value of friendship.

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Implementing Comic in ELT in Primary Schools

D. Annuncy Vinoliya

II English, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

English plays a vital role in this modern world and especially in Tamil Nadu it is treated as a second language. There are several methods applied in teaching English to the students but still the students are lagging behind in learning and acquiring the second language. Perfect nourishment from the young age will definitely help the students in learning the second language. Therefore the nourishing process should involve according to the age, standard and mental growth. So it very essential to teach the second language (i.e.) English through comics in the early stages.

Activity Based Learning

Activity Based Learning is the current teaching methodology used in the primary schools of Tamil Nadu. The main feature of ABL method is child-friendly education where the student involves in self-learning. In this method the text has produced group of cards which contains lessons for each subject namely Tamil, English, Science, Mathematics, social studies. When the child finishes a group of cards she\he completes a "milestone". The draw backs in this method are

- Teacher plays a minimal role in this method and so the students cannot learn the lessons completely.
- It can be suited for the classroom which contains minimum students.
- In the process self- learning, academically excellent and the average students can learn wherein the below average and the slow learners remain in the same card.

In the course of self -learning the students find very difficult to learn the second language since it involves in teaching grammar, pronunciation, reading and writing.

L2 Material Production

Comic play a dynamic role in English Language Teaching and therefore the material produced for the second language teaching and learning should be created using comic strips. Now in ABL (Activity Based Learning) the text that are prescribed contains rhymes, poems, essay. This subject matter involves lengthy and huge sentence formation and the children find very difficult to learn the language. The ABL method has produced a very less quantity of comics. Instead of placing big and enormous text for the primary school students the

material should be produced using comic strips. By using comic strips in the text, it provides the students

- A lot of white space, where they feel very comfortable with the text while learning.
- It brings an attractive presentation of the subject, where the content is so appealing to the students.
- It invites and encourages the students for active participation in the learning process.
- It also implies novelty and variety through comic strips.
- Through comic strips the material can discuss the culturally relevant ideas, history, geography and other aspects.
- The material which prepared through comic strips brings in different types of learning style namely:
 - i. Visual
 - ii. Auditory
 - iii. Analytical
 - iv. Dependent & Independent

Comic through Krashen's input hypothesis

The comic strips in the primary class room for learning English is achieved through some of the Krashen's input hypothesis. This theory deals with natural order hypothesis, affective filter hypothesis, monitoring hypothesis. These three hypotheses are applicable in using comic strips in the ELT class room. From the hypothesis the method to use the comic strips are as follows:

a) Natural Order Hypothesis

This theory states there is a natural order of learning followed by the student while learning or acquiring the second language. In the early stage they speak the language using conjunctions, gerunds with each verb, auxiliary verb which don't have a proper sentence formation. In the next stage they include articles, prepositions, and singular, plural and in the last stage they use irregular present, past and as a result they succeed in acquiring the language. Through comics the students first listen to the conversation of the characters and imbibe them and try to express in their discourse. Every child has their own way to speak the second language and comics paves the way for the sequential learning of the language which is possible according to nature order hypothesis.

b) Affective Filter Hypothesis

When students are exposed to the second language they involuntarily have emotional attachment towards the second language. These emotional attachments stand as a barrier to the learning process. These affective factors can be reduced using comics since the comics allow the students to feel comfortable with the language and the text. Comics which have cartoons create

fun and entertainment in the students and they involve in the learning process without any fear and stress. Comics don't affect the students rather it create an effect on the students. Listening to the subjects in the form of stories, visuals reduce the fear of learning the second language in the students.

c) Monitor Hypothesis

The monitoring hypothesis is the output of the grammar in the second language. According to Krashen, learning is a monitor and it acts in planning, editing and correcting function. This monitoring is attained through comics because it enriches the language of the students by simple sentence production. The students acquire the language and able to correct since they have learnt the rules and the grammar in the second language. Comic which uses lively language helps the students in their communication process and in monitoring while speaking. Students think about the language used in comics and communicate similarly when there is a break in the discourse of the student the comic language helps to correct and reproduce it.

Comic with Multiple Intelligence Class room

A class room is a mixture of students where they exhibit different talents and skills. It is the duty of the teacher to make the students excel in the language and other subjects. When it comes to the classroom of multiple intelligence second language is achieved only by comics because the syllabus of the ABL method doesn't satisfy the needs of all the students. Multiple Intelligence is the theory developed by Howard Gardner. The theory states every individual have eight type of intelligence through which they solve the problem and understand the world better. It is a cognitive theory, where each intelligent occupies at different proportion. These intelligences are found in the students where they surpass in a particular intelligence and learn the subject through that particular intelligence. Gardner has identified eight types of intelligence. They are:

- Linguistics
- Logical-Analytical
- Music
- Bodily kinetic
- Interpersonal
- Intrapersonal
- Spatial
- Naturalist

These are the eight types of intelligence through the learning process is fulfilled by the students. But this theory of Multiple Intelligence is not highly fruitful in the ABL classroom. When the theory of multiple intelligence and comic is implemented in ABL method for English Language Teaching the result is highly successful.

Prescribing comics in the multiple intelligence classrooms will produce the following effects and progress in the students,

1. Regarding the *Linguistics intelligence* comics provide a large area to stimulate their intelligence in learning English. From comics they learn more vocabularies, utter the words with appropriate pronunciation, and write in the language with perfect grammar. To develop this intelligence the teacher should dictate the words, make them to write a story using comics, and make them to converse with the words they have learnt from comics.
2. Regarding the *Logical analytical intelligence* the teacher can narrate the starting stages of the story and makes the students to finish the story. The teacher can give puzzles about the words and grammatical structures to these types of students and they automatically involve in the solving process.
3. Regarding the *musical intelligence* the teacher can telecast the audio visual comics to the students. The students immediately respond to these types of comics since they have been accompanied by music and they learn to compose music on comics on their own. As a result English language can be produced in music and songs.
4. Regarding the *Bodily kinetic intelligence* the teacher allow those students to act the comics in the classroom where they willingly participate since they are posing body gestures.
5. Regarding the *Interpersonal intelligence* the teacher can make them engaged in the groups where they can discuss about the comics they are learning and as a result they absorb the morality and the mannerism of the comic characters and apply them in their personality development. Here language acts a medium to transfer the comic to their lives.
6. Regarding the *Intrapersonal intelligence* comics construct these types of students towards creativity. They learn the language through comics, take up the style in which it is written, and try to produce any piece of art using the language.
7. Regarding the *Spatial intelligence* comics persuade the students to participate actively in the language learning. As the comics are filled with cartoon pictures it the students of spatial intelligence learn the second language easily. They voluntarily narrate the story by seeing the picture itself. They also produce or reproduce the comic strip in their own artistic perspective. Comics contribute more visuals as input to these students and as a result second language is automatically developed in them.
8. Regarding the *Nature intelligence* the teacher can take the students a field trip and most of the activity done by the students take place outside the class. Through comics a teacher can bring the environmental subjects to them so as to bring out their intelligence.

Conclusion

Comics budge the children into an imaginary world where they can learn the realistic world. Implementing comics in the primary school breaks the barriers in learning second language. A cent percent communicative competence is possible only by comics because it psychologically attached to the mental growth of the primary kids. Visual effects create more evolution than the words and so when the text is produced with comics then it is very simple to widen the communication in the students.

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Humanity concern in Naomi Klein's This Changes Everything: Capitalism vs. Climate

D. Vinotha

M.Phil. English, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

This Changes Everything: Capitalism vs. the Climate is Naomi Klein's fourth non-fiction work. She was born in Montreal, Canada on May, 1970. She is an author and social activist, who is known for her political analyses and criticism of corporate globalization. She received the 2014 Hilary Western Writer's Trust Prize for Non-fiction for This Changes Everything: Capitalism vs. the Climate. It was published in September 2014 by Simon and Schuster. Klein was an award-winning journalist, syndicated columnist, and bestseller The Shock Doctrine: The Rise of Disaster Capitalism. Her first book, No Logo: Taking Aim at the Brand Bullies was also an international bestseller.

Klein's Argument with Climate Change

Expect the difficult-even radical-lowdown on the scariest topic of all: climate change and the hard choices she finds that humanity must make to salvage civilization. Today's economic models run counter to saving society. Environmental issues are common in a technological world. The climate change is one of the big issues in Canada's environmental condition. What is meant by climate? Climate is both a consequence and a demonstration of the workings of complex processes in the atmosphere, the oceans and on land. As a result of the unequal heating of the earth's surface by the sun, an atmospheric circulation pattern is developed and maintained. Thus, the climate change is not a scientific but also manmade disaster.

Much of this book is concerned with showing that powerful and well-financial right-wing think-tanks and lobby groups lie behind the denial of climate change in recent years. There is not much reasonable doubt as to the finds of science on the subject. As a result of human activities to a large-scale of climate change is under way. Government have backed off from previous climate commitments, and environmental concerns have slipped down the policy agenda to a point at which in many contexts they are treated as practically irrelevant. She also told that humanity is too greedy and selfish to rise to their challenge. She argues, it is a civilizational wake-up call, a powerful message delivered in the language of fires, floods, storms, and droughts.

Climate change isn't just another issue to be neatly filed between taxes and health care. It's an alarm that calls us to fix an economic system that is already failing us in many ways. Klein meticulously builds the case for how massively reducing our greenhouse emissions is our best chance to simultaneously reduce gaping inequalities, re-imagine our broken democracies, and rebuild our gutted

local economies. And she demonstrates precisely why the market has not-and cannot-fix the climate crisis but will instead make things worse, with ever more extreme ecologically damaging extraction methods, accompanied by rampant disaster capitalism. The struggle for a sustainable world is really a fight against capitalism.

Naomi Klein argues that capitalism has finally gone too far. Globalization was bad enough-but global warming is even worse. Capitalism is now changing the world very literally, altering the planet's climate and threatening to destroy the prospect of a livable future on earth. As the climate change, everything else is going to change whether we like it or not. Thus the duty to change the world deliberately is more urgent than ever before.

For the first time, Klein saw that climate change is not an abstract, science matter, and that it's far too important to be left to the knit-your-own. Her proposals for what she calls "a politics based on reconnection" involve real, ordinary, active humans, working in properly modern complex societies. Climate action is in fact a massive job creator as well as a community builder and source of hope. As she explains, the impact of capitalism, human greed, selfishness, and the ever-increasing addiction to profit and growth continue to dig humanity deeper and deeper into possible climatologically oblivion. She also explains how a new process of rebuilding and reinventing the collective, the communal, the commons, and the civil might, after many decades of attack and neglect, begin a new era of natural worldwide climate cycles that would no longer be caused by human folly.

Climate change is important, but it's boring, so it's hard to communicate properly. Making things even harder is that we have very powerful industries with a vested interest in the status quo that are muddying the waters by filling the media with stories that aim to confuse people about the science. There's also the fact that it's harder to make a compelling story if we have to stick to the facts-and they are complex-than if you can just make stuff up, like the climate deniers do routinely. One problem with policies that attempt to recover the full costs of environmental services from users is that they may be regressive-there is some evidence that the cost of environmental policies as a fraction of income has been greater for lower income groups than for higher income groups.

Canada should continue to play an active role towards the development of a multilateral approach to dealing with global pollution problems. As consumption levels increase, particularly in the rapidly growing economies of Asia, severe pressure will be placed on the global environment. Carbon emissions will increase biodiversity will be threatened, the health of the oceans will be placed in jeopardy, and there will be further pressure on the ozone layer. Canada will be confronted with a series ethical dilemma about how to reconcile its wealth with significant human suffering in other parts of the world.

All of which is clearly meant to convey in no uncertain terms that climate change literally changes everything for today's society. It threatens to turn the mythical human conquest of nature on its head, endangering present-day civilization and throwing doubt on the long-term survival of *Homo Sapiens*. The source of the close circle is not the planet, which operates according to natural laws, but rather economic and social system in which we live, which treats natural limits as mere barriers to surmount. Hence, the change that Klein is most concerned with, and to which her book points is not climate change itself, but the radical social transformation that must be carried out in order combat it. Klein argues in effect for system change not climate change-the name adopted by the current ecosocialist movement in the United States.

The core argument of *This Changes Everything* is a historical one. If climate change had been addressed seriously in the 1960s, when scientists first raised the issue in a major way, or even in the late 1980s and early 90s, when James Hansen gave his famous testimony in Congress on global warming the Intergovernmental Panel on climate change was first established, and Kyoto Protocol introduced, the problem could conceivably have been addressed without a complete shakeup of the system. At that historical moment, Klein suggests, it would still have been possible to cut emissions by at most 2 percent a year.

Over 586 billion metric tons of carbons have been emitted into the atmosphere. To avoid a 2 c (3.6 F) increase in global average temperature-the edge of the cliff for the –it is necessary to stay below a trillion metric tons in cumulative carbon emissions. Elizabeth Kolbert, writing for the *New York Review of Books*, quickly lets us know that she has not come to praise Klein but bury her. Klein's references to conservation, "managed degrowth," and the need to shrink humanity's ecological footprint, Kolbert says, are all non-marketable ideas, to be condemned on straight forwardly capitalist-consumerist principles.

Therefore these statements and others views are only gave a temporary solutions and one should against or praise others views about the environmental issues. Klein says capitalism is now changing the world but it is not true acceptance. How science shows that human activity causes climate change, it is really true facts. Though we want to change the human activity, it will be changes everything, not only the climate change but also the capitalism, and other environmental issues and all the literal problems in the world.

The world is naturally good but created bad environmental of such a diverged activities. When scientific and technological progress seems to be making mankind less constrained by the natural environment, and in particular, less vulnerable to unexpected climate events. Everyone's mind scope is very difficult to understand, their cells are growing up the fast in the childhood. In this stage is very important to learned the life studies, because they are understood our self and how to face the technological world. Klein's arguments are talks about the humanity concerned views but it brought on ordinary

solutions. Climate change is complex process in the atmosphere. Capitalism was never cleaned everything. It will taking as a profit making and they are not going beyond the level of widening to control every issues.

Conclusion

Education should be changes everything, not only the environmental problems but also any literal problems in the world. Now a day's Canada faces many environmental issues but the climate change is to be considered one important. If the education should be good which means to taught the humanity concern. Now they done only theoretical concern not a practical session, so the peoples are not well aware of such problems. If the education is good that country was never faces any problems considered to be a high. Every new born baby is growing up their motherhood very sweet and tasty, after that they will shape by their parent and the society also. Every parent are not well aware of everything and not to spent more times to their child's, so the teacher as their second parents should take aware of that child's life. Why the education is very important means to enjoy the world literally and also scientifically. Some uneducated people's are achieved, but the technological world some more difficult to come across everything. So education must be very important to acknowledge the world view. In this world whatever we can think or do, but it will be not affected our self and others. Why we need the education, it should be changes everything in this world is a question to everyone. Childhood is a key to activate the right direction to control their mind. Thus, Klein argues Capitalism should changes such a environmental issues including the climate change. It is good, but Education is a base to changes everything.

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C. Subramaniam – His Contribution in the National Politics

M. R. Raj Kumar

Assistant Professor of History, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

Tamil Nadu has been the birth place of many great political leaders and thinkers. *C. Subramaniam* is a great leader popularly known as “C.S.” *C. Subramaniam* took a prominent part in Indian Freedom Movement. Distinguished, politician and a bountiful social worker of India. As a member of Constituent Assembly in 1946, he rendered valuable service in drafting of Indian Constitution. Later, he was elected as a member to the Madras Legislative Assembly and had the distinction of serving the state as Finance and Education Minister with excellence. He earned a great name for his grasp of the national problems and for his pragmatic approach. His efficiency and integrity paved the way for wider spheres of his activity at the national level. Among the few leaders from South India who have made their mark in all-India politics in the post-Independence period *C. Subramaniam* holds a unique place. In this research article, the scholar attempts to throw some light on his contribution in the national politics in India.

Entry into politics

C. Subramaniam hankered to become a Congress worker, both during his high school and college days. He had taken part in the student's movement. When studying at High School in Pollachi, he had attended all the Congress meetings in his area. At that time he was on hearing the eloquent speeches of the state Congress leader Rajaji, District Congress leader Boopathy Mudaliar and Pollachi Congress leader Mahalinga Iyer and also meets Avinashilingam Chettiar, V.O. Chidambaram Pillai, Vijayaragavachari and V.S. Srinivasa Sastri. These, meetings influenced C. Subramaniam to take part in the Congress activities. The simmering words of Jawaharlal Nehru in the Indian National Congress Session, Madras in 1927 along with many others made him enter into the field of freedom movement. In 1927, Mahatma Gandhiji had taken measures for the Freedom Movement in Tamil Nadu. C. Subramaniam had an opportunity to meet him in person in Madras friend L.K. Muthusamy. The simplicity, curiosity for getting freedom, dynamic efforts to elevate the downtrodden and effective utterances of Gandhiji attracted him and converted him to a congressman.¹

After the meeting of these Congress leaders, C. Subramaniam gave up wearing foreign clothes and learnt to spin on Charkha and spun a certain quota of yarn every day. As a matter of fact, spinning was nothing new to the then. People did spin but with the advent of the cheap mill cloth, spinning had been given up and *Charkhas* had been kept away in the attics. All these *Charkhas* were taken out

and not only his family but also other families in his had the village taken to spinning. He used only *Khadi* clothes made out of yarn spun by his family, particularly by his mother and sister. The members of the Vanamalar Sangam underwent a tour of the villages spreading the message of Mahatma Gandhi, particularly the message of *Khadi*, Untouchability and Prohibition².

Role in Freedom Movement

Salt Satyagraha in Tamil Nadu and C. Subramaniam's Role

In Tamil Nadu Salt Satyagraha was organized by Rajaji, who was the president of the Tamil Nadu Pradesh Congress Committee at that time. The Congress Committee decided to defy the salt laws at Vedaranyam, a village situated in the Sandy region of point Cali mere but favorably situated near a salt factory. Rajaji was made the dictator of the movement. The idea was to defy law and discredit the British authority, marking the beginning of Civil Disobedience in Tamil Nadu. After a month of the famous Dandi March; Rajaji started the Vedaranyam March on April 13, 1930. A party of 100 volunteers headed by Rajagopalachari began its much advertised march to Vedaranyam near Cape Calimere where it proposed to scrape salt from the adjoining swamps. The British Government declared that too was illegal and put Rajaji and others on Jail³. C. Subramaniam joined the Salt Satyagraha Movement with a few of his friends. His family was utterly disappointed and late of cruces he joined the Madras Law College⁴.

C. Subramaniam and Second Civil Disobedience Movement, 1932

The Salt Satyagraha Movement was suspended and Mahatma Gandhi proceeded to London as the sole representative of the Indian National Congress to participate in the Round Table Conference. There the future of India was to be discussed and determined. Gandhiji's speeches at the Round Table Conference received worldwide publicity and served the cause of Indian freedom by creating an international opinion in favor of India. In spite of all this the Round Table Conference ended without any positive decision being reached regarding the freedom of India. The British Government was not prepared to think in terms of full freedom for India, and therefore, India had to wait for some more years and go through the fire before reaching its goal of Purna Swaraj. The new Viceroy Lord Willington was out to crush the Indian National Congress and resorted to a policy of repression. Another Civil Disobedience Movement became inevitable. It took the form of picketing liquor and foreign cloth shops. Most of the Congress leaders found themselves in prison⁵. In 1932, Civil Disobedience Movement was rampant in all nook and corner of India. C. Subramaniam also participated in the movement and was behind the bars in the prisons of Coimbatore and Vellore for nearly a year. In February 1934, Mahatma Gandhi undertook a tour of the Coimbatore District as part of his Harijan Movement. One night Gandhiji stayed at the Vidyalaya at Podanur and C. Subramaniam was asked to look after him⁶.

C. Subramaniam and Toddy Shop Picketing

Gandhiji asked all congressmen to take part in “Toddy Shop Picketing”. Subramaniam and his colleagues of the congress organized picketing of toddy shops. In July 1932, auctions were to be held for toddy shops at Pollachi, the taluk headquarters. On that fateful day along with seven other volunteers he proceeded to the taluk office where the auction was being held and shouted slogans requesting the people to boycott the auction and follow the mandate of the Indian National Congress. They were promptly arrested and taken to the police station.

C. Subramaniam and Individual Satyagraha

The Individual Civil Disobedience campaign had opened with Vinoba Bhave’s speech protesting against dragging India into the war against its willingness. This movement took an effective shape during 17th October 1940 to December 1941⁷. Without the consent of the Indians and without the knowledge of the Indians, Indian wealth was granted for the world war by the British. C. Subramaniam started the Individual Satyagraha on 7th January 1941 at Pollachi. When he shouted slogans about the prohibition and against the war activities of British, he was subjected to lathi charge from the police. As he led the Individual Satyagraha he was arrested on 7th January, 1941 at Pollachi⁸.

C. Subramaniam and Quit India Movement

C. Subramaniam took active part in the Quit India Movement. Coimbatore District was very actively involved in the Quit India Movement. Particularly, the textile labourers were actively participated in many of the acts of sabotage. C. Subramaniam had boldly given shelter and sufficient economic help to leaders like V.M. Ubayadullah, Thiruvannamalai, N. Annamalai Pillai, C.N. Muthuranga Mudaliar and M. Bhaktavatsalam, the important leaders of the Quit India Movement. At a Congress conference in Bombay under the leadership of Gandhiji, C. Subramaniam participated in national processions, hartals and meetings in Thirunelveli. When he shouted slogan against the foreign government, he was lathi charged by the police and arrested and put behind the bars⁹.

Member of Constituent Assembly

After the 1946 elections, he was selected as a member of the Constituent Assembly presided by Dr. B. R. Ambedkar. He was one of the youngest members to participate in the framing of the constitution. He was elected a member of the Constituent Assembly. He became one of the principal architects of the Indian Constitution¹⁰. As a member of the Constituent Assembly during 1946-52, he rendered valuable service in the drafting of the Indian constitution¹¹. On 15th August 1947, India restored her child of freedom, having sunken cheeks and the lack of lustrous eyes due to the harassment of the British imperialistic exploitation¹².

Nehru Government and C. Subramaniam Chairman of Land Reforms Committee

C. Subramaniam served as a minister of Madras State Government until 1962. But, he was included in the Central Government of India's Ministry due to the recommendations of Kamaraj¹³. C. Subramaniam attracted the special attention of Prime Minister Nehru during one of the All India Congress Committee sessions at Nagpur, when the former spoke on the Land Reforms Resolution. After he finished his speech, Jawaharlal Nehru called him and congratulated him on the excellent speech he had made and asked him to take up the Chairmanship of the Land Reform Committee to be appointed by the All India Congress Committee and to submit a report. Thus began a very close and loyal association between Jawaharlal Nehru and C. Subramaniam. As a chairman of Land Reform Committee he made several reforms in India¹⁴.

Formation of Ministry

In 1962 election congress got an absolute majority in the Lok Sabha. Jawaharlal Nehru again formed the ministry. C. Subramaniam was conferred as the Minister of Steel and Heavy Industry from 6th April 1962 in the Nehru's Ministry. The Prime Minister Nehru bestowed C. Subramaniam with the portfolios of Mines, Minerals and Heavy Engineering on 14th February 1963. Due to his efforts a steel industry was installed at Burga on 26th October 1962, which produced 35,000 tons steel in the same year and he took efforts to establish a steel industry in Karnool¹⁵. C. Subramaniam's achievements in the Steel Ministry were significant in many ways. He sought to give a new deal to the steel plants by reorganizing their managerial set-up and combining greater decentralization and autonomy at the plant level with greater responsibility for production and efficiency. He introduced a new thinking in the management of the steel plants by decentralizing the powers of management and control to some extent. In regard to distribution of steel, he appointed the "Raj Committee" to enquire into the steel distribution system which resulted in the Creation of the Joint Plant Committee which functions effectively to this day. C. Subramaniam had a visit to Japan to get loan 1050 lakhs of rupees from her on 30th October 1962. He allotted 84 lakhs of rupees on 29th November 1962 to import needful materials from Western countries. Iron was produced abnormally in Visakapattinam. It produced 250 metric tons per annum. Roorkela Iron Industry also produced 26 tons more than the year 1961¹⁶. C. Subramaniam collaborated with private industries so as to produce materials excellently. Such collaborated firms are: 1. Hindustan Motor Industry. 2. Heavy Vehicle Industry, Bhopal and 3. Praja Steel Industry, Hyderabad.

He increased the production in the industries from 1.5 lakhs tones to 3 lakhs tones. He passed an Act on 17th December 1962 to establish Small Scale Steel Industries in all the states. His able steps, in the Third Five Year Plan, Five coal Mines were constructed at Roorkela in Bihar. Those were able to produce 122

Megawatt electricity. In the same plan he extended the Coal Refinery Factory at East Kangadi¹⁷. Jawaharlal Nehru's tragic demise on 27th May 1964, C. Subramaniam announced the demise of the Prime Minister in the Lok Sabha in a choking voice, "The Light is out". The death of the Prime Minister Nehru interrupted his tenure in the steel ministry, because Lal Bahadur Sastri was elected as prime Minister on 29th June 1964 and he formed new team of ministers¹⁸. He was the minister for Agriculture and Food from 29th June 1964 to 7th January 1967. Lal Bahadur Sastri died on 14th January 1965. Then Mrs. Indhira Gandhi became the Prime Minister. In her ministry C. Subramaniam continued as a Minister with his previous portfolios and also he held the portfolios of Community Development and Co-operation as additionally in 1966-67¹⁹.

Kamaraj Plan

In 1963 the famous Kamaraj Plan of the congress was mooted at a time when there was lack of discipline among the congress men and Pandit Nehru was worried. Perhaps very few know that C. Subramaniam was indirectly the originator of the idea²⁰. C. Subramaniam mentioned to Jawaharlal Nehru that the same was occurring in Tamil Nadu and Kamaraj was thinking in terms of resigning his Chief Minister ship to bestow his full attention for organisational work. C. Subramaniam made a draft plan and submitted to panditji for his consideration in which C. Subramaniam suggested that some of the senior ministers of Central Cabinet as well as some Chief Minister should be released from office and assigned to organization work in order to strengthen the party. This is how the Kamaraj Plan emerged and as the nation knows many important personalities like Morarji Desai, Jagjivan Ram, Lal Bahadur Sastri and Kamaraj. laid down their office to work for the organization²¹. It was during this period that, the well-known syndicate was formed and a group of prominent congress people were members of the syndicate. At the death of Nehru and later Lal Bahadur Sastri the syndicate had a prominent part to play in the election for the post of Prime Minister Ship. Thus, C. Subramaniam, during his 50 years and more as a Congress man had faced ups and downs in the organization, from the beginning as member of Coimbatore District Congress Committee to the role of being the confidant of Prime Minister, Pandit Jawaharlal Nehru. It can be said that by and large C. Subramaniam had a successful and eventful carrier as a congress man and justified the confidence reposed in him by Rajaji and Nehru²². Due to the intervention of Indhira Gandhi, the elected member of Krishnagiri parliamentary constituency resigned his post and in the same constituency C. Subramaniam was elected through a by-election²³. After the election he was immediately appointed as minister for Planning and Deputy Chairman of the Planning commission from 1971-72. The newly formed department of Science and Technology was later added to his charge. He kept this charge from 1971 to 1974²⁴.

He was the minister for Industrial Development from 1972 to 1974. The Prime Minister Indira Gandhi nominated him as the Minister of Finance on 11th October 1974. He had served as the Finance Minister until 12th January 1977. C. Subramaniam appointed a committee to analyze the functions of the Reserve Bank of India on 4th November 1974. This Committee collected income taxes. This committee made more than 61 check-ups and collected income taxes. In order to proliferate the life of poor he sanctioned loan rupees 7.19 crores of rupees under the scheme N 292 in December 1974.²⁵

Commencement of Banks

In 1975 he increased the strength of officers of the State Bank of India to 11,239 whereas 714 in the previous year. He took this step so as to ease the works and to make the masses to use the services of the Banks. In the same year he nationalized eight private Banks. He ordered all banks of India including the Reserve Bank to submit their report to the Government. On analyzing the developments of the banks he asked the banks to give loans to farmers, cottage industries and landless farmers. The Bank loan was 470 crores of rupees from June 1975 to June 1976 which were distributed to farmers and small industries. On 28th February 1975, C. Subramaniam submitted the budget for the year 1975-76 in the Indian parliaments. He imposed new taxes for 35.5 crores of rupees and managed the some sort of scarcity of the nation. However, it resulted the deficit of 247 crores of rupees. Besides he took steps to reimburse the debts of foreign²⁶.

On 10th June 1976 he made a treaty with World Bank and got loan of 25 million dollars and used it for the development of the states. Besides, he wanted to open many branches of the State bank of India in all parts of the all states. So he made agreement with United States and got 10,000 US dollars of loan. In 1976, the Prime Minister Indira Gandhi announced 20 point programme in India. C. Subramaniam appropriated 111 crores of rupees for the fulfillment of the programmed²⁷. In 1977, he increased the salary for the employees of the central government. So, the budget 1976-77 had the scarcity of 270 crores of rupees. C. Subramaniam increased the customs Tax to 5% in February 1977 and so he raised the worth of Indian goods. C. Subramaniam hammered out to make grand irrigation projects in India, so as to develop the agriculture. He allotted 578 millions of rupees for the same in 1976. He provided 1.21 crores of rupees for the Land Development Bank in the same year under the Land Development Plan²⁸.

C. Subramaniam and MISA

During the time of crucial period of Indian National Congress Committee in 1977. Indira Gandhi declared Maintenance of Internal Security Act (MISA). The MISA was opposed by C. Subramaniam, because, the MISA was composed with adamant policy in family planning, negligence in supplying food and the hateful attitude to the opposition front. It battered the fort of Congress in all

nooks and corner of India²⁹. In the seventh general election Indira Gandhi came back to power with two-third majority for congress (I). She was invited to form the ministry in January 1980. But C. Subramaniam did not participate in the election. From the year 1980 onwards he completely retired from politics³⁰.

Conclusion

The role and activities of C. Subramaniam traced hitherto shows that he was a real administrator of profound ability. Besides, C. Subramaniam holds a dominant place in Tamil Nadu, Politics and as few parallels in the history of India. He started his career as a congress worker and become a constituent leader, by dint of hard work, dedication and devotion to the principles of the party. He rose to the zenith both in the state and central government by leer and concrete approach to the policies. He constantly held his sway over the masses. He was endowed with strong will powered and astern resonant to serve the people which made the people to look upon his as the 'Man of Destiny' to solve any problem.

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**Paradigm Shift in the Lives of the Less Privileged - A Select Study with
Special Reference to *Navjeevan Seva Mandal*:
A Voluntary Social Service Organization**

W. Elizabeth

Assistant Professor in History, Bishop Heber College (Autonomous), Tiruchirappalli

India poised as one of the fast developing countries in the third world, having diverse cultural and religious backgrounds and more than 60% of its population live in rural and tribal villages. But unfortunately majority of them experience multiple exploitations through people in different levels at one or other occasion that leads to poverty and its de-effects. In order to cut across this undesirable poverty scenario and to achieve the vision of National leaders that “the rural and tribal are mainstreamed and allowed to enjoy their real life in their rural and tribal settings”, it is essential that every citizen should realize their responsibility to help and care one another so that the rate of socio economic inequality is reduced and balanced. Taking heed of the socio economical deterioration state of Indian tribal and rural poor, the like minded leaders from Friends Missionary Prayer Band have formed an organization in 1984 under the NGO frame work called Navjeevan Seva Mandal which means “New life service organization”.¹

History of NSM

Navjeevan Seva mandal is a developmental organization started to develop the people in the mission fields reached by the Friends Missionary Prayer Band (FMPB). Friends Missionary Prayer Band is a missionary organization involved in evangelistic work in different states of India sending missionary from Tamil Nadu since 1967. Dr.Chandrasekar was the Vice President of Friends Missionary Prayer Band since 1970 and the same time he had been working as Vertinarian in IVPM, Ranipet. He was the founder director of Navajeevan Seva Mandal.² NSM was started to take care of the developmental activities of FMPB as sister organization. Initially it was functioning funded by World Vision of India in Gujarat and it had a wider opportunity of expanding all over the country where FMPB was working.³ NSM as a voluntary social organization was registered in Delhi in 1985 and of 1991 in Tamilnadu under Societies Act.⁴

Vision Statement

To serve the poorest, most backward, illiterate and exploited people, particularly tribal's and those living in remote parts of India, mountains and forests.⁵

Focus of NSM

The focus of NSM was on health and economic development of tribal groups and facilitate education of tribal children through the establishment of homes in

different states. The target population of NSM was primarily for the tribal villages where poor and marginalized people live. The services were provided to the community without reference to caste, creed or religion.⁶

Source of Income

NSM receives its fund for its many activities from a number of national and international agencies. Initial funding was provided by World Vision of India (WVI) followed by CASA, Stromme Memorial Foundation (SMF) – Norway, Indien Hilfe-Bangalore, Action Aid – Bangalore, The Bridge Foundation (TBF) – Bangalore, SKIP – Bangalore, Foundation for Christian Education (FCE) – Holland CROSS LINK – UK and Holistic Child Development (HCDI), (KHN, Nagpur). As part of its effort to encourage local support, local sponsors for children have been identified as well as local fund raising of NSM staff. In addition there is an annual contribution of FMPB.

Publication

From August 2004 the Navajeevan Magazine is being issued as a bi-monthly under the name of 'Aatharam' in Tamil and quarterly periodical in English.⁷

Performance of NSM

NSM is serving the tribal and rural poor particularly the women and children in 10 Indian states through 61 development projects which serves around 7000 children for their total developments and 12379 families through its five core development programs called "Educational Development, Health Development, Youth Development, Women empowerment and Relief and rehabilitation. There are 353 staff working in NSM to bring its vision practical and true.⁸

Activities of Navajeevan Seva Mandal

With love and compassion for the weaker section of the society, particularly the children and women, NSM has implemented small and bigger level development programs. Navajeevan Seva Mandal maintained the following projects and programs during the year and has implemented the activities as detailed below:⁹

S.No.	Name of the program	No. of Projects
1	Residential child care projects	23
2	Child care in the community (CDC+CFCD)	13
3	Child care through day care centers	12
4	Medical and health care projects	5
5	Social welfare & HIV AIDS project	4
6	Educational projects	2
7	Vocational training centers	3
8	Agricultural development programs	2
Total projects		64

The mission statement of Navajeevan Seva Mandal promotes leadership through the socio-economic and spiritual transformation of the vulnerable to raise the healthy self-reliant and sustainable community.¹⁰

Social issues addressed by the society are:

- a) Arresting migration by improving livelihood options and sustainable income generation activities.
- b) Redeeming & rehabilitating children from child marriage and child abuse
- c) Rehabilitating the most vulnerable in the society (HIV/AIDS infected & affected)
- d) Removing illiteracy through formal and adult literacy education
- e) Restoring ethical life through Christian values based on Gods word
- f) Empowering the women through, training, exposure and Self Help group activities.
- g) Reducing poverty and its negative impacts through income generation programs
- h) Empowering the community through advocacy and awareness building.
- i) Preventing infant and mother mortality rate through health care & awareness programs
- j) Protecting mothers and children from malnutrition through nutritional supplements and health care training.¹¹

Residential child care program: Navjeevan Children Homes:

The society Maintained 23 Children's Homes during the year caring for 1920 Children (1275 Boys and 635 Girls).

Raising second generation leadership being the primary target of NSM ministries, children education is prioritized and children from the underprivileged communities are given educational supports through hostel facilities, special tuition centers, motivation and were taken for educational tour and exposure visits through which they got motivated for educational excellence that helped them to pursue higher education. Tribal Children who were viewed, good for nothing and have no IQ for education are now becoming school teachers, nurses police men, Engineers, pastors, missionaries and Govt. officers at various levels. Indeed it is the contemporary miracle. Also, the compassion of the missionaries who have denied their family welfare and lived among them to develop these underprivileged in their physical, mental, spiritual, social and political growth.¹²

Navajeevan Seva Mandal has worked hard and concentrated on raising and strengthening the second generations leadership which is the only hope that the tribal parents develop in their life that their children would get good education and one day they will become the leaders of their community and fight against the exploitation and polarization and bring hope to their impoverished society.¹³

Children's Health and Welfare

Health care is another area of concern of hostel projects since most of NSM home children come from very poor family backgrounds. Therefore the hostels give special importance for their health because health is another essential in order to expect mental growth. The children of Navajeevan Homes were given good facilities for recreation. They played football, hockey, cricket and other games in the evening.

Two medical checkups were provided to children in most of the hostels particularly in tribal locations where the risk of Malaria and other diseases are very high.¹⁴ The height and weight of the children were recorded in the months of June and December.

Children were given soap, oil and other toiletries regularly. Parents are also provided extra toiletries. Children specially are taught to keep all their belongings neat and clean. Two sets of uniform were given to the students during the reopening of schools for the academic year.¹⁵

Child Care in the Community (CFCD & CDP) 13 projects

Child focused Community Development Projects (3)

With the support of KNH and HCDI, NSM implement two community based child development project namely, i) Sayathri Hills CCD project, Dangs, Gujarat: 819 children; and ii) Ashray CCD project, Dharampur, Gujarat: 800 children; in which the children and women are mainly focused with the aim to enter into mainstream of life and to enhance the living standard of girl children who are neglected though they are recognized as the Home makers. Child rights, gender imbalance, bonded labour system, child labour system, male domination, ecological imbalance, health negligence and many other social issues that affects the tribal community particularly the children and women are mainly targeted and tackled through the partnership effort with the community, panchayat institutions and other NGOs who work in the vicinity.¹⁶

There are 4000 children taken care of through the community based CFCD and CDC projects located in 11 states of India. It is accepted by everyone that if the socio-economic condition of a family improves naturally the living condition of the child will be also desirable and the child gets sustainable support from the parents for its all-round growth.¹⁷

People were given awareness in number of issues which set the trend for development take off in terms of their living status and community participation.

More than 6000 tree saplings have been distributed by out involvement in 20 villages supported by HCDI in reducing the Global warming and intervening the ecological imbalance.

Child Development Centers (CDC 8)

S. No.	Name of the project	No. of children benefitted
1.	Navjeevan Bal phalaie Kendra, Budlada, Punjab	250
2.	Navjeevan Bal vikas yojana, karchond, Gujarat	243
3.	Karuna child development center, bedpan, Silvasa	264
4.	Navjeevan child development center, Shirahatti, Karnataka	240
5.	Hosajeevana child development center, shiggaon, Karnataka	181
6.	Navjeevan balvikas Kendra, devmogra, maharashtra	200
7.	Kirupa bal vikas yojana, hanvaachond, Gujarat	214
8.	Asha bal vikas kendrea, ratia, Haryana.	170
Total		1762

The NSM offers 8 child development centers in different parts of India. Children in these projects were provided nutritious food, educational support and spiritual counseling etc. though they were sent every day to sleep with parents, the child care including their health affairs have been taken care of by the project.¹⁸

Mother and Child Survival Projects (3)

This project has provided pre, neo and post natal care to 168 mothers in 35 villages located in very remote forest areas, being supported by Caruna Bal Vikas (CBV). Nearly 945 children are benefitted through Navajeevan day care centers located at different places like Delhi, Gujarat, Jharghand, Punjab and Tamilnadu.¹⁹

Medical & Health Care Projects (5 projects)

Realizing the health care need of the target villages and target communities particularly the rural and Tribal poor, NSM had been extending medical service since 1984 through,

- a) Health care clinics in remote and interior forest prone villages.
- b) Health awareness education through visual and folk drama medium.
- c) Villages Health workers training
- d) Health linkages with Government and NGO medical institution.

- e) Coverage's on pre-neo and post natal care.
- f) HIV/AIDS awareness and
- g) Associating with government and NGO medical institution on national health care programs.²⁰

About 8102 rural women and 2650 men from 87 villages in Shirahatti taluk Gadag district in Karnataka have been provided health awareness and health care network facilities through the national health awareness program launched by Rural Unit for Health And Social affairs (RUHSA), Vellore. Men and women were gathered in the PHCS and panchayat offices where the medical personals were invited to explain them the health facilities available under national health care scheme. NSM health care personals work as the liaison unit between the target community and Govt. Health care services. Govt. Doctors are invited to the clinics located in very remote villages. Awareness and counseling sessions were conducted for the children, adults and women separately that they would be freed from their superstitious beliefs.

Health coverage programs such as the national polio eradication program, malaria eradication program, mal nutrition program, care to pregnant women and babies area successfully carried out.²¹

Relief and Rehabilitation

NSM gets ready to serve children at risk, people in crisis, women in life danger and others affected due to natural calamities such as Tsunami, earthquakes, flood and so on. NSM raises funds and utilizes them through experts who volunteers or NSM staff in that particular region.²²

The society under took work of relieving the sufferings of people affected by the tsunami waves on the 26th December 2004 in partnership with IMA, Holistic Child Development India, Global Geneva, Salt and other organizations. The work was organized at two centers of Cudalore and Kovalam.²³

Social welfare & AIDS projects (4 projects)

During the year 2010-2011, these projects were implemented to concentrate on health, medical care, educational support, nutrition support, psycho, social support, social protection/economic strengthening, legal support and to give alternate care to fulfil the needs of children.²⁴

HIV/AIDS project in Delhi

Navjeevan Seva Mandal has started the CFCD project very early in 1997 based at Delhi with the help of Holistic Child Development india. NSM began to minister among the infected children providing them a home based care and support at Rohini. The project started with just a handful of affected and infected children, today it has expanded the support to more than 514 children.²⁵ They are regularly visited by our staff to provide them social security and counseling on education and personal health etc. 219 families (86 widows, 10

widowers and 123 parents) were supported through SHG programs so that they would get regular income through home based income generation activities which helps them to obtain medicines and food materials for their survival.

1. Children at Risk (HIV/AIDS) Project, Delhi.
2. Gnanajothi (HIV/AIDS) Project, Vellore, Tamilnadu.
3. Neerodai (HIV/AIDS) rehabilitation Project, Vellore, Tamil Nadu.
4. Support for the Leprosy and Blind, Sevoor, Tamilnadu.²⁶

About 25 HIV/AIDS infected women are given care and support through Neerodai project at Vellore. It provided opportunity to earn and care their family members through Paper production unit. They make medicine cover for Christian Medical College hospital.²⁷

Women who lost their hope in the society are given opportunity to rebuild their trust on God and to remove their trauma & Stigma through counseling and prayer. They are supported to earn their livelihood through small scale income generation program and hence they are able to regain their individual identity in the society where they have been neglected due to their sickness.²⁸

Leprosy and the Blind Friends Fellowship Meeting

Around 40 blinds, 35 handicapped and 45 lepers who have been begging on the streets were given an opportunity to meet each other once in every month. A common fellowship lunch was provided every time they met at Sevoor. Blind, leprosy and other disabled are attending the friends program at Sevoor.²⁹

Educational Projects

St. Stephen English Medium School of NSM, Selamba, Gujarat

English medium in education is becoming an inevitable stream because everyone would like to educate their children in English medium so that children would achieve better prosperity. Realizing this NSM started St. Stephen English medium school at Selamba, in Gujarat on 25.7.1998. It is a self supportive school through Navajeevan funds.³⁰ It has grown through the years and presently there are 600 children studying in the school. This school mainly started for the socio-economic development of the tribal people.³¹

Youth Development Programmes

Youth and life settlements

NSM offers to train youth on various subjects so that they do not fall prey into the hands of communal elements but be able to prove themselves as a reputed individual who are committed to care for their family and are dedicated to serve their society and the nation. To achieve this goal NSM extends vocational guidance, training and Financial support to underprivileged youth on

- a) Life skill and leadership skill education and training.
- b) Vocational and skill training.

- c) Youth groups & saving.
- d) Social and community action plans.
- e) Information assimilation and net working with working youth.
- f) Functional literacy.³²

Around 1655 youth are provided various training opportunities in different training institutes that they get some kind of employment opportunity by which they are able to help their families and to serve the community. 70% of the children who have completed Higher secondary education have pursued higher education's such as B.A, B.Th, B.Ed, B.Sc nursing, Dip. Nursing, poly technique etc and 30% have joined professional courses, vocational and ITI training. More than 15 students have got employed in reputed companies and NGO organizations.

In addition to skill and vocational training the young girls were given "Ghragani" training and the young boys were given life skill education. More than 90 youth have been supported to start their micro enterprises through which they can earn their living.³³

Theological Training Programme (2010-2011)

Interested youth were motivated to pursue theological education in Tamilnadu and Calcutta. The students who have completed biblical trainings have joined FMPB, CNI and other organizations where they earn good name through their hard work and commitment.

Vocational Training Projects

1. Navjeevan Tailoring training center at kattupadi, Vellore – 6
2. Navjeevan Tailoring training center velam, Ranipet – 6
3. Navjeevan Tailoring training center Denkanikottai – 60
4. Navjeesvan Tailoring training center Bramapuram – 18

Young women are given opportunities to learn tailoring as a skill to earn their living. Muslim girls who do not go outside their house in Denknikottai are able to attend the tailoring centers.³⁴

Women Empowerment and Self Help Groups

Self Helps groups have been initiated for the women in the interior villages with the primary aim to create awareness. Economic assistance is provided through SHGS for rearing goats and buying milch cows.³⁵ NSM gives priority to women and child development through comprehensive development activities such as:

- a) Women and literacy
- b) Women rights and child right awareness and assertions
- c) Women involvement in panchayat raj and political institutions.

- d) Women in family and community decision making
- e) Women self help groups & credit groups, thrifts and Banking.
- f) Micro level home based income generation programs

NSM is covering more than 20000 women and 6000 children through its development programs in 11 states. NSM would like to intervene with its development activities at least 50000 women and 10000 children by 2020 across the nation.³⁶

Impact of NSM

Primarily NSM became a catalyst among the downtrodden to organize themselves into a united people group. The following were the methodologies:

- a) To raise critical awareness: Through many awareness programmes of the situation of the oppression and exploitation in which they live. Their wealth of land, water, forests were taken by non-tribal population of towns and cities. They were dehumanized.
- b) Impart cultural education: To bring changes in their lifestyle
- c) Enable to realize their own strength- through unity, co-operation and organization to bring about growth and change in their lives as individuals and as a community.
- d) Enlighten them to change –NSM educated these people to change their negative self image so that they can feel proud of themselves and equal citizens of India.
- e) Encourage them to know about their various rights-on legal, social, political and above all about their human rights ,through the NSM'S various programmes and activities .
- f) Help and encourage them to organize themselves into youth groups and mahilamandals.

As a result, the people had undergone sea-changes in various spheres like Impact on their cultural- impact in their social life- impact in their economic life-impact in their educational life-impact in their religious life-and on their political life.

There are many mission organization like Navajeevan Seva Mandal involved in various types of social services. But involving in social action along with the social services is also very important. It means liberating people from different types of bondages, oppression and suppressions. These missions are successful as the people are liberated from their bondage of illiteracy ignorance, superstition, poverty, exploitation, bonded labor hood, indebtedness, and other social evils. Yet the country needs a lot more NGO's apart from the active role of the elected governments, to play a pivotal role in the upliftment of the poor and needy.

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Employee Engagement: Emerging Perception of Management vs. Employee

R. Aswini¹ and A. Lalitha²

¹MPhil. Scholar, Dept of HRM, St. Joseph's College (Autonomous), Tiruchirappalli
²Assistant Professor, Dept of HRM, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

The word engagement it is not simply commitment with job (or) work. But employee engaged with actual care about their performance, the clear view of future opportunity to improve self as well as to survive in the competitive business corporate. Today the emerging trend requires potential employee with highly skilled expertise. Organization will continue to be challenged. The level of business status in global, showing signs of recovery, which will create more opportunities for employers and employees. In this concept employee engagement, the employers' have to focus the important drives that motivate employees. If the management has high level of engaged workforce, that help to deal with challenge and improve engagement levels and that continues for the success in the future.

Why management needs employees want to be engaged?

Traditionally, the concept employee engagement has been with us for many years. The years of ego Gallup & other companies pioneered the concept of the "engagement survey". The roots of these employee engagement started in the late 1800s when "Fredrick Taylor, a pioneering industrial engineer, studied the attitude of the employees, brought a big impact in the productivity."¹ Even today also the employee's attitude and behavior reflect in the output. This belief emphasizes the importance to employee engagement with in organization.

Employee Engagement Model



Employee engagement at Emerging talent imperative, all business leaders face unprecedented challenges brought on macro-level economic, technical, demographic and social trends. These demand, availability of talent, changing requirements of the workforce from companies, and changing expectations of companies from the workforce. Many business leaders will need to revisit and set new strategies but they cannot effectively execute on what is required for future survival without people. Not just people, but engaged employees. Engaged employees invest their discretionary effort in the right behaviors to achieve future business objectives.

How engagement drivers motivate employee?

The organization engagement measures the level of employee engagement and the experience of employee across different aspects of the work environment. Today we have much survey measurement to identify which things make employee different. This information, referred to as impact analysis, identifies and prioritizes factors that drive engagement. This model identifies the primary or key drivers of engagement and the magnitude of expected improvement if action is taken. It also identifies the potential decline in engagement if key drivers are not maintained. For employers, improving the engagement level of specific drivers can improve overall employee engagement. For three consecutive years globally as well as across all regions, career opportunities have consistently ranked among the top three drivers positively impacting overall engagement levels. There will be various reasons for an employee to work in an organization. It may be for salary or because of the loyalty of the organization or status or the mission of the organization, the employees get impressed (Tiwari Shash, 2010).² Apart from these three, two more factors are there:

1. **Individual driver:** Individual or self-motivated means caring oneself accountable for one's decision and actions. The inner driver leads a person to do things with confidence and more effectively.
2. **Social driver:** the social driver can be either management or peer to peer encouraging mutually. This positive power of peer pressure is to engage each other, leads to desire engagement attitude and behaviors. Every organization work environment will differ according to the culture of the organization.

The role of emotional intelligence on employee engagement

Most often employee engagement has been defined as emotional and intellectual commitment to the organization (Baumruk, 2004; Richman 2006; Shaw, 2005).³ Affective commitment emphasizes the emotional connection employees have with their work and is analogous to the emotive qualities of engagement (Mackey & Schneider, 2008).⁴ Employees' emotional attachment with the organization is viewed as an indispensable factor in shaping commitment and loyalty which are outcomes of employee engagement (Ripades, Eisenberger & Armeli, 2001).⁵

The leader or management when they have high level of EQ is better to initiate and create a deep engagement among employee. If the less number of engagement, employee may be demotivated, which can lead to a high rate of employee turnover that is not fair for the wellbeing of the organization. Emotional intelligence is the primary driver to leadership. Every organization running under pressure meets competitive advantage. This pressure may lead leaders to behave hardly and get work from employee under the stress. This would definitely break the engagement of employee.

Perceptions on relationship between employee engagement and recognition of reward; there should be a connection between employee contribution and compensation paying them by management. When a small research was conducted in the year 2013 at Voltech Group, Power Engineering, HR services, among the fresh trainees in the company, it is noted that they all were very new to the company and they were placed at minimum remuneration. The first two months the performance was high and they contributed as much as possible. But after wards they tried of achieving target and they demotivated by remuneration. This situation continued for months. To improve employee engagement the HR department announced that there will be program conducted by event management department for sales promotion every month end. Those who can produce the best sales promotion will be encouraged by some amount of incentive. So every month employee worked effectively. This is a valuable effort the company has done on employee engagement especially with regard to the work effort and reward.

Current Common Barriers: Though employee engagement is felt everywhere as most essential there are still some barriers in the task.

Job Insecurity: The real impact of job insecurity can have the significant impact on employee engagement. When an employee truly engaged with organization, he/she can broadly say positive things about their organization to others. Similarly the job insecurity can have a direct impact on employee behavior, tell others negative things about the organization. Every employee feels that our job is secured with a steady income which helps to support family.

Unfairness: Today most of the MNCs facing a common problem like unfair promotion. The situation of unfair promotion definitely will lead an employee to look for other job. The perfect recognition of employee is to make them engaged with organization more close; otherwise the bottom line relationship will not be succeeded.

Less Number of Opportunity: The potential employee always seeks for the best opportunity. When the management not offers equal and continuous opportunity to high skilled employee, it reduces the level of engagement towards work performance.

Poor Management: Actually it's the responsibility of management to retain potential employee within organization. When management fail to support,

retain, motivate the employee, they may lose the potential workforce and so, and it will create a gap in the organization and it will be a time consuming process again to recruit and train another person. It is actually leads to loss of potentials on the other hand. Therefore, it is so needed that management should be effective enough to coordinate the workforce effectively.

Not right person to right place: In many organizations the employee will not be placed on the right place, for example, the employee highly knowledgeable with marketing department but the management placed him HR department for low income or for the purpose of filling empty place. This may lead to unrest and this will result in less performance among the workforce side.

Conclusion

Employee engagement emphasizes overall success of the organization. Employee engagement is becoming increasingly mainstreamed, it is still a young tool, and the effectiveness of different approaches varies widely. The organization implements and refines their employee engagement efforts, it is important that they continue to collect the kind of feedback and motivate them with correct recognition of rewards. The two way communication enhances the management and employee relationship with regard to commitment. To meet the corporate competitive advantage, the organization develops their work environment by providing various training, development program, orientation about modern trend. So that is can motivate employee to commit more effectively and hence the management can retain their high skilled employees.

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Research Trends in Commerce: A Citation Analysis of Ph.D. Theses Submitted to the Bharathidasan University, Tiruchirappalli

S. Arockiasamy¹ and M. Dorairajan²

¹Research Scholar, St. Joseph's College (Autonomous), Tiruchirappalli

²Librarian, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

The research performance evaluation systems revolve around the concept of quality. The purpose for evaluation research performance is to identify areas for improvement in the quality of research. Citation analysis is one among the several methods that have been proposed and used to complement the traditional research performance evaluation measures. A citation is a bibliographic reference or a footnote listed at the end of a paper. It expresses a connection between the citing document and cited document. The purpose of citation analysis is to evaluate and interpret those references in terms of the types of documents, authors, institutions and the subjects etc. The citations are an indicator of the use of previously published documents and the relative merit of the cited paper. The purpose of the present study is to explore the citation pattern of information resources referred in Ph.D. theses submitted in the discipline of Commerce at Bharathidasan University, Tiruchirappalli during 1986-2014.

Review of Literature

Review of related literature reveals the existence of a large number of bibliometric and quantitative studies on citation analysis of Ph.D. theses.

Chikate and Patil (2008) examined citations appended to 27 theses submitted to university of Pune in the discipline of library and information science during 1982 and 2005 and analyzed 6,257 citations. They found 42% of the citations journal articles. Three quarters of the journal articles were from LIS journals and the remaining from other 33 subject areas.

Arockiasamy and Dorairajan (2015) in their study they found that the Journal articles were most preferred source of citations. The most frequently cited journal was Journal of Indian History and Journal of History of Tiruchirappalli. The study covers 84 doctoral theses submitted to the Department of History in Bharathidasan University, Tiruchirappalli. This study will serve a purpose in the collection development policy of the library to cater the needs of the research scholars. The period of the study was 1988-2011.

Vallmitjana and Sabatywe (2008) used citation analysis as a tool for collection management in an academic chemistry library. The analysis covered 46 doctoral theses presented at the Institute Quimic de Sarria (IQS) from 1995 to 2003. The

results obtained from the 4,203 citations revealed that the most frequently used documents were scientific papers, which accounted for 79 percent of the total.

Kumar and Mallikarjun (2011) investigated citations of 49 doctoral dissertations submitted to Indian Institute of Management, Ahmedabad during the period 2004 to 2009. The study revealed that journals are the most cited sources.

Kumar and Reddy (2012) examined citations that were used in dissertations submitted to the department of Library and Information Science of the Sri Venkateshwara University, Tirupathi during the period 2000-2007.

Objectives of the Study

- To determine the principal forms of literature used in Doctoral theses submitted in Commerce to Bharathidasan University
- To understand the most productive guides and affiliating agencies in the subject of Commerce.
- To verify the authorship pattern in citations made, most frequently cited journals in the theses of commerce.
- To have a detailed analysis on citations used by the doctoral researches in the Bharathidasan University.
- To know the expected level of growth of literature for Commerce subject and its doubling time.
- To verify the geographical distribution of research in Commerce.

Need for the Study

The research and publication productivity in both print and electronic form has given quantitative jump in both Science and Humanities literature from the challenge to librarian to find better ways to access the different user requirements. Therefore the research and publication output is expected on further increasing trend in the universities publication and production of quality documents is possible with higher stands in different areas of arts and science disciplines.

Statement of the Problem

Citation analysis is one of the techniques that give potentially valuable information in the management of library resources. It is also very much useful to understand the knowledge structure in various subjects. The theme of the study is under the title “Research Trends in Commerce: A Citation Analysis of Ph.D. Theses Submitted to the Bharathidasan University, Tiruchirappalli”.

Methodology

The researcher began his study with the survey of details about the subject, title; guide, number of pages, journals cited, books referred etc. were extracted from each and every thesis in the subject of Commerce submitted and available in the Central library of the Bharathidasan University. Since the University is being the hub of affiliated institutions engaging in research and hence it is appropriate to do the study on the theses submitted to Commerce Department of

Bharathidasan University, Tiruchirappalli, and Tamil Nadu for his study. The study covers Ph.D. theses submitted in the subject of Commerce in Bharathidasan University for the award of doctoral degree.

The period of study ranges between to 1986 to 2014 to obtain the data to researcher went to the University Library and gone through the theses manually and noted the details of citations appended to each theses and the data was entered in work sheet and further the details were fed into the computer in MS EXCEL. Various attitude of analysis include the subjects, different types of documents used, the ranking of documents particularly journal on the basis of usage.

Scope and Limitations

From the establishment of Bharathidasan University, Tiruchirappalli in the year February 1982, with the encouragement of Government of Tamil Nadu to affiliate many colleges, the number of colleges today affiliated is 138. The growth results of Arts and Science colleges in Tiruchirappalli area, the enormous growth of research and development by productivity, submission of Ph.D. theses in quite large numbers. It is also found that majority of the colleges affiliated by this university. This university is having more research departments.

Hence the research output is impressive in these colleges. Since more number of theses are submitted the researcher limited his scope of the study by restrict to the research work done in Commerce only. The researcher has further depended upon the availability of the theses physically available in the library.

Analysis

A research publication in a university is of great importance to the promotion of further research. Counting, measuring, comparing qualitatively, analyzing quantitatively is perhaps the main tool of publication productivity. In the university, the output of research activities is subjected to evaluation in the present decade as a policy across the world. It is important to observe that the theses submitted to the Department of Commerce are comparatively higher than other departments.

Out of 360 theses submitted by the faculty and research scholars from the Department of Commerce from 1986 to 2014 was carried out. While referring the thesis uploaded in Shodhganga, INFLIBNET site it is found that 55 theses were uploaded in Commerce as on 19th August 2015. Among this, 48 theses each were submitted in the years 2011 and 35 these were submitted in the year 2010 and 33 theses were submitted in the years 2002, 2009 respectively. During the period of study only one thesis was submitted during the years 1986, 1991 and in 1994, 4 theses was indicated in the table for the year 2014 is due to the fact that the theses submitted after evaluation will be given to the University Library and many theses were awaiting for evaluation.

Table 1: Trend analysis and Doubling time of the Research Trends in Commerce

Year	No. of Thesis submitted	Cumulative records	W1	W2	R	Mean	DT	Mean DT
1986	1	1	-	0	0		0	
1987	1	2	0	0.69	0.69		1.00	
1988	1	3	0.69	1.09	0.40		1.73	
1989	1	4	1.09	1.38	0.29		2.38	
1990	1	5	1.38	1.60	0.22	0.32	3.15	1.65
1991	1	6	1.60	1.79	0.19		3.64	
1992	3	9	1.79	2.19	0.4		1.73	
1993	2	11	2.19	2.39	0.2		3.46	
1994	1	12	2.39	2.48	0.09		0.77	
1995	11	23	2.48	3.13	0.65	0.306	1.06	2.13
1996	3	26	3.13	3.25	0.12		5.77	
1997	2	28	3.25	3.33	0.08		8.66	
1998	7	35	3.33	3.55	0.22		3.15	
1999	13	48	3.55	3.87	0.32		2.16	
2000	7	55	3.87	4.00	0.13	0.174	5.33	5.01
2001	11	66	4.00	4.18	0.18		3.88	
2002	33	99	4.18	4.59	0.41		1.69	
2003	12	111	4.59	4.70	0.11		6.3	
2004	16	127	4.70	4.84	0.14		4.95	
2005	17	144	4.84	4.96	0.12	0.192	5.77	4.51
2006	14	158	4.96	5.06	0.10		6.93	
2007	25	183	5.06	5.20	0.14		4.95	
2008	19	202	5.20	5.30	0.10		6.93	
2009	33	235	5.30	5.45	0.15		4.62	
2010	35	270	5.45	5.59	0.14	0.126	4.95	5.67
2011	48	318	5.59	5.76	0.17		4.07	
2012	32	350	5.76	5.85	0.09		7.7	
2013	6	356	5.85	5.87	0.02	0.09	34.65	15.47
2014	4	360	5.87					
	360	360				1.20		34.44

The above table indicates the Relative Growth Rate and also the doubling time for further growth. It could be observed by the Relative Growth Rate for all the theses submitted in Commerce have decreased from 0.69 in 1986 to 0.02 in 2013, the mean Relative Growth Rate for the periods 1991 to 1995 and 2010 to 2013 are 0.30 and 0.09 respectively. The overall study period has witnessed a mean Relative Growth Rate as 1.20 Contrastingly the doubling time for research productivity in Commerce has increased from 1.00 in 1987 to 34.65 in 2013.

2013 the mean doubling time for research publication for the year 1990 was 1.65 and it has increased to 15.47 in the year 2013. In general the research output in Commerce has shown a declining trend as for as publications concerned inversely Doubling time has increased progressively.

Table 2: Ranking of Guides in Commerce

Guide Name	Thesis	Rank
Dr. Hariharan, (National College)	34	1
Dr. Shaik Mohamed (Jamal Mohammed College)	21	2
Dr. Rajkumar.S (Naina Mmohamed College)	17	3
Dr. Nazer.M (<i>Khadir</i> Mohideen College)	15	4
Dr. Sekar S (Urumu Dhanalakshimi College)	14	5
Dr. Srinivasan T (A V C College)	13	6
Dr. Subramani N (Urumu Dhanalakshimi College)	12	7
Dr. Nakiran S (TBML College)	11	8
Dr. Suriyamurthy (J J College of Engn. and Technology)	11	8
Dr. Mubarak Ali L (Jamal Mohammed College)	10	10
Dr. Frank Ratnakumar (Bharathidasan University)	9	11
Dr. Selvaraj V (Nahru Memorial College)	9	11
Dr. Victor Louis Anthuvan (St.Joseph's College)	9	11
Dr. Ganesan (Poompuhar College)	8	14
Dr. John G (St. Joseph's College)	8	14
Dr. Alexander Pravin Durai (St. Joseph's College)	7	16
Dr. Francis Gnanasekar (St.Joseph's College)	7	16
Dr. Mohamaed Mohideen M (<i>Khadir</i> Mohideen College)	7	16
Dr. Mohan S (SKSS Arts College)	7	16
Dr. Cristy Selvarani D (Urumu Dhanalakshmi College)	6	20
Dr. Joseph Xavier S (St.Joseph's College)	6	20
Dr. Savarimuthu(TBML College)	6	20
Dr. Seenivasan K (Bharathidasan University)	6	20
Dr. Selvachandran M (ADM College)	6	20

It is very important to understand the research guides who have guiding the scholars to complete their work within the period. The above table shown the guide wise distribution of PhD theses in the subject of Commerce Out of 360 theses submitted by the scholars 34 PhDs theses were guided by Dr.Hariharan of National College, occupying the first rank. Next to him Dr.Shaik Mohamed of Bharathidasan University helped his 21 scholars to submit the theses in this University occupying the Second Rank. Dr. Raj Kumar of National College, of the Department of Commerce have supervised and guided 17 scholars ranked in third position. Dr.Sekar guided 14 scholars and Dr. Srinivasan guided for 13 scholars were helped to complete their research work.

Table 3: Ranking of cited journals in Commerce

Journal Name	Theses	Rank
The Economic Time	52	1
Economic and Political Weekly	46	2
Southern Economist	31	3
Indian Journal of Agricultural Economics	28	4
Indian Development report	22	5
The Management Accountant	20	6
Indian Journal of Political Science	18	7
Yojana	13	8
Indian Co-operative review	11	9
Kurukshetra	11	9
Kisan World	11	9
Health Technology Assessment	10	12
International Journal of bank marketing	10	12
Journal of Productivity	10	12
Journal of applied psychology	9	15
Marketing Management	9	15
Indian Journal of Industrial relations	8	17
Journal of rural development	8	17
Journal of Marketing Management	6	19
Financial Management	6	19
Tourism policy	6	19
Transport Policy	5	20
The Hindu Survey	5	20
The Journal of Insurance	5	20

With reference to Bradford's law, most of the articles on a certain subject are published in a few numbers of journals. The analysis of the studied references reveals that core journals referred in most of the theses in Commerce are listed in the table. It is found that the maximum of 52 theses were used the citations in the journal, "Economic Times" occupied the first rank in the list. It is also found that Economic and Political Weekly was cited in 46 theses placed in the second rank. 31 theses were used the citations of the journal of Southern Economist occupied the third rank in the list of journals

Indian Journal of Agricultural Economics with the use of its articles in 28 theses was placed and occupied fourth rank. Indian Development Report and other journals are placed in few theses. It is inferred that 360 theses analyzed in the subject Commerce used only 20 core journals repeatedly in its citations. Thus the Bradford's law of scattering is proved.

Table 4: Author wise distributions of Citations in Commerce

S. No.	No. of Authors	No. of Citations	Percentage
1.	One Author	12144	53.55
2.	Two Authors	6521	28.55
3.	Three Authors	3124	13.77
4.	Four Authors	633	2.79
5.	Five Authors	132	0.58
6.	More than Five Authors	121	0.53
	Total	22675	100.00

It is obvious from the above table that single authored citations with 53.55 percent. Next to this, 28.55 percent of the citations were available in the two authors in the references of theses submitted in the Commerce department of Bharathidasan University. It is also found that 13.77 percent of the citations were made by three authors. Rest of the citations was made by more than three authors. To analyse the nature of researcher's participation in research activity, the author productivity is tested. In this context, the researcher aims at analyzing the degree of collaboration in the references cited in the theses submitted.

Table 5: Degree of Collaboration in Commerce

S. No.	No. of Authors	No. of Citations	Percentage	Cum
1.	Single Author	12144	53.55	53.55
2.	Multi Authors	10531	46.45	100.00
	Total	22675	100.00	

Various methods have been proposed to calculate the degree of research collaboration. Here in this study the formula proposed by Dr. Subramaniyam (1983) has been used.

$$\text{The Degree of collaboration } C = \frac{Nm}{Nm+Ns}$$

Where, C = Degree of collaboration

Nm = Number of multi authored papers in the discipline

Ns = Number of single authored papers in the discipline.

Here Nm = 10531

Ns = 12144

$$C = \frac{10531}{12144+10531} = \frac{10531}{22675} = 0.46$$

It is found that the nature of dominance of sole authorship over the joint authorship. Thus the degree of collaboration for the thesis submitted in the Department of Commerce, Bharathidasan University for the references made is analyzed.

Table 6: Form-wise distribution of Citations in Commerce

Document Type	Sum	%
Reference Book	16770	46.50
Conference Proceeding	1919	5.32
Government Report	3479	9.64
National Journal	7979	22.12
International Journal	4236	11.74
Thesis referred	1680	4.68
Total	36063	100.00

It is obvious from the above table that the books contribute the highest number of citations accounting for 46.50 percent. Indian Journals are the second highest group accounting for 22.12 percent. International Journals are the third highest accounting for 11.74 percent. Government Reports accounting for 9.64 percent in total citations is fourth place.

Table 7: Distributions of illustrations used in theses of Commerce

Document Type	Citations	Percentage
Tables	26736	78.03
Figures & Graphs	4759	13.89
Photos	744	2.17
Maps	2022	5.91
Total	34261	100.00

It is found from the table that maximum numbers of tables were used as the Illustrations made for analyzing the research theses in Commerce submitted in Bharathidasan University. The maximum of 78.03 percent of the Illustrations were explained through the tables. And next to this, 13.89 percent of Figures and graphical representations were explained. It is also found that 5.90 percent of the illustrations were made through the Maps attached in the theses. Only 2.17 percent of the theses were illustrating the details with Photographs.

Table 8: Chronological Distribution of Citations in Commerce

Year	No. of Citations	Percentage	Rank
1986-1995	3225	10.65	3
1996-2004	12101	39.96	2
2005-2014	14953	49.39	1
Total	30279	100.00	

The above table explains the chronological distribution of citations made in the PhD thesis submitted by the scholars in the Department of Commerce, Bharathidasan University. The total periods were divided in 3 different periods as 1987 to 1995, 1996 to 2004, and 2005 to 2014. Among the different periods most, of the references made during the period of 2005-2014 stood in first rank where 49.39 percent of the citations were published. Next to this 39.96 percent of the articles published and references were made during the period 1996 to 2004. Publications during the period of 1987 to 1995 with 10.65 percent of the references were made in the theses submitted in the Department of Commerce. It is inferred that the latest Publications were cited in the maximum number of (49.39%) Commerce Theses submitted.

Table 9: Geographical distributions of theses submitted in Commerce

Place	No. of theses	Rank	Percentage
Trichy	150	1	41.66
Tanjore	50	2	13.88
Tamilnadu	42	3	11.66
Chennai	15	4	4.16
Nagapattinam	11	5	3.05
Pondicherry	10	6	2.77
Karur	8	7	2.22
India	7	8	1.94
Pudukottai	7	8	1.94
Coimbatore	5	9	1.38
Poraiyar	5	9	1.38
Kerala	4	10	1.11
Kumbakonam	4	10	1.11

Geographical analysis of distribution of thesis provides information of the range of areas studied active in the field and their relative work. It was found in this present study that the maximum of 150 theses (41.66 percent) analyzed the various Commerce indicators of Trichy area ranked in first place. Next to this, 50 theses studied about the Thanjavur area occupies second place. Thesis concentrated on Tamilnadu ranks third place with 42 PhD theses.

Findings

- The study reveals that journal articles were the most preferred sources of citations.
- Authorship pattern indicates that single authored articles were cited mostly.
- Books published from India are more referred than the other countries.
- In the discipline of Commerce, St. Joseph's College, Tiruchirappalli and Bharathidasan University, Trichy is producing more number of Ph.D.s

- The mean relative growth rate for the theses submitted in Commerce is 1.20 and the mean doubling time is 34.44. There is an increasing trend in the productivity of Commerce research.
- It is obvious from the above table that the books contribute the highest number of citations accounting for 46.50 percent.
- It is found from the table that maximum numbers of tables were used as the Illustrations made for analyzing the research theses in Commerce submitted in Bharathidasan University. The maximum of 78.03 percent of the Illustrations were explained through the tables.
- It was found in this present study that the maximum of 150 theses (41.66 percent) analyzed the various Commerce indicators of Trichy area ranked in first place.

Conclusion

In this paper, an effort has been made to analyze the bibliographical details of the theses submitted to the Bharathidasan University, Tiruchirappalli. It is suggested that the University has to improve the infrastructure facilities and motivating the research scholars to produce more number of papers in reputed and peer reviewed journals and also to encourage them to submit their theses by completing the research work in time.

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On Cyclical Cauchy Sequences of Cyclically Proximal Sets

J. Maria Felicit and A. Anthony Eldred

PG & Research Department of Mathematics, St. Joseph's College, Tiruchirappalli

1. Introduction and Preliminaries

In [9] Rafael introduced the notation called proximally complete pair of subsets of a metric space, which weakens the notion of *UC* property and cyclical completeness introduced by Karpagam [5] in the theory of Best proximity points. In [9] the authors also shown that every pair of non-empty closed convex subsets of a uniformly convex banach space (or boundedly compact subsets of a metric space) is proximally complete. In [8] the cyclical proximal property says that if there exists $x_i \in A_i$ for $1 \leq i \leq p$ such that $x_i = x_{i+p}$ for all $i = 1, 2, \dots, p$ whenever $\|x_i - x_{i+1}\| = d(A_i, A_{i+1})$.

For a pair of subsets (A_i, A_{i+1}) , for $i = 0, 1, \dots, p-1$, where $A_p = A_0$.

Let $A_{i+1}^0 = \{y \in A_{i+1} : d(x, y) = d(A_i, A_{i+1}) \text{ for some } x \in A_i$
and $d(y, z) = d(A_{i+1}, A_{i+2}) \text{ for some } z \in A_{i+2}\}$

Definition 1.1

Let A_0, A_1, \dots, A_{p-1} be a non-empty subsets of a metric space X .

A sequence $\{x_n\}_{n \geq 0}$ in $\bigcup_{i=0}^{p-1} A_i$, with

$$x_1 \in A_1, \dots, x_{pn} \in A_p, x_{p(n+1)} \in A_1, \dots, x_{p(n+1)-1} \in A_{p-1}$$

for $n \geq 0$, is said to be a cyclical Cauchy sequence iff for each pair (A_i, A_{i+1}) and any $\varepsilon > 0$ there exists an $n \geq \mathbb{N}$ such that

$$d(x_{pk_1}, x_{pk_2+1}) < d(A_i, A_{i+1}) + \varepsilon \text{ for } k_1, k_2 \geq N.$$

Definition 1.2

The p -sets A_0, A_1, \dots, A_{p-1} of metric space is proximally complete iff for every cyclically Cauchy sequence $\{x_n\}_{n \geq 0} \in \bigcup_{i=0}^{p-1} A_i$, the sequence $\{x_{pn}\}, \{x_{p(n+1)}\}, \dots, \{x_{p(n+1)-1}\}$ have convergent subsequences in A_0, A_1, \dots, A_{p-1} respectively.

Definition 1.3

[6] Let (X, d) be a metric space and let A_1, A_2, \dots, A_p be non-empty subsets of X . If $T : \bigcup_{i=1}^p A_i \rightarrow \bigcup_{i=1}^p A_i$ is a p -cyclic non-expansive mapping, then $d(A_i, A_{i+1}) = d(A_{i+1}, A_{i+2}) = \dots = d(A_1, A_2)$ for $i = 1, 2, \dots, p$.

Definition 1.4

[8] The non-empty subsets A_1, A_2, \dots, A_p of a metric space X said to satisfy cyclical proximal property if there exists $x_i \in A_i$ for all $1 \leq i \leq p$ such that $x_i = x_{i+p}$ for all $i = 1, 2, \dots, p$ whenever $\|x_i - x_{i+1}\| = d(A_i, A_{i+1})$.

Lemma 1.5

[1] Let A be a non-empty closed and convex subset and B a non-empty and closed subset of a uniformly convex Banach space. Let $\{x_n\}$ and $\{z_n\}$ be sequence in A and $\{y_n\}$ be a sequence in B satisfying.

- i) $\|z_n - y_n\| \rightarrow d(A, B)$;
- ii) For every $\varepsilon > 0$ there exists $N_0 \in \mathbb{N}$ such that for all $m > n \geq N_0$, $\|x_m - y_n\| \leq d(A, B) + \varepsilon$. Then for every $\varepsilon > 0$, there exists N_1 such that $\|x_m - z_n\| \leq \varepsilon$ for all $m > n \geq N_1$.

Definition 1.6

[7] Let A and B be non-empty subsets of a metric space X . (A, B) is said to satisfy property UC iff whenever $\{x_n\}$ and $\{z_n\}$ are sequences in A and $\{y_n\}$ is a sequence in B such that $\lim_{n \rightarrow \infty} d(x_n, y_n) = d(A, B)$ and $\lim_{n \rightarrow \infty} d(z_n, y_n) = d(A, B)$, then $\lim_{n \rightarrow \infty} d(x_n, z_n) = 0$.

Lemma 1.7

Every cyclical Cauchy sequence is bounded.

Proof

Let $\{x_n\}_{n \in \mathbb{N}}$ be a cyclical Cauchy sequence in $\bigcup_{i=0}^{p-1} A_i$. Therefore, there exists $N \in \mathbb{N}$ such that

$$d(x_{pn}, x_{pN+1}) < d(A_i, A_{i+1}) + 1, \text{ for all } n \geq N.$$

Therefore, $x_{pn} \in B(x_{pN+1}, r)$ for all $n \geq N$, where

$$r = \max \{d(x_p, x_{pN+1}), d(x_{2p}, x_{pN+1}), \dots, d(x_{pN}, x_{pN+1}), d(A_i, A_{i+1}) + 1\}$$

Then $d(x_{pn}, x_{pN+1}) \leq r$ for $n \in \mathbb{N}$.

Which implies $\{x_{pn}\}$ is bounded.

Similarly $\{x_{p(n+1)}\}, \{x_{p(n+2)}\}, \dots, \{x_{p(n+1)-1}\}$ are also bounded.

2. Main Results

Theorem 2.1

Let (A_i, A_{i+1}) be a proximally complete pair in a metric space X . Therefore A_i^0 is non-empty iff there exists a cyclical Cauchy sequence in $\bigcup_{i=0}^{p-1} A_i$.

Proof

Let $\{x_n\}$ be a cyclical cauchy sequence: then there exist $x_{pn_k}, x_{pm_k+1}, x_{pi_k+2}, \dots, x_{p(jk+1)-1}$ convergent subsequences of $x_{pn}, x_{pn+1}, x_{pn+2}, \dots, x_{p(n+1)-1}$ converging to $x_0 \in A_0, x_1 \in A_1, x_2 \in A_2, \dots, x_{p-1} \in A_{p-1}$ respectively. Hence

$$d(A_0, A_1) \leq d(x_0, x_1) = \lim_{k \rightarrow \infty} d(x_{pn_k}, x_{pm_k+1}) = d(A_0, A_1)$$

and

$$d(A_1, A_2) \leq d(x_1, x_2) = \lim_{k \rightarrow \infty} d(x_{pm_k+1}, x_{pi_k+2}) = d(A_1, A_2)$$

Therefore $x_1 \in A_1^0$.

Similarly $x_i \in A_i^0$ for all $i = 0, 1, \dots, p-1$.

Theorem 2.2

Let A_0, A_1, \dots, A_{p-1} be subsets of a metric space X . If (A_i, A_{i+1}) is proximally complete, then $A_i^0, i = 0, 1, \dots, p-1$ are closed subsets of X .

Proof

Let $x_n^1 \in A_1$ such that $x_n^1 \rightarrow x \in X, x_n^2 \in A_2, \dots, x_n^p \in A_p, x_n^{p-1} \in A_{p-1}$ such that

$$d(x_n^1, x_n^2) = d(A_1, A_2), d(x_n^2, x_n^3) = d(A_2, A_3), \dots, d(x_n^{p-1}, x_n^p) = d(A_{p-1}, A_0)$$

For $n \in \mathbb{N}$,

$$y_n = \begin{cases} x_m^1, & \text{for } n = pm + 1 \\ x_m^2, & \text{for } n = pm + 2 \\ \vdots \\ x_m^p, & \text{for } n = pm \end{cases}$$

Then

$$\begin{aligned} d(y_{pn}, y_{pm+1}) &= d(x_n^p, x_m^1) \\ &\leq d(x_m^1, x) + d(x, x_n^1) + d(x_n^1, x_n^p) \end{aligned}$$

which tends to $d(A_0, A_1)$ and

$$\begin{aligned} d(y_{pn+1}, y_{pm+2}) &= d(x_n^1, x_m^2) \\ &\leq d(x_n^1, x) + d(x, x_m^1) + d(x_m^1, x_m^2) \end{aligned}$$

which tends to $d(A_1, A_2)$, as $m, n \rightarrow \infty$.

Hence $\{x_n\}$ is a cyclical Cauchy sequence. Since (A_i, A_{i+1}) is proximally complete, $\{x_n^1\}, \{x_n^2\}, \{x_n^3\}, \dots, \{x_n^{p-1}\}, \{x_n^p\}$ have convergent subsequences which converges to $x_1 \in A_1, \dots, x_{p-1} \in A_{p-1}, x_p \in A_p$ respectively.

Hence $x = x_1$, so $d(x_0, x) = d(A_0, A_1)$ and $d(x, x_2) = d(A_1, A_2)$ which implies A_1^0 is closed. Similarly A_i^0 for $i = 0, 1, \dots, p$ are closed.

Theorem 2.3

Any non empty, closed and convex pair (A_i, A_{i+1}) in a uniformly convex Banach space is proximally complete. Furthermore, for any cyclical Cauchy sequence $\{x_n\}$, sequences $\{x_{pn}\}, \{x_{pn+1}\}, \{x_{pn+2}\}, \dots, \{x_{p(n+1)-1}\}$ converges to $x_0, x_1, x_2, \dots, x_{p-1}$ respectively, with $d(x_0, x_1) = d(x_1, x_2) = d(x_2, x_3) = \dots = d(x_{p-1}, x_p) = d(A_i, A_{i+1})$.

Proof

Let $\{x_n\}$ be a cyclical Cauchy sequence in $\bigcup_{i=0}^{p-1} A_i$. Suppose $\{x_{pn}\}$ is not a Cauchy sequence. Therefore, there exists $\epsilon_0 > 0$ and subsequences $\{x_{pnk}\}$ and $\{x_{pmk}\}$ of $\{x_{pn}\}$ such that $d(x_{pnk}, x_{pmk}) \geq \epsilon_0$ for all $k \in \mathbb{N}$.

One can also observe that

$$d(x_{pnk}, x_{pk+1}) \rightarrow d(A_0, A_1) \text{ and } d(x_{pmk}, x_{pk+1}) \rightarrow d(A_0, A_1) \text{ as } k \rightarrow \infty.$$

Recalling Lemma 1.5, we reach the contradiction that there exist $N_1 \in \mathbb{N}$ such that $d(x_{pn_k}, x_{pm_k}) < \varepsilon_0$ for all $k \geq N$.

Hence $\{x_{pn}\}$ converges to a point $x_0 \in A_0$.

Similarly $x_{pn+1} \rightarrow x_1 \in A_1, x_{pn+2} \rightarrow x_2 \in A_2, \dots, x_{p(n+1)-1} \rightarrow x_{p-1} \in A_{p-1}$

and that

$$d(x_0, x_1) = \lim_{n \rightarrow \infty} d(x_{pn}, x_{pn+1}) = d(A_0, A_1);$$

$$d(x_1, x_2) = \lim_{n \rightarrow \infty} d(x_{pn+1}, x_{pn+2}) = d(A_1, A_2);$$

$$\vdots$$

$$d(x_p, x_{p-1}) = \lim_{n \rightarrow \infty} d(x_{pn}, x_{p(n+1)-1}) = d(A_0, A_{p-1}).$$

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Growth, spectral, optical and thermal properties of nonlinear optical sodium *para*-nitrophenolate dihydrate single crystals

S. Selvakumar and A. Leo Rajesh

Department of Physics, St. Joseph's College (Autonomous), Tiruchirappalli

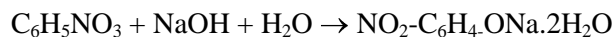
1. Introduction

Nonlinear optical (NLO) materials play a vital role in fast developing fields, such as photonics and optoelectronics [1]. The organic crystals have large nonlinearity but they have poor mechanical and thermal stability [2]. Inorganic crystals have excellent mechanical and thermal properties but possess relatively modest optical nonlinearity because of the lack of extended π -electron delocalization [3]. Due to the above reason, investigations have been made on semi organic crystals which have combined properties of both organic and inorganic crystals and it is more suitable for device fabrication. The organic ligand (nitrophenoxy ion) is ionically bonded to the metal ion (inorganic host) to impart improved mechanical and thermal properties [4]. In semi-organic compounds, metal centers can act as both donors and bridging moiety in D- π -A system [5]. The metal-ligand bond is expected to display large molecular hyperpolarizability due to the transfer of electron density between the metal atom and the conjugated ligand system [6]. Hence, investigations have been made on semi-organic crystals that have both organic and inorganic properties which is more suitable for device fabrication [7]. During the past few decades, researchers have shown much interest in the nitro phenol family of crystals due to their intensive applications in the field of opto-electronics [8]. *Para*-nitrophenol is found to be a best proton acceptor for the metallic hydroxide complexes [9]. The crystal structures of sodium *para*-nitrophenolate dihydrate single crystal were reported by Minemoto *et al* [10]. In the present work, we have report that the synthesis and growth properties of sodium paranitrophenolate dihydrate single crystal. The grown crystal is subjected to powder X-ray diffraction analysis, DRS-UV analysis, FTIR, Micro-Raman spectral studies, TG-DTA and SHG studies.

2. Experimental

2.1 Synthesis of material

The analytical grade *para*-nitrophenol and sodium hydroxide were taken in stoichiometric ratio of 1:1 and the chemical reaction is given below:



The purity of the synthesized salt was further increased by successive recrystallization process using double distilled water. The resultant solution was completely stirred to obtain a homogenous solution and filtered using Whatman filter paper and kept it in a beaker for slow evaporation. The yellow color

crystal of dimensions with $10 \times 5 \times 2.4 \text{ mm}^3$ was obtained after a period of 20 days and the photograph of the as grown crystal is shown in Figure 1.

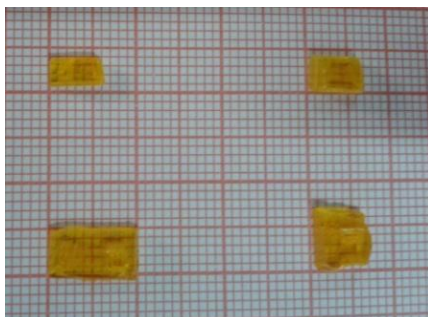


Fig. 1: Photograph of as grown NPNa crystal3. Characterization

X-ray diffraction pattern of the grown crystal was recorded by D8 Advance X-ray diffractometer with Cu $K\alpha$ radiation ($\lambda = 1.5406 \text{ \AA}$) and operated at 40KV and 100 mA. The optical measurements were carried out by recording the transmission and absorbance spectra of the samples using Perkin- Elmer lambda 950, double beam UV-visible spectrophotometer. The presences of various functional groups are collected by FTIR spectrum using Bruker-Vertex 70 spectrometer. The Micro-Raman of the NPNa crystal was recorded for the wavelength region of $400\text{-}1100\text{cm}^{-1}$ using Jobin -Yvon Horibia (LABRAM-HR-800) spectrometer, which uses Ar^+ laser (488 nm wavelength, 10mW power) as excitation source. Thermal properties of grown crystals were studied by using the instrument SDT Q600 V20.9 BUILD 20. The second harmonic generation (SHG) efficiency test was performed by Kurtz-Perry powder technique.

4. Results and Discussion

4.1 Powder X-ray diffraction

The X-ray diffraction pattern of the sodium *para*-nitrophenolate dihydrate crystals are shown in Figure 2(a) and (b) using water and methanol respectively.

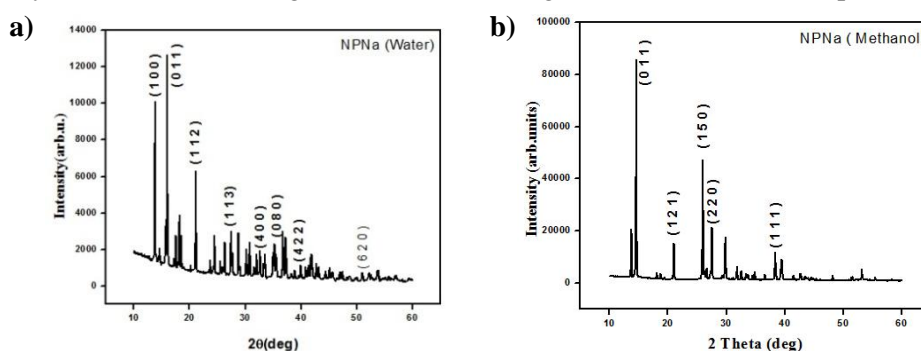


Fig. 2. Powder XRD pattern of NPNa crystals (a) Water and (b) Methanol

The sample was scanned over the 2θ range between 10° and 60° at a scan rate of $1^\circ/\text{min}$. The 2θ values and corresponding X-ray intensities diffracted by various planes are observed. The well-defined peaks reveal that the grown crystals are of good crystalline quality. The obtained lattice parameters that are shown in table 1 and confirms of that the grown crystals belong to orthorhombic system with the space group $Ima2$ and are consistent with the results reported using the single crystal X-ray diffraction. These data are in good agreement with the earlier reported data [2].

Table 1: Lattice parameter values of sodium *para*-nitrophenolate dihydrate crystal

Lattice parameter	a (Å)	b (Å)	c (Å)
Reported [2]	6.8920	19.6920	6.4390
Calculated (water)	6.8826	19.7249	6.4547
Calculated (Methanol)	6.8510	19.7817	6.3701

4.2 DRS –UV spectral studies

The UV analysis of grown single crystals was carried out between 200 and 2200nm using DRS-UV-Visible spectro-photometer. The absorption and transmittance spectra obtained are shown in figure 3 (a) and (b). When the absorbance is examined from longer to shorter wavelength, enhanced absorption is observed between 1400 and 2000 nm.

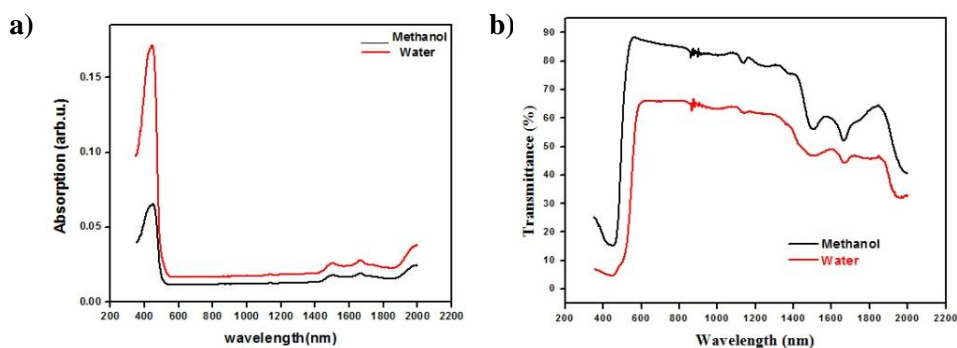


Fig. 3. The DRS-UV spectrum of NPNa crystals
(a) Absorption (b) Transmittance

The absorptions in these regions are due to overtones of some fundamental vibrations of *para*-nitrophenolate. Between the visible regions the material is observed to be highly transparent and important for crystals possessing NLO properties. The lower cut-off wavelength of the crystal in which the transmittance falls to zero is found to be at 492 nm [11].

4.3 FTIR spectral analysis

The FTIR spectrum of sodium *para*-nitrophenolate dihydrate single crystal recorded between 450 and 4000 cm^{-1} using the KBr pellet technique by a bruker, vertex 70 FTIR spectrometer and the resultant spectra are shown in Figure 4 (a) and (b) using water and methanol respectively. The broad band at 3253 and 3293 cm^{-1} corresponds to O-H stretching mode of vibration respectively. The C=O stretching vibrations were absorbed at 1851 cm^{-1} in both water and methanol spectrum.

The peaks at 1479 and 1470 cm^{-1} represent aromatic ring skeletal vibrations. The presence of NO_2 stretching vibration is observed at 1305 cm^{-1} . The band at 844 and 854 cm^{-1} corresponds to C-H in-plane bending. The hydrate of sodium metal ion in the lattice of the crystal is found below 500 cm^{-1} [12-15].

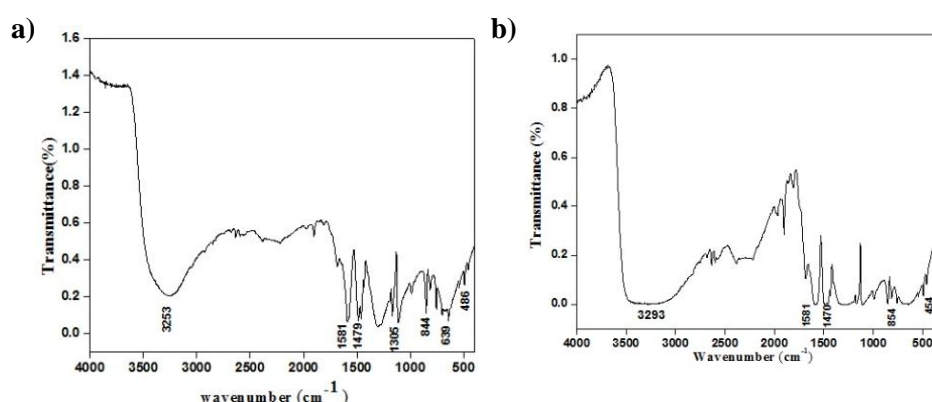


Fig. 4. FT-IR spectrum of NPNa single crystals. (a) Water (b) Methanol

4.4 Micro-Raman analysis

To confirm the various functional groups of the Micro-Raman spectrum of the grown sodium *para*-nitrophenolate dihydrate single crystal have been carried out in the wavelength region of 400-1100 cm^{-1} using Jobin -Yvon Horibia (LABRAM-HR-800) spectrometer, which uses Ar^+ laser (488 nm wavelength, 10mW power) as excitation source. The room temperature Micro-Raman scattering results of NPNa single crystal is shown in Figure 5.

The observed band at 844 and 854 cm^{-1} shows the C-H deformation that Benzene ring containing two adjacent H atoms. The C-OH stretching vibrations were absorbed at 1116 and 1117 cm^{-1} .

The peak at 1581 and 1589 cm^{-1} represents NO_2 stretching vibration. The presences of aromatic ring skeletal vibrations are observed at 1591 and 1596 cm^{-1} . The excitation wavelength of sodium atom is confirmed by the band at 390 and 395 cm^{-1} [16-17].

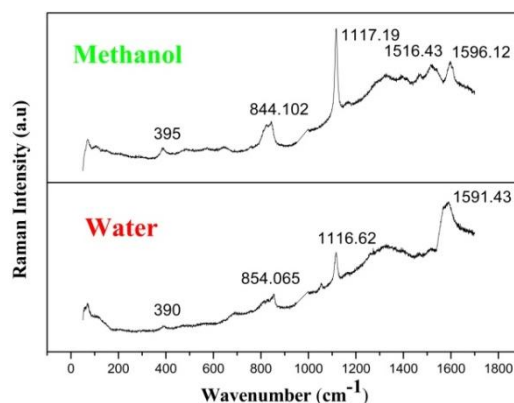


Fig. 5. Micro-Raman spectrum of NPNa single crystals

4.5 Thermal analysis

TGA and DTA analysis of NPNa crystal was carried out between room temperature and 400 °C at a heating rate of 10°C/minute in the nitrogen atmosphere using the instrument SDT Q600 V20.9 BUILD 20.

The respective thermogram (TG-DTA and DSC) curves are given in Figure 6.

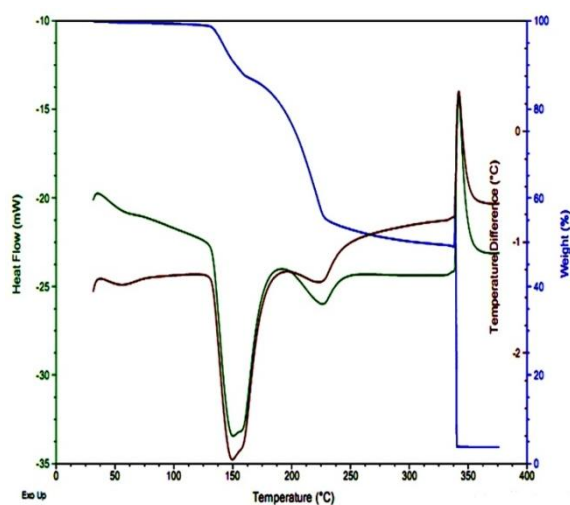


Fig. 6. TG-DTA-DSC curve of NPNa

The TGA curve of NPNa crystal reveals that there is a weight loss of 34% between 137.5 and 231.25°C in the TGA curve coincide with the endothermic DTA peak at 150°C. This could be attributed to the loss of lattice water. Another sharp and major weight loss of 40% occurs at 337°C confirms the sharp exothermic peak at 338°C indicating the complete decomposition of

the material. The thermal analysis of NPNa indicated that there is no phase transition. Hence NPNa crystal can be exploited for device fabrication between room temperature and 137°C.

4.6 Second harmonic generation

The experiment of second harmonic generation efficiency was performed using Kurtz-Perry powder technique [18] with Nd: YAG laser source of Wavelength 1064 nm. The grown crystal of NPNa crystal was crushed to fine powder. A high intensity laser radiation was passed through the sample. The SHG was confirmed by the emission of green radiation. The intensity of the SHG output was compared with that of KDP. The SHG efficiency of NPNa crystal was 1.2 times that of KTP.

5. Conclusion

Good optical quality crystal of sodium *para*-nitrophenolate dihydrate having dimensions of $10 \times 5 \times 2.4 \text{ mm}^3$ have been grown successfully with in a period of 20 days by slow evaporation technique. Lattice parameters were evaluated by powder X-ray diffraction technique which has confirmed that the grown crystal belongs to the orthorhombic crystal with space group *Ima2*. The optical study shows that NPNa single crystal was optically transparent in the entire visible and near IR region with lower cut-off wavelength 492nm. The FTIR and Micro-Raman spectrum confirmed the functional group presence in the compound. TG-DTA and DSC studies reveal that the NPNa crystals have good thermal stabilities. The SHG efficiency of the grown NPNa single crystal was 1.2 times greater than that of KTP crystals. Owing to its transparency, molecular strength and noncentrosymmetric structure, NPNa crystal is considered as a promising material for NLO applications.

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Indoor Radon and Annual Effective Dose in Dwellings in Tiruchirappalli City, Tamilnadu, India

R. Hariprasath and A. Leo Rajesh

Department of Physics, St. Joseph's College (Autonomous), Tiruchirappalli

Introduction

The natural back ground radiation comes from the primordial radionuclides present on earth, forms the terrestrial component and radiation from cosmic rays are the extra-terrestrial ones that prevails everywhere [1]. More than 3.5 billion years ago, the natural background radiation was three times greater than the present level [2]. The natural material such as sand, soil, cement, bricks etc., are used for the construction purposes that have different amount of radioactive isotopes [3]. Long and short exposure of radiation causes health issues in human beings. Of these radiations, alpha particles are considered to be more carcinogen than gamma radiations [4]. ^{222}Rn , a daughter product of ^{226}Ra which is also a daughter product of $^{238}\text{Uranium}$, a long lived alpha emitter contribute nearly 50 % of radiation to the living organisms [5]. The daughter products of radon (^{222}Ra) a short lived gas (3.825 days) decays to ^{214}Po , ^{214}Pb , ^{214}Bi and ^{218}Po causes respiratory problem through inhalation [6, 7]. Radon as an inert gas in the environment is naturally present in the atmosphere, soil and dissolved forms in water [8]. The assessment of population exposure to the radon gas present naturally in the building materials provides us the information of the radionuclides present in the environment. The source of indoor radon is mainly due to the soil construction material, its topography, characteristics of the soil and climatic conditions [9]. The concentration of radon gas depends on the rate of diffusion in soil and air and may vary with time both diurnally and seasonally [10]. Radon gas enters the dwelling by convection via utility access points, cracks and openings. The amount of radon is due to the presence of radionuclides in the surrounding environment such as ventilation, topography of the buildings, sanitary fittings etc., there would be a considerable amount of radiation in low ventilation areas [11,12].

A numerous work had been done for the estimation of radon gas from buildings materials like sand, soil, bricks, cement etc. Rocks are the poor emitters of radon gas except granite that has an emanation factor of greater than 10% of other materials but very low for tiles and clay bricks baked under high temperature [13]. The lung cancer is caused mainly due to the indoor radon gas next to smoking [WHO, 2003] and the national reference level of radiation was 200 Bq m^{-3} [14]. Since the exposure of radon to the public in residential buildings provides evidence that the lung cancer can be commonly found at even at low radon levels and hence the reference level was reduced to 100 Bq m^{-3} [WHO, 2009]. Radon and its progenies deposit on the bronchio-pulmonary tree as solids causing cancer [15]. Based on the health effects of

radon and its progenies an environmental monitoring is done in the city of Tiruchirappalli, Tamil Nadu, India using LR-115, Type II, Dosirad films.

Materials and methods

SSNTD (Solid State Nuclear Track Detector) is an effective tool to measure the aerosols by track density. LR- 115, a non-strippable film of 12 μm red cellulose nitrate is (high energy alpha particle between 2-4 MeV causes tracks in the film) pasted on to a 100 μm clear inert polyester base is used in the experiment. The Dosirad, type II, LR-115 films were cut to a size of 1x1 cm^2 . These films were attached to a cardboard to be exposed to the environmental radiation and was made to hang at a distance of 1m from the walls and ceiling so as to avoid the direct exposure of radiation from the construction materials. They were hung for a period of three months and left undisturbed. The alpha particle in the air causes a localized damage to the molecular structure of cellulose nitrate. The films were then etched with 2.5 N of NaOH solution maintained at a temperature of 60° C for about 90 minutes. They were washed with distilled water to remove the colloids struck on the sheets. Under careful observation the film is separated from polymer sheet and the subjected to a spark counter (PSI-SCD). The counts in the spark counter gave the number of tracks formed by the alpha particle.

Study area

Tiruchirappalli city being the fourth largest municipal corporation in Tamil Nadu has a population of 847,387 (2011, census). The measurement of radiogenic gases were done by using SSNTD films in the dwellings of the city. All the samples were hung in the first floor of the buildings in living rooms. The buildings were of concrete flooring and some of the roofing were of concrete and asbestos sheets. The raw materials used for the construction of the dwellings were obtained from the surroundings and the sand from the Cauvery river beds. The houses had a normal ventilation condition. The film was hung at 21 different dwellings in the city and was left undisturbed for a period of three months.

Results and discussion

The study of radon and its progenies that is present naturally in the environment and its distribution makes us to predict the amount of radiation exists in the surroundings. The buildings materials in the dwellings too contribute to the radon gas inside the room. The poaching of aerosols in air is an important factor as it causes mutations in DNA of living organisms. Table 1 shows the concentration of radon and annual effective dose rate of radon and its progeny in the dwellings of Tiruchirappalli city, Tamilnadu, India. 21 places have been selected in the city and SSNTD films were hung for a period of three months and the films are etched and counted using spark counter.

From the track density, the concentration of radon was calculated using the sensitivity factor of radon and it was determined from controlled experiments

and found to be $0.020 \text{ Tr cm}^{-2} \text{ d}^{-1} (\text{Bqm}^{-3})^{-1}$. The concentration of radon and its progeny is calculated from the equation 1.

$$C_r (\text{Bqm}^{-3}) = T_m / (d \times S_m) \quad (1)$$

where C_r is the concentration of radon, T_m be the track density in the cellulose nitrate film, d is the exposure time of the films in the environment and S_m be sensitivity or calibration factor of the membrane. The concentration of radon gas and its progenies ranges from 10.50 Bqm^{-3} to 32.70 Bqm^{-3} with an average of 23.39 Bqm^{-3} . The concentration of aerosols is high at the location site S19 which is due to poor ventilation. The variation of values in the city at the spots are given in Table 1.

Table 1. Indoor radon levels and annual effective dose rate in Tiruchirappalli city dwellings

S. No.	Indoor Concentration (C_r) (Bq/m^3)	Annual Effective dose (mSv)	EEC_{Rn} (Bq/m^3)	PAEC (mWL)
S1	19.44	0.48	7.77	0.62
S2	21.66	0.54	8.66	0.69
S3	28.33	0.71	11.33	0.9
S4	15.00	0.37	6.0	0.48
S5	13.88	0.34	5.55	0.44
S6	32.70	0.82	13.08	1.04
S7	17.70	0.40	7.08	0.56
S8	21.66	0.54	8.66	0.69
S9	10.50	0.26	4.20	0.33
S10	19.44	0.48	7.77	0.62
S11	22.73	0.57	9.09	0.72
S12	32.38	0.81	12.95	1.03
S13	27.52	0.69	11.0	0.88
S14	21.94	0.55	8.77	0.71
S15	26.73	0.67	10.69	0.85
S16	18.27	0.46	7.30	0.58
S17	32.65	0.82	13.06	1.04
S18	27.54	0.69	11.01	0.88
S19	33.71	0.84	13.48	1.06
S20	17.62	0.44	7.04	0.56
S21	29.80	0.75	11.63	0.96
Maximum	32.70	0.82	13.08	1.06
Minimum	10.50	0.26	4.2	0.33
Average	23.39	0.58	9.35	0.74

The range of distribution varies due to the type of flooring and the ceiling of the dwellings and also the place where it was hung. The annual effective dose (AED) due to radon and its progeny in the houses of study area was calculated

from the radon concentration to assess the variability of expected radon exposure to the public. The amount of aerosols depends on the temperature and the climatic conditions. AED is calculated from the Equation 2.

Annual Effective Dose =

$$C_r (\text{Bq m}^{-3}) \times 0.09 \times 7000 \text{ h} \times 40 \text{ nSv (Bq h m}^{-3})^{-1} \quad (2)$$

where C_r is the average concentration of radon in the study area and 0.46 be the equilibrium factor for radon and its progenies for Indian dwellings. The annual effective dose rate varies from 0.26 mSv to 0.82 mSv. The average annual effective dose is 0.58 mSv which is low compared to the standards. An effective dose rate of 3-10 mSv has been proposed by ICRP and a range from 200 to 600 Bq m^{-3} for the action level of radon activity [17]. The present study had been compared with the indoor levels of radiation from the states Haryana, Kerala, Uttar Pradesh, Rajasthan, Punjab, Uttaranchal and Arunachal Pradesh in India and the values obtained from the present work lie below the range [11,16,19]. Potential alpha energy concentration is the sum of the potential energy of all the daughter atoms present in a unit volume of air. The inhalation exposure to individuals is expressed by potential alpha energy exposure and is given by the equation

$$C_p (\text{WL}) = T_m / K T (\text{mWL}) \text{ milli Working Levels} \quad (3)$$

where C_p is the potential alpha energy exposure, T_m be the track density, K is the calibration factor and was taken as $625 \text{ Tr Cm}^2 \text{ d}^{-1}$ per WL. The values lies between 1.06 mWL and 0.33 mWL with an average of 0.77 mWL

Equilibrium equivalent radon concentration (EEC_{Rn})

It depends on the activity concentration of radon (A_{Rn}) and short lived radon daughter products. EEC_{Rn} is the concentration of radon for which the daughter products are in equilibrium and might also have the same potential alpha energy as the actual radionuclides in the atmosphere and is given by the relation [17]

$$EEC_{Rn} = F. A_{Rn} \quad (4)$$

where F is the equilibrium constant and for indoor air the range is assumed to be 0.3-0.6, the mid value of 0.4 is taken in the reported values [18]. The values obtained for different locations in the city is given in table 1.

Conclusion

The radon concentration was measured in dwellings in Tiruchirappalli city, Tamilnadu, India. The concentration of radon and the annual effective dose are in safe limits and ventilation in the dwellings play a major role in the radon concentration. Apart from this, other factors like flooring, roofing and man-made materials present in it too contribute to the radon concentration. The observed doses are below the recommended limits and hence the radiation doesnot pose any significant causeto the livings beings. Hence the values obtained are of safe from health hazard from the radium point of view and the values can be used as a baseline data in the study area.

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Building a Price Predictor for an Auctioning Website

C. Muthu¹ and M. C. Prakash²

¹Associate Professor, Dept of Statistics, St. Joseph's College, Tiruchirappalli

²PG Student, Bharathidasan Institute of Management, Tiruchirappalli

1. Introduction

The Techniques that are related to Big Data Analytics have great impact on the productivity and profitability of big Organizations^[1]. The Hadoop ecosystem is now extensively used for successfully implementing the advanced statistical algorithms on the big data ^[2]. The preferable approach for determining the price predictor for an item is to find a few of the most similar items and assume that the prices will be roughly the same. By finding a set of items similar to the item that interests us, the K-nearest Neighbours algorithm can average their prices and make a guess at what the price should be for this item.

2. Data needed for Study

Shalom InfoTech is at present developing an Auctioning Module for its UK-based Client Sherwood Tinnings. The data needed for predicting the prices of Artifacts auctioned by Sherwood Tinnings through its website were collected from its customers by way of conducting an online survey. The data thus collected were made available by Shalom InfoTech for analyzing through an XML-based API. This API was used to perform item searches and get detailed item information. The XML-based API provided by Sherwood Tinnings website required sending of values of appropriate parameters in XML format for every request. The API returned an XML document that could be parsed with the *parseString* function from the *minidom* library. The Python function *sendRequest* was written to open a connection to the server, post the parameters' XML and parse the result. The function *sendRequest* was added to *Sherwoodpredict.py*. As DOM parsing was found to be a tedious process, a simple convenience method named *getSingleValue* was created, which easily found a node and then returned its contents.

3. Performing a Search

Performing a search involved the creation of the XML parameters for the *GetSearchResults* API call and passing them to the previously defined *sendRequest* function. The XML parameters were in the following form:

```
<GetSearchResultsRequest xmlns = "urn:sherwood:apis :
  sherwoodBaseComponents">
  <RequesterCredentials> <sherwoodAuthToken> token
</sherwoodAuthToken> </RequesterCredentials>
  <parameter1> value </parameter1>
  <parameter2> value </parameter2>
</GetSearchResultsRequest>
```

The following two parameters were passed to the *GetSearchResults* API call:

- i) **Query:** This is a string containing the search terms. Using this parameter is exactly like typing in a search from the Sherwood Tinnings home page.
- ii) **Category ID:** This is a numerical value specifying the category we wish to search. Sherwood Tinnings has a large hierarchy of categories, which we can request with the *Getcategories* API call. This can be used alone or in combination with Query.

The Python *doSearch* function took these two parameters and performed a search. It then returned a list of the item IDs, which were used with the *GetItem* call, along with their descriptions and current prices. The *doSearch* function was added to *sherwoodpredict.py*.

In order to use the *category* parameter, a function was needed to retrieve the category hierarchy. This was another straight forward API call, but the XML file for all the category data was found to be very large, took a longtime to download, and was very difficult to parse. Because of this reason, the category data were limited to the *Statue* category, for which the price is to be predicted.

The *getCategory* function took a string and a parent ID and returned all the categories containing that string within that top-level category. This function was added to *sherwoodpredict.py*. This function was subsequently used in the following Python session in order to list the *statue* category items:

```
>>> import sherwoodpredict
>>> statues = sherwoodpredict.doSearch ('statue', categoryID = 511480)
>>> statues [0 : 10]
```

4. Getting Details for an Item

The listing in the above search results gave the title and id, and it was possible to extract details such as the metal with which the *statue* was made and the year in which the *statue* was made from the XML text of the title. Sherwood Tinnings website also provided attributes specific to different item types. Each *statue* was listed with attributes like statue's age, its metal and level of craftsmanship. In addition to these details, it was also possible to get details such as the seller's rating, the number of bids, and the starting price.

In order to get the above details, an API call was made to *GetItem*, passing the item's ID as returned by the *doSearch* function. To do this, a function called *getItem* was added to *sherwoodpredict.py*. This function retrieved the item's XML using the *sendRequest* function and then parsed out the interesting data. Since attributes were different for each item, they were all returned in a dictionary. This function was used to display the attributes of the category statues [7][0].

```
>>> reload (sherwoodpredict)
>>> ebeypredict.getItem (statues [7][0])
```

```
{'attributes': { u '12' : u '2', u '25710' : u 'India' u '26444' : u '45',
                u '26446' : u 'Bronze'}, 'price' : u '515.0', 'bids' : 'u '28', 'feedback' : u '2797',
                'title' : u 'Lord Nataraja Statue-India'
            }
}
```

From the above output, it was known that the attribute 26444 represented statue's age, 26446 represented metal type, 12 represented level of craftsmanship and 25710 represented country of origin. The seller rating, the number of bids, and the starting price, which were provided by the above output, helped us to build the required Price Predictor.

5. Building a Price Predictor

The Python function *makeStatueDataSet* was made to call the *doSearch* function to get a list of statues, and then request each one individually. Using the attributes determined in the previous section, the function created a list of numbers that could be used for prediction, and put data in the structure appropriate for the K-nearest neighbours (KNN) function named *knnestimate*, which would provide the price estimate. The *makeStatueDataset* function was added to *sherwoodpredict.py*.

This function ignored any items that did not have the necessary attributes. Downloading and processing all the results took some time, but an interesting dataset of real prices and attributes was provided. The *knnestimate* function acted on this dataset and provided the price estimate, as shown below:

This function ignored any items that did not have the necessary attributes. Downloading and processing all the results took some time, but an interesting dataset of real prices and attributes was provided. The *knnestimate* function acted on this dataset and provided the price estimate, as shown below:

```
>>> reload (sherwoodpredict)
>>> set1 = sherwoodbaypredict.makeStatueDataset()
>>> numpredict.knnestimate (set1, (40, bronze, 2, India))
$ 667.89 9999 9999 9998
```

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அகஇலக்கியங்களில் மகளிரின் பண்பாட்டுச்சிறப்புகள்

ச. புனிதா

முனைவர் பட்ட ஆய்வாளர்

தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி

அரிது அரிது மானிடராய்ப் பிறத்தல் அரிது

என்று ஓளவையார் கூறினார். கவிமணி தேசிக விநாயகம் பிள்ளை அவர்கள்,

**மங்கையராய்ப் பிறப்பதற்கே நல்ல
மாதவம் செய்திட வேண்டும்மா”**

என்றும்,

**அன்பினுக் காகவே வாழ்பவரார்-அன்பின்
ஆவியும் போக்கத் துணிபவரார்
இன்ப உரைகள் தருபவரார் - வீட்டை
இன்கை யாலொளி செய்பவரார்**

என்றும் பெண்மையைப் போற்றுகிறார். மகளிர் அன்பிற் சிறந்தவர்கள். ஆகையால் தான் “அம்மையே அப்பா ஒப்பிலா மணியே” என இறைவனை மாணிக்கவாசகர் தாயின் வடிவமாக அழைக்கிறார். “ஈன்றாளோடு எண்ணக் கடவுளும் இல்” என்ற நான்மணிக்கடிகைப் பாடல், மகளிர் இறைவனின் மறுவுருவம் என்று கூறுகிறது. இதற்கு முன் தோன்றிய சங்க இலக்கியங்களும் மகளிரை முதன்மைப் படுத்தியே களவு, கற்பு, அறம், பண்பாடு போன்ற வாழ்க்கைநெறிகளை எடுத்துரைத்துள்ளன. இவ்வாழ்வியல் பழங்கால மக்களின் பண்பாட்டுச் சிறப்பிற்கு எடுத்துக்காட்டாக அமைந்துள்ளது என்பதை எடுத்துரைப்பது இதன் நோக்கமாகும்.

பண்பாடு

தமிழர் அறத்தையே அனைத்து உயிரினங்களுக்கும் அடிப்படையாகக் கொண்டிருந்தனர். ‘பண்பெனப்படுவது பாடறிந்தொழுகுதல்’ என்று கலித்தொகை பண்பாட்டுக்கு இலக்கணம் கூறுகின்றது. எல்லோரும் வாழவேண்டுமென்பது தமிழரின் பொது நோக்கம். இதற்கு,

**பசியும் பிணியும் பகையும் நீங்கி
வசியும் வளனும் சுரக்கென வாழ்த்தி** (மணி. 2:70-71)

மற்றும்,

**பாரக மடங்கலும் பசிப்பிணியறுகென
ஆதிரை யிட்டனள் ஆருயிர் மருந்தென்** (மணி. 16:134-135)

என்னும் மணிகேலையின் கூற்று தமிழரின் பொதுநல நோக்கைப் புலப்படுத்துகின்றது என்பதை அறியலாம்.

பண்பாடு ஆழமான பரந்து விரிந்த பொருளை உடைய சொல். பண்பு என்பது தனிமனிதப் பண்பையும், பண்பாடு என்பது சமூகத்தின் பண்பையும் குறிப்பதாகும். தமிழ் நிலம் தொன்மையானது. தமிழ்மொழி மிகுந்த தொன்மையுடையது. தொல் பழங்காலத்தொட்டுத் தமிழ் நிலத்தில் சிறந்த பண்பாட்டு நெறிகள் வளர்ந்தோங்கி உள்ளன. தூய தமிழ் மரபுகள், வாழ்க்கை நெறிகள் காலந்தோறும் தமிழ் இலக்கியத்தில் பதிவு செய்யப் பெற்றுள்ளன. ‘பண்புடையார்ப் பட்டுண்டு உலகம்’ என்பது திருக்குறள் விதித்த விதியாகும். யாரால் உலகம் வாழ்கிறது? என்ற வினாவை எழுப்பி, பண்புடையரால் உலகம் வாழ்கிறது என்ற விடையைப்

புறநானூறு பகர்கிறது. உலகின் மூத்த நாகரிகங்களில் முதன்மையானது தமிழர் நாகரிகம். அது காலப்பழமையில் மட்டுமின்றி நனிநாகரிகக் கூறுகளால் தனித்தன்மை வாய்ந்தது என்று விளக்குகின்றார் அ.கிருட்டிணன்.

திருமணம்

சந்தனம் மலையில் பிறக்கிறது. ஆனால் மலைக்குப் பயன்படுவதில்லை. பூசிக்கொள்பவருக்குப் பயன்படுகிறது. முத்து கடல் நீரிலே பிறக்கிறது. ஆனால் அது அணிபவர்க்கே பயன்படுகிறது. இசை யாழிலே பிறக்கிறது. ஆனால் கேட்பவர்க்கு மட்டுமே இன்பம் அளிக்கிறது. இதனைக் கலித்தொகைப் பாடல்

பலவுறு நறுஞ்சாந்தம் படுப்பவர்க்கு அல்லதை
மலையுளே பிறப்பினும் மலைக்கலைவதாம் என்செய்யும்

... ..

யாழுளே பிறப்பினும் யாழ்க்கு அவைதாம் என்செய்யும் (கலி. 16)

என்று எடுத்துரைக்கிறது. இதன் அடிப்படையில் மகளிர் செல்வச்செழிப்புடைய வீட்டில் பிறந்தாலும், திருமணம் செய்து கொடுத்தல் தமிழரின் மரபு. திருமணம் களவு மணம், கற்பு மணம் என்று இரண்டாகப் பிரிக்கப்படுகிறது.

களவு மணம்

களவு மணம் என்பது ஒத்த பருவம் உடைய ஒருவனும் ஒருத்தியும் சிந்தித்துக் காதல் கொள்வது ஆகும். முதற்சந்திப்பில் அவர்களின் விழிகள் உரையாடின. விழி உறவு நெட்டுறவிற்கு வழிகோலியது. மீண்டும் சந்தித்து உரையாடினர். இந்த உறவு இரவும் பகலுமாகத் தொடர்ந்தது. இருவரும் பெற்றோர் உடன்பட மணஞ் செய்து வாழ விழைந்தனர். பெற்றோர் ஒப்புக்கொள்ளாதபோது, முரண்பாடு ஏற்படின் தலைவியை அழைத்துக் கொண்டு தலைவன் உடன்போக்கு சென்று தனிக்குடித்தனம் நடத்துவது தடையின்றி ஒப்புக்கொள்ளப்பட்டது. அதுவே அறவழி என்னும் கருத்தும் பெற்றது. இதனைக் கலித்தொகைப் பாடல்,

நடுவு இகந்து ஓர்இ நயன் இல்லான் வினை வாங்க,

... ..

சொல்லுவது உடையேன்: கேண்மின,மற்று ஐஇய!" (கலி. 8)

என்று விளக்குகிறது.

கற்புமணம்

பெற்றோரும், உடன்பிறந்தோரும், உறவினரும், நண்பரும், ஊரும், உலகமும், அறியும் படியாக நிகழும் மணம் கற்பு மணம் எனப்பெற்றது. இக்கற்பு மணம் தோன்றியதற்கான காரணத்தைத் தொல்காப்பியர் மிகத்தெளிவாகக் கூறுகிறார். கற்பு மணத்திற்குரிய மணச்சடங்கு கரணம் எனப்பெற்றது. தமிழ் இலக்கணங்களில் முன்னோடியான தொல்காப்பியம்

பொய்யும் வழுவும் தோன்றிய பின்னர்
ஐயர் யாத்தனர் கரணம் என்ப

(தொல். 1091)

என்று உணர்த்துகிறது. களவு மணத்தில் ஏற்பட்ட பொய்யும் வழுவும் 'கற்பு மணம்' என்ற அமைப்பு தோன்றக் காரணங்களாக இருத்தல் வேண்டும் என்பது தொல்காப்பியரின் கருத்தாகும். திருமணத்தைக் கற்பு என்றும், வரைவு என்றும் கூறும் பழக்கம் இருந்துள்ளது. பெற்றோர் முன்னின்று நடத்தும் திருமணமும் இருந்தது.

கற்பு எனப்படுவது கரணமொடு புணரக்
கொளற்குரி மரபின் கிழவன் கிழத்தியைக்
கொடைக்குரி மரபினோர் கொடுப்பக் கொள்வதே

(தொல். 1088)

கொடுப்போர், கொள்வோர் திருமணமே சமுதாயத்தில் சிறப்புடையதாகக் கருதப்பட்டுள்ளது. நீண்டநாள் களவு வாழ்க்கை நடத்திய தலைவன் கற்பு வாழ்வு நடத்தத் துணிந்து, முறைப்படி தலைவியின் பெற்றோரிடத்துப் பெண் கேட்க ஊர் முதியோர் நால்வரை அனுப்பி வைப்பதை,

**அம்மவாழி! தோழி! -நம்ஊர்ப்
பிரிந்தோர்ப் புணர்ப்போர் இருந்தனர் கொல்லோ?-
தண்டுடைக் கையர், வெண்தலைச் சிதலவர்** (குறு. 146)

என்ற குறுந்தொகையில் இடம்பெற்றுள்ள வெள்ளி வீதியார் பாடல் உணர்த்துகிறது. பெற்றோர் இல்லாது நடக்கும் திருமணமும் இருந்தது. இரண்டு வகைத் திருமணமும் அன்றைய சமுதாயத்தில் ஒப்புக் கொள்ளப்பட்டன. இதனைத் தொல்காப்பியர்,

**கொடுப்போர் இன்றியுங் கரணம் உண்டே
புணர்ந்து உடன்போகிய காலையான** (தொல். 1089)

என்று கூறியுள்ளார். அதுமட்டுமல்லாமல் திருமணம் நடைபெறுவதற்கு முன் மணமகன், மணமகளுக்கான பொருத்தம் பார்ப்பது இன்று நிலவிவரும் பழக்கத்திற்கான பத்துப் பொருத்தங்களை,

**பிறப்பே, குடிமை, ஆண்மை, ஆண்டொடு
உருவு நிறுத்த காம வாயில் நிறையே,
அருளே, உணர்வோடு திருவெனமுறையறக்
கிளந்த ஒப்பினது வகையே** (தொல். 1219)

என்னும் நூற்பா விளக்குகிறது.

பரிசமளித்தல்

பெண்ணுக்கு மணமகன் பரிசளிக்கும் வழக்கம் தொன்றுதொட்ட தமிழர் மரபாகும். அன்று இது முலைவிலை, சிறுவளை விலை, பரியம் என்று அறியப்பட்டது. பாசிலை விலையென்றும் இதற்குப் பெயர் உண்டு. இதனை,

**முழங்குகடல் முழவின் முசிறி அன்ன
நலம்சால் விழுப்பொருள் பணிந்துவந்து கொடுப்பினும்
புரையர் அல்லோர் வரையலள் இவள் எனத்** (புறம். 343)

என்ற சான்றினால் சங்ககாலத்தில் மணமகன் பெண்ணுக்குப் பரிசளித்துத் திருமணம் நடத்தியதை அறியமுடிகிறது. திருமணம் ஆகும் பெண்ணுக்கு வெண்ணூல் சூட்டுதல் என்ற சடங்கு நடைபெற்றதை அகநானூற்றுப் பாடல் வழி அறியலாம்.

**மென்பூ வாகைப் புன்புறத் கவட்டிலை
... ..
தண்நறு முகையொடு வெண்ணூல் சூட்டி** (அகம். 136)

வாகையிலையினையும், அருகம்புல்லின் கிழங்கினையும் முகையொடு சேர்த்துக் கட்டிய வெண்ணூல் மணமகளுக்கு அணிவிக்கப் பெற்றதாகத் தெரிகின்றது. இந்த அணி ஒருவிதத்தில் தாலியை ஒத்திருப்பது போன்றதாக இப்பாடல் விளக்குகிறது. தமிழரிடையே 10-ஆம் நூற்றாண்டளவில்தான் தாலி கட்டும் மரபு ஏற்பட்டது. “இழை” என்ற சங்கத் தமிழ்ச்சொல் தாலியைக் குறித்து வழங்கியதை,

வால் இழை மகளிர் நால்வர் கூடி (அகம். 86)

என்ற பாடலடிகளில் காணமுடிகிறது. “இழை” என்ற சொல் மங்கல அணி அல்லது தாலியைக் குறித்ததாக இருக்கலாம் என்று அறியமுடிகிறது. ஏனென்றால் கரிகாலன் இறந்தபோது அவன் மகளிர் இழை களைந்தனர் என்று புறப்பாடல் விளக்குகிறது.

மெல் இயல் மகளிரும் இழை களைந்தனரே (புறம். 224)

சிலப்பதிகாரத்தில் கூறப்படும் கண்ணகியின் திருமணம் மாமுது பார்ப்பான் மறைவழி காட்டிட நடந்தது. மணமக்கள் இருவரும் தீ வலம் செய்வதனைக் காணக்கொடுத்து வைத்தவர்களை அடிகள் பாராட்டுகிறார்.

சிலம்புகழி நோன்பு

சங்க காலத்தில் பெண் குழந்தைகளுக்குப் பாலுண்பருவத்தில் கால்களில் சிலம்பணிவிக்கும் பழக்கம் உண்டு. திருமணம் முடிந்த பெண்கள் சிலம்பினை அகற்றி விடுதலே இன்றியமையாத செயலாக இருந்துள்ளது. இது ஒரு சமுதாய மரபாகவும் கடைப்பிடிக்கப்பட்டுள்ளது. இதுவே சிலம்புகழி நோன்பாகவும் திருமணத்திற்கு முன் நடைபெறும் ஒரு சடங்காகவும் இருந்துள்ளது.

**நும் மனைச் சிலம்பு கழிஇ அயரினும்
எம் மனை வதுவை நல் மணம் கழிக**

(ஐங். 399)

என்ற பாடலடிகள் ஒரு நற்றாயின் விருப்பத்தை உணர்த்துகின்றன. சிலம்புகழி நோன்பு தலைவன் இல்லத்திலும், திருமணம் தலைவியின் இல்லத்திலும் நடைபெறுதலே வழக்கமாகும். சிலம்புகழி நோன்பு தலைவன் இல்லத்தில் நடந்தாலும், திருமணமாவது தன் இல்லத்தில் நடைபெற வேண்டும் என நற்றாய் வேண்டுகின்றாள். இதன் வழியாகச் சங்க காலத்தில் திருமணத்தின் சடங்காகவே இந்தச் சிலம்புகழி நோன்பை மேற்கொண்டுள்ளனர் என்பதை அறியலாம்.

விருந்தளித்தல்

திருமணத்திற்கு வந்திருக்கும் உற்றார், உறவினர் அனைவருக்கும், உளுந்தம் பருப்புப் பெய்து சமைத்த செவ்விய குழைதலையுடைய பொங்கலோடு மிக்க சோற்றினையும் இட்டனர். அதனை உண்ணும் போது ஏற்படும் ஆரவாரம் இடையறாது ஒலிக்கின்றது என்பதை,

**உழுந்து தலைப்பெய்த கொழுங் களி மிதவை
பெருஞ் சோற்று அமலை நிற்ப**

(அகம். 86)

என்ற சங்கஅகப்பாடலிலிருந்து உணரலாம். திருமண நாளன்று செம்மறியாட்டின் பாலில் விளைந்த தயிர், கொல்லையில் விளைந்த வரகைக் குற்றியெடுத்த அரிசி, ஈசல் ஆகியவற்றில் இட்டுச் சமைத்த இனிய புளிப்பையுடைய சூடான சோற்றை, பசு வெண்ணெய் மேலேயிருந்து உருக விருந்தளித்தனர்.

சீதனம் தருதல்

தாய்வழிச்சமூகத்தில் திருமணம் நிச்சயித்தவுடன் மணமகன் வீட்டார் மணமகளுக்கு ஒரு குறிப்பிட்ட தொகையுடன் ஆடைகளைச் சீதனமாகத் தருதல் வழக்கமாகும். இதனைப் பரிசுப் பணம் என்பர். மணமகளுக்குப் பரிசும் மணமகன் வீட்டாரிடமிருந்து வழங்கப்படுவது பழக்கம். இப்பரிசும் அணிகலன்களாகவோ அல்லது பணமாகவோ, நிலம் போன்ற சொத்தாகவோ வழங்கப்பெறும். மணமகளின் பெற்றோர் கேட்கும் பரிசுத்தொகை அனைத்தையும் கொடுத்தால்தான் திருமணம் நடக்க ஒப்புதல் அளிக்கப்படும். இதனை,

நறுநுதல் அரிவை பரிசிழை விலையே

(அகம். 90)

என்ற பாடலில் மருதனிள நாகனார், தலைவியின் பரிசுத்தொகை என்ன, எவ்வளவு என்பதைத் தலைவனிடம் கூறுவதாகக் குறிப்பிடுகின்றார்.

தாய்மை நிலை

இலக்கிய மாந்தர்களில் உயர்ந்த நிலைக்குரிய பல பெயர்கள் இருப்பினும் “தாய்” என்ற உறவுக்கு அப்பெயர்கள் ஈடாகாது. சங்கத் தாய்மார்கள் தன் குழந்தைக்கு அன்பு காட்டுதல் மட்டுமன்றிப் பாலூட்டுகின்ற காலத்தே நற்பண்புகளையும், வீரத்தையும் ஊட்டி வளர்த்தனர். ஒரு குடும்பத்தில் தாயின் பங்கு மிக முக்கியமான ஒன்றாகும். குடும்பத்திலே பண்பைக்காட்டிப் போற்றியும், மனித

நேயத்தை அவர்களிடம் காட்டியும் சிறப்புப் பெறுபவள் தாய். உலகத்து உயிர்கட்கெல்லாம் இலக்கணம் வகுத்த தொல்காப்பியம் தாயன்பையே பெரிதாக மதித்திருப்பதைக் காணலாம். தலைவியின் மென்மையான அன்பினைத்

**தாய்போல் கழறித் தழீஇக் கோடல்
ஆய்வினைக் கிழத்திக்கும் உரித்தென மொழிப
கவ்வொடு மயங்கிய காலையான** (தொல். 1119)

என்று தொல்காப்பியர் விளக்குகிறார். எனவே, உலகில் எல்லா உறவுகளிலும் தாய் அன்பே தலைசிறந்தது எனக் கருதுவதில் தொல்காப்பியருக்கு உடன்பாடு உண்டு எனலாம். இச்சிறப்பைக் கருதி 'உலகத்து உயிர்களிலே நல்லுறவு கொண்டாடத் தகுந்த ஒரே உயிர் தாய் தான்' என்று கூறுகிறார்.

வளைகாப்பு

களவு முடிந்து, கற்பு வாழ்க்கைக்குச் சென்ற தலைவனும், தலைவியும் இன்புற்று வாழ்கின்றனர். அவர்களின் இல்லற வாழ்வு சிறப்பாக அமைந்தமைக்கு எடுத்துக்காட்டாக, தலைவி தாய்மைநிலை அடைகிறாள். வளைகாப்பு என்பது மகளிர் அனைவருக்கும் முதல் குழந்தை தரிக்கும்பொழுது நடத்தப்படுவதாகும். மகளிர் பத்துத்திங்கள் கருவுற்றிருத்தலும், வயா(குழந்தைபேறுப் பெற்ற மகளிர்) நோயுற்ற மகளிர் புளிப்புச் சுவையுடைய பொருள்களை விரும்புவர் என்பதையும் இப்பாடல் அடிகளில் காணலாம். மேலும், கன்னியராய் இருந்து பின் கொண்ட முதற்குல் ஆதலின் 'கடுஞ்சூல்' என்று கூறப்பட்டது. குட நாட்டு வீரக்குடி மகளிர் கருக்கொண்டால், அவர்க்குக் கரைத்த பசும்புளியை ஒரு வாளியின் வழியாக வாயில் வார்ப்பதைச் சடங்காகச் செய்வது தொன்று தொட்டு இருந்து வருகின்றது எனவும், இதுவே பசும்புளி வேட்கைக்கு ஏதுவாகும் எனவும் இரா.இராகவையங்கார் சான்று காட்டுகிறார். இதனை,

**ஓதுங்கல் செல்லாப் பசும்புளி வேட்கைக்
கடுஞ்சூல் மகளிர் போல நீர் கொண்டு** (குறு. 287)

என்று குறுந்தொகையும்,

**புளிங்காய் வேட்கைத்தன்று, நின்
மலர்ந்த மாப்பு, இவள் வயா நோய்க்கே** (ஐங். 51)

என்று ஐங்குறுநூறும்,

**வயவுறு மகளிர் வேட்டு உணின் அல்லது,
பகைவர் உண்ணா அரு மண்ணினையே** (புறம் 20:14-15)

என்று புறநானூறும் எடுத்துக்காட்டுகின்றன.

குழந்தைப் பேறு

குழந்தையைப் பத்து மாதம் சுமந்தவள் தலைவி என்பதைக் குறுந்தொகைப் பாடல் பின்வருமாறு விளக்குகிறது,

**முந்நால் திங்கள் நிறைபொறுத் அசைஇ
ஓதுங்கல் செல்லாப் பசும்புளி வேட்கைக்
கடுஞ்சூல் மகளிர்** (குறு- 287)

'மயக்குறு மக்களை இல்லோர்க்குப் பயக்குறை இல்லை தாம் வாழும் நாளே' என்று மக்கட்பேற்றின் சிறப்பைப் புறநானூறு எடுத்துரைக்கிறது.

**படைப்புப் பல படைத்துப் பலரோடு உண்ணும்
... ..
பயக் குறை இல்லை-தாம் வாழு நாளே** (புறம். 188)

அதாவது செல்வம் பலவற்றையும் உடையவராய் பலருடன் கூடி இருந்து உண்பவராயினும் அவர் பெற்ற செல்வத்தால் வாழ்வின் பயன் ஒன்றும் இல்லை என்று மக்கட்பேற்றின் அவசியத்தை விளக்கியதை உணரமுடிகிறது. இல்லறத்தின் பயன் பலவாகும். அவற்றுள் மக்கள் பேறு தலையானதாகும். திருவள்ளுவர் இதனைத் தெளிவாக உரைக்கிறார்.

**பெறும்அவற்றுள் யாம்அறிவது இல்லை அறிவுஅறிந்த
மக்கள்பேறு அல்ல பிற**

(குறள் 61)

நிறைவுரை

மக்களின் அன்றாட வாழ்வில் நிகழும் பழக்கங்கள், வழக்கங்களாக அமைந்து பின்னர் அவையே நாகரிகப் பண்பாட்டுச் செயல்முறைகளாக மாறிவிடுகின்றன. இவை யாவும் மக்களின் வாழ்வில் பல்வேறு தாக்கங்களையும், வாழ்க்கையின் மீது பற்றினையும் உண்டாக்குகின்றன. தமிழரிடையே காணப்படும் இத்தகைய மணச்சடங்குகள் பரிணாம வளர்ச்சிக்கு உட்பட்டவையாக உள்ளதால், கன்னி மகளிராக இருந்து கற்பு நிலைக்குச் சென்றவுடன் மகளிர் தாய்மைநிலை, வளைகாப்பு, குழந்தைப்பேறு என்ற பழங்கால பண்பாட்டுடன் இணைகின்றனர். ஆகையால் அக இலக்கியங்கள் இதனை மகளிரின் வாழ்வியல் விழுமியங்களாக எடுத்துரைத்துள்ளதை இக்கட்டுரையின் வழி அறியமுடிந்தது.

பார்வை நூல்கள்

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2. வாழ்வியற்களஞ்சியம், தொகுதி 13
3. இ.சுந்தரமூர்த்தி, இலக்கியச்சுடர்
4. இளங்குமரனார், இலக்கியம் கூறும் தமிழர்வாழ்வியல்
5. பரிமேலழகர் உரை, திருக்குறள்
6. எட்டுத்தொகை நூல்கள், நியூசெஞ்சரி புக் ஹவுஸ்

உளவியல் நோக்கில் மாறன் அகப்பொருள்

மா. சங்கீதா

முனைவர் பட்ட ஆய்வாளர்,
தமிழாய்வுத்துறை, தூயவளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி

உள்ளத்தின் கோலங்களையும் கோணங்களையும் ஆராய்கிற ஓர் அறிவியல் அணுகுமுறையே உளவியல் ஆகும். மனிதனின் நடத்தையை நிர்ணயிப்பதும், அவன் மனதில் புதைந்து கிடப்பனவற்றைப் புரிந்து கொள்வதுமே உளவியல் பகுப்பாய்வு ஆகும். இலக்கிய இலக்கண நூல்கள் மனித வாழ்க்கையைப் பிரதிபலிக்கின்றன. ஒவ்வொரு படைப்பாளரின் படைப்புகளும் அவர்களுடைய அனுபவங்களின் வெளிப்பாடாகும். இலக்கியங்களின் சாரமாகக் கருதப்படுவது இலக்கணம். மனித வாழ்க்கையைப் பற்றிப்பேசுவது பொருளிலக்கணம். அவை அகப்பொருள், புறப்பொருள் என தோன்றியுள்ளன. அதில் ஒன்று 'மாறன் அகப்பொருள்' ஆகும். இதனை இயற்றியவர் திருக்குருகைப் பெருமாள் கவிராயர் ஆவார்.

உளவியலாளர்களின் உணர்ச்சிகளையும் மாறனகப்பொருளில் காணலாகும் அக உணர்வுகளையும் ஒப்பிட்டு ஆராய்வதே இக்கட்டுரையின் நோக்கமாக அமைகின்றது.

மாறனகப்பொருளில் இயல்பகுப்புமுறை

மாறனகப்பொருளின் காலம் கொல்லம் 723, அது கி.பி. 1548 என்கின்றனர். இதில் இடம் பெறும் இயல்களை,

**ஐந்திணைச்சேர் மாறன் அகப்பொருளிற் சேருமியல்
ஐந்தாம்நூற் பாவெண் அடைவாகப் - பைந்தொடியே!
முந்நூற்று அறுபத்து மூன்றாம் முதல் இறுதி
உந்துவட ஓர் கடனே ஓர் (தமிழிலக்கண வரலாறு ப.351)**

வெண்பா வாயிலாக அறியமுடிகிறது. இதில் அகத்திணையியல், களவியல், வரைவியல், கற்பியல், ஒழிபியல் ஆகிய ஐந்து இயல்களில் 363 நூற்பாக்கள் இடம் பெறுகின்றன.

மனிதனின் அடிப்படைத் தேவைகள்

ஒவ்வொரு மனிதனும் தன், இயல்பான தேவைகளின் அடிப்படையில் முன்னேறுகிறான். மனிதனின் தேவைகள் ஆறு படி நிலைகளைக் கொண்டது என்கிறார். மாஸ்லோ, அவை

**உடல்சார் தேவைகள்
காப்புத் தேவைகள்
அன்புத் தேவை
தன்மதிப்புத் தேவைகள்
நன்மதிப்புத் தேவைகள்
மேனிலையாக்கம் (இலக்கியமும் பிறதுறைகளும்,ப.893)**

இதில் உடல்சார்தேவைகள் உணவு, உடை, இருப்பிடம் ஆகும். இவை பூர்த்தியான பின்பு மனம் காப்புத் தேவையை நாடுகிறது. காப்புணர்வு, நலம், அமைதி, போன்றவை நிறைவேறிய பின் அடுத்த தேவையின் மீது கவனம் செல்கிறது. நல்ல பாதுகாப்பு கிடைத்த பிறகு அன்புத் தேவை உருவாகிறது. தன்னிடம் பிறர் அன்பு செலுத்துவதையும், தன் அன்பைப் பிறர் ஏற்பதையும் மனம் விரும்புகிறது.

உணர்ச்சிகளின் தோற்றம்

உணர்ச்சிகளின் தோற்றத்தை அறிவியலாளர்கள் கவனமாக ஆராய்ந்துள்ளனர். உணர்ச்சி என்பது, வழக்கமான புலன் செயல்பாடுகளின் ஊடே நிகழும் ஒருவிதத்தை அல்லது அவற்றினிடையே நிகழும் தற்காலிக மாற்றமே உணர்ச்சி என்கின்றனர். அப்போது தனிச்சையாக (Automatic) நனவு மனத்தின் கட்டுப்பாட்டினைத் தாண்டி, உடம்பில் ஒருவிதமாக உந்துதல் சக்தி தொடர்ந்து நிற்கின்ற நிலையும் ஏற்படுவதுண்டு அப்போது மன அழுத்தம் (Stress) போன்ற தீவிர மனநிலை ஏற்படுகிறது.

எந்தவித உணர்ச்சியும் காலத்தைத் தாண்டும் போதும், ஆழ அகல பரிமாணங்களைத் தாண்டும் போதும், மனநிலை மாற்றங்களை ஏற்படுத்துவது உடலியலைப் பொறுத்தவரை தவிர்க்க இயலாததாகும். இப்படிப்பட்ட மனநிலை ஏற்படும் போது உடலில் வேறுபாடுகள் தோன்றுகின்றன. “இதயம் வேகமாகத் துடிக்கிறது, அதிக புரதங்கள் சுரக்கின்றன. அதனால் சர்க்கரையை வெளிப்படுத்த ஈரலுக்குத் தூண்டல் தேவைப்படுகின்றது. மற்ற உறுப்புகளின் இறுக்கத்தை ஏற்படுத்துகின்றன. உமிழ்நீர் சுரப்பி ஓரளவிற்கு மட்டுப்படுத்தப்படுகின்றது. அதனால் வியர்வை பெருகுகிறது. தோல்பகுதி சுருங்குகிறது இவையெல்லாம் உணர்ச்சி நிலை அளவு கடந்தால் ஏற்படும் நிகழ்வுகளாகும்.

மாறன் அகப்பொருளில் தலைவன் தலைவி சந்திக்கும் போது, சில மாற்றங்கள் ஏற்படுகின்றன. களவியலில் கைக்களை பாகுபாட்டில் முதல் காட்சி

நிலம் வேறுஒன்று எனும்நிலைமையர் ஆகி
குலநலன் திருவுரு குறிக்கொளின் ஒன்றாம்
இறைவனும் இறைவியும் இருமையும் தொடர்ந்த
முறைபயில் பான்மை மூதுடை முதல்வன்
ஏவலின் கண்ணுறும் இயற்கைக் காட்சி
காவலன் உயரினும் கடிநிலை இலவே (மாறன்களவியல் - 30)

குலம், செல்வம், அழகு, பண்புநலன் ஆகியவற்றால் ஒத்த தலைவனும், தலைவியும், வேறொரு காரணம் பற்றிப் பிறவிதோறும் தொடர்ந்து வந்து ஒருவரை ஒருவர் காண்பது இயற்கைக்காட்சி நிகழ்கின்றன. அப்போது சில மாறுதல் ஏற்படுகின்றன.

மாறனகப்பொருளில் மெய்ப்பாடுகள்

மாறனகப்பொருளில் நகை, அழகை, இளிவரல், மருட்கை, அச்சம், பெருமிதம், வெகுளி, உவகை ஆகிய எட்டு மெய்ப்பாடுகளையும் முப்பத்திரண்டு ஆக விரித்துரைக்கிறார். அவை உடைமை முதலாகக் கலக்கம் என்பதை இறுதியாக நிகழும் காட்சியாகும் என்கிறார். அகத்திற்குரிய மெய்ப்பாடுகள் புணர்ச்சிக்கு முன் நிகழ்பவை, புணர்ச்சிக்குப் பின் நிகழ்பவை, களவுக்காலத்திலும், சில கற்புக் காலத்திலும் மேலும் வரைதல் வேட்கைக்குரிய மெய்ப்பாடுகளையும், வரைந்தெய்திய பின் தலைவியின் மனத்துக்கண் நிகழும் மெய்ப்பாடுகளையும் எடுத்துரைக்கிறார்.

உளத்துறும் இன்பம் ஆங்குரவோர்
வளர்த்த செய்யுளின் வகுத்தசொற் பொருளினும்
மெய்யினும் வெளிப்படல் மெய்ப்பாடாகும் (மாறனகப் பொருள் - 278)

மனதில் ஏற்படும் இன்ப துன்பங்கள் மெய்யில் வெளிப்படையாகத் தோன்றுவது மெய்ப்பாடு என்கிறார்.

உணர்ச்சிகளின் மூன்று படிநிலைகள்

உளவியலாளர்கள் உணர்ச்சியை மூன்று படிநிலைகளில் விளக்க முயற்சித்துள்ளனர்.

1. உணர்ச்சியை எவை உந்துவிக்கின்றன? அல்லது எழுப்புகின்றன?

2. எழுப்பிய பின் மனமும் உடலும் எவ்வாறு அவற்றோடு தொடர்பு கொண்டு இயங்குகின்றன?
3. உணர்ச்சியை நாம் அனுபவிக்கும்போது உடலும் உள்ளமும் எவ்வாறு 'விளைவு அறிவிப்பு' செய்கின்றன? என்ற வினாவை எழுப்புகின்றன. மேலும் இவ்வுணர்ச்சிகளை மூன்று நிலைகளாகப் பகுக்கின்றன. அவை அக உணர்ச்சி, சின உணர்ச்சி, அழகை உணர்ச்சி ஆகியவையாகும்.

இலக்கணத்தில் அகஉணர்வுகள்

உணர்ச்சி என்பது எதுவென்று விளக்க (Definition) விஞ்ஞானத்தாலும் முடியவில்லை. இதனைத் தொல்காப்பியர்

**நோயும் வேட்கையும் நுகர்வும் என்றாங்கு
ஆவயின் வரும் கிளவி எல்லாம்
நாட்டிய மரபின் நெஞ்சுகொளின் அல்லது
காட்டலாகாப் பொருள் என்ப** (தொல். பொருள் - 51)

இதனை ஐம்பொறிகளின் வாயிலாக அறியுமாறு விளக்குகிறார். இதனைத் திருக்குருகைப் பெருமாள் கவிராயர், குறிப்பறிதல் இலக்கணத்தில் உணர்த்துகிறார்.

**கண்ணினை புகுமுகம் புரிதலிற் காரிகை
உள்நிகழ்வேட்கை உரவோர்க்கு உணர்த்தும்** (மாறன்களவியல் - 40)

தலைமகளின் கண்களிரண்டும் எதிர் நோக்கம் செய்தலான் அவளது உள்ளத்து வேட்கையைத் தலைவன் உணர்வான். ஆதலின் அவன்தன் தண்ணிய நோக்கம் அவன்பால் அவளுற்ற வேட்கையை உணர்த்துகின்றன.

தொல்காப்பியர் இதனை வேட்கை முதலாக சாக்காடு ஈறாக பத்து அவத்தைகளில் உணர்த்துகிறார். அவை,

**வேட்கை ஒருதலை உள்ளுதல் மெலிதல்
ஆக்கஞ் செப்பல் நாணுவரை இறத்தல்
நோக்குவ எல்லாம் அவையே போறல்
மறத்தல் மயக்கம் சாக்காடு என்றிச்
சிறப்புடை மரபினைவ களவென மொழிய** (தொல்- பொருள் - 97)

காட்சி, வேட்கை, ஒருதலையுள்ளுதல், மெலிதல், ஆக்கம் செப்புதல், நாணுவரை இறத்தல், நோக்குவ எல்லாம் அவையே போறல், மறத்தல், மயக்கம், சாக்காடு போன்ற உணர்வுகள் ஏற்படும் என்கிறார். செலவழுங்கல் துறைகளில் தலைவிக்கு ஏற்படும் மாறுதல்களை உணர்த்துகிறார்.

தலைவன் செலவழுங்கல்

**ஐவகை பிரிவினும் அழுங்கற்கும் உரியன
மனைவயின் அழுங்கலும் வன்சுரத்திடைச் சென்று
அழுங்கலும் முரிய னாகும் மென்ப
அம்மனை இவளொடும் தன்மன மாயிடை
விம்முறல் ஒழிக்கும் விதி தனக் கழுங்கினும்
செம்மலர் செலவினை தீரானாங்கே (தமிழ் இலக்கணநூல்கள், 315-317)**

தலைவன் செலவழுங்கலுக்குரிய இடம், தலைவி செலவழுங்கலுக்குரிய இடம், மாறனகப்பொருளில் பாசறைப் புலம்பலில் தலைவனின் நிலையைப் பதிவுசெய்கிறார்.

**மனைவி தன்னிலை வினைவயின் இளையார்
சேயங்கொள் காலையில் செப்புவதாகும்** (த.இ.நூல்கள்-318)

இத்தகைய செலவழுங்கல் துறை, தலைவன் தலைவியை விட்டு பிரிந்து செல்லும்போது ஏற்படுகின்றன. இதனைத் தொல்காப்பியர்,

நோய்மிகப் பெருகித் தன்னெஞ்சு கலும்ந்தோயே

என்கிறார். மேலும் செலவழுங்களில் இச்செயல்கள் நடந்த உடனே, உடம்பில் நடைபெறும் நிகழ்வுகள் நனவு மனத்தில் பதியப்படுகின்றன. மூளையின் செயல்பாடுகள் ஆளுக்கு ஏற்றவாறும், வயதுக்கு ஏற்றவாறும் மாறக்கூடியது. அழுகை உணர்ச்சியைத் துன்ப உணர்வானது வெளிப்படுத்துகிறது. பழைய அனுபவங்களின் நினைவும், புதிதாக களம் கண்டது போல செயல்படுவதுண்டு. பழைய நினைவுகளும், புதிய உணர்வுகள் போலத்தோன்றுவதுடன், அவை புதிய சூழ்நிலையைத் தூண்டுகிறது என்பதை உணர்த்தும் பாடல்,

**அற்றைத் திங்கள் அவ்வெண் ணிலவின்
எந்தையும் உடையேம் எம்குன்றும் பிறர்கொளார்
இற்றைத் திங்கள் இவ்வெண் ணிலவின்
வென்றெறி முரசின் வேந்த ரெம்
குன்றும் கொண்டார் யாம் எந்தையும் இலமே** (புறம்.112)

தந்தை பாரியை இழந்த மகளிரின் புலம்பல் துன்பதை வெளிப்படுத்துகிறது.

சின உணர்ச்சி என்பது என்றோ நடந்த வாக்குவாதத்தின் நினைப்பு இன்று மனதில் தோன்றி ஏற்படுத்தும் தூண்டலால் சினம் வெளிப்படுகின்றன.

**வரிவயம் பொருத சினக்களிறு போல
இன்றும் மாறாதது சினனே** (புறம்.190)

ஒருவரைப் பார்த்தவுடன் காரணமில்லாமல் சினம் கொள்கிறோம். இதற்கு மூளையின் பதிவாகியுள்ள எண்ணப் பதிவுகளே காரணம் என்பதை உளவியலாளர்கள் உணர்த்துகின்றனர்.

நிறைவாக

பொருளிலக்கணத்தில் ஒரு பகுதியாக விளங்குகின்ற அகப்பொருளில் தொல்காப்பியர் எட்டு மெய்ப்பாடுகளை முப்பத்திரண்டாக விரித்துக் கூறுகிறார். மாறனகப்பொருளிலும் அதே 32 மெய்ப்பாட்டுணர்வுகள் வெளிப்படுகின்றன. உளவியலாளர்கள் உணர்ச்சியை மூன்றாகப் பகுக்கின்றனர். அவை அகஉணர்ச்சி, அழுகை உணர்ச்சி, சின உணர்ச்சி ஆகும். அக உணர்ச்சி அகப்பொருளில் மட்டும் இடம் பெறுகிறது. அழுகை அகம், புறம் இரண்டு நிலைகளிலும் வெளிப்படுகின்றன. சினம் புறநூல்களில் அதிகம் இடம் பெறுகின்றன என்பது இக்கட்டுரையின் வழி ஆராயப்பெற்றுள்ளன.

துணை நின்ற நூல்கள்

1. சண்முகம் தா.ஏ, உளவியல், சைவசித்தாந்த நூற்பதிப்புக் கழகம், சென்னை.
2. மாரப்பன். எம் தொல்காப்பியரின் உளவியல் கோட்பாடுகள், தி பார்க்கர் பதிப்பகம், சென்னை.
3. இளங்குமரனார் இரா., தமிழ் இலக்கண வரலாறு, மெய்யப்பன் பதிப்பகம், சிதம்பரம்.
4. கண்ணன். இரா, மாறனகப்பொருள் - களவியல், கூத்தன் பதிப்பகம், சென்னை.

சிந்தாமணியில் சங்க இலக்கிய அகக்கூறுகள்

ச. சேவியர்

முனைவர் பட்ட ஆய்வாளர்
தமிழாய்வுத்துறை, தாய வளனார் கல்லூரி, திருச்சிராப்பள்ளி

முன்னுரை

உலகில் சிறப்பாக வழங்கி வரும் உயர் தனிச்செம்மொழிகளுள் தமிழ் மொழியும் ஒன்றாகப் போற்றப்படுகிறது. தமிழ் மொழியில் தோன்றிய இலக்கியங்கள் உலகச் சிறப்புடையனவாகும். இதில் தமிழர்களின் பண்பாட்டுச் சிறப்பினைச் சங்க இலக்கியங்கள் சிறப்பாக எடுத்துக் கூறுகின்றன. நம் செந்தமிழ் மொழியில் சிறந்து விளங்கும் காப்பியங்களுள் சீவக சிந்தாமணியும் ஒன்றாகும். இதில் காதலும், வீரமும் தமிழர்களின் வாழ்க்கையோடு அவர்கள் உதிரத்தில் ஊறியனவாய்த் திகழ்கின்றன. தத்தமக்குப் புலனாகிய பிறர்க்குக் கூறப்படாதவை அகம் எனலாம், அப்புலனுணர்வு அவனுடைய உணர்ச்சிகளுக்கு வடிகாலாய் அமையும். இதனை ஒரு முகப்படுத்தி, நெறிப்படுத்தி ஒரு கட்டுப்பாட்டுக்குள் கொண்டு வரும் உயரிய அகவாழ்வைச் சிந்தாமணி காப்பியத்தோடு ஒப்பீடுவதே இவ் ஆய்வு கட்டுரையின் நோக்கமாகும்.

அக இலக்கியம்

“செம்மொழி இலக்கியங்களில் அகப்பாடல்கள் நயமும் நயத்தக்க நாகரிகமும் செறிந்த பாடல்களைத் தம்மகத்தே கொண்டவை. உலகப் பொதுமையுடன் சிறந்த ஒரு குறிக்கோள் வாழ்க்கையை உள்ளத்தில் உறைய வைக்கும் ஓர் அற்புதமான இலக்கியமாகத் திகழ்வது அக இலக்கியம் எனப்படும்”. அக இலக்கியம் தலைவன், தலைவியரிடையே காணப்படும் காதல் உணர்வையும் அதன் மிகப்பெரும் பரிமாணத்தையும் அதன் தெய்வீகத்தையும் அதனால் ஏற்படும் பல்வேறு உள்ளணர்வுகளையும் குறிக்கோளுடன் எடுத்துரைக்கின்றன.

அகம் என்பது அறம், பொருள் இன்பம், வீடு என்பதில் வரும் இன்பம் ஆகும். “ஓத்த நேசத்தினால் ஒருவனும் ஒருத்தியும் கூடுகின்ற போது ஏற்படும் பேரின்பத்தை இருவரும் விளக்கிச் சொல்ல முடியாது அது எப்போதும் ஒரு மனதின் உணர்வாகவே இருக்கும். இந்த இன்பம் தான் அகம்” மேலும் இந்த இன்பத்தைப் போலவே காமத்தைச் சேராத துன்பமும்கூட அகமாக நச்சினார்க்கினியர் குறிப்பிடுகின்றார். ஓரிலக்கியத்தை வேறு இலக்கியம் அல்லது இலக்கியங்களோடு ஒப்பிடுவதும், இலக்கியத்தை மற்ற அறிவுத்துறைகளோடு ஒப்பிடுவதும் ஒப்பிலக்கியத்தின் பணிகளாகும்.

அன்பு

மதுரை மருதனிள நாகனார் என்னும் புலவர் அகநானூற்றில் அந்த நாட்டில் உள்ள ஆண் நண்டு பெண் நண்டினிடத்தில் அன்புடையதாக இருக்கிறது என்பதைக் கூறுகின்றார். அகன்ற இலையை உடைய நாவல் மரம் நீரிலைகளில் உதிர்ந்துவிட்ட நாவல் கனி ஒன்றைக் கவர்ந்து எடுத்துக்கொண்டு போய்த் தாழை மரத்தின் வேருக்குக் கீழே வளையில் இருக்கிற தன்னுடைய பெண் நண்டிற்கு ஆண் நண்டு வழங்கியது இதனை நெய்தல் நிலத் தலைவன் தோழியிடம் கூறுகிறான்.

அகலிலை நாவல் உண்துறை உதிர்த்த
கனிகவின் சிதைய வாங்கிக் கொண்டு தன்
தாழை வேரளை வீழ்துளைக் கிடுஉம்

(அகம். 212)

என்னும் அடிகளில் நாட்டின் வளத்தையும் கூறுகிறார்.

நிறைந்த இலைகளையுடைய பலாச்சுளைகளும், வாழைப்பழமும் தண்ணீரில் சொறிகின்ற நிலையில் உள்ளன. தண்ணீரில் உள்ள ஆண் நண்டானது அவற்றைத் தன்னுடைய கருவுற்றிருக்கின்ற பெண் நண்டுக்குக் கொண்டுபோய்க் கொடுக்கிறது என்பதைப் பின்வரும் அடிகளில் சுட்டிக்காட்டுகிறார். இதனை,

**அள்ளிலைப் பலவி னளிந்துவீழ் சுளையுங்
கனிந்துவீழ் வாழையின் பழனும்
புள்ளிவா ழலவன் பொறிவரிக் கமங்குள்
ஞெண்டினுக் குய்த்துநோய் தணிப்பான்.** (சீவக. 2109)

மருதனிள நாகனார், ஓர் ஆண் நண்டு பெண் நண்டிற்கு நாவல் கனியை அன்போடு கொண்டுபோய் ஊட்டிய செய்தியைச் சொல்லுகிறார். திருத்தக்க தேவர் இன்னும் சிறிது பொறுப்பும் அன்பும் மீதுற அந்தப் பெண் நண்டு கருவுற்றிருக்கின்ற நண்டு என்று அழகாகச் சொல்லுகிறார். இதிலிருந்து அவர் சங்க இலக்கியங்களில் தோய்ந்து மாணிக்கங்களைக் கண்டெடுத்து, அவற்றிற்கு மெருகூட்டித் தருகின்ற பண்பையும் நம்மால் அளவிட முடியாது என்பதை தனது பாடலில் குறிப்பிடுகின்றார்.

நாணம்

நற்றிணையில், களவொழுக்கத்திலுள்ள தலைவனைக் கட்டாயம் திருமணம் செய்துகொள்ள வேண்டும் என்று தோழி வற்புறுத்துவதாகப் புலவர் அறிவுடை நம்பி கூறுகிறார். 'எங்களோடு பிறந்த நாள் முதல் தொடர்ந்து வந்த நாணமாகிய வெட்கத்தை விட்டு விட்டோம். இனி இவ்வூரில் எங்களைப் பற்றித் தூற்றுகின்ற அலர் எழுவதாக' என்று தோழி சொல்கின்றாள்.

**சேணும் எம்மொடுவந்த
நாணும் விட்டேம் அலர்க இவ்வுரே** (நற்றிணை-15)

திருத்தக்க தேவரும் சீவகனைக் கண்ட விமலை நாணத்தை இழந்துவிட்டான் என்கின்ற இடத்தில்,

**பெண்பா லவர்கட் கணியாய்ப்பிரி யாதநாணும்
திண்பா னிறையுநீ திருமாமையுஞ் சேர்ந்த சாயல்
கண்பாற் கவினும் வளையுங் கவர்ந் திட்ட கள்வன்** (சீவக. 1961)

என்று கூறுகிறார். பெண்பாலார்க்கு அணியாக உள்ள நாணத்தையும், திண்ணிய நிறையையும், அழகான சாயலையும், அழகையும் கவர்ந்திட்ட கள்வன் என்று சொல்கிறார். அறிவுடைநம்பியார் சொன்னதைப்போல பெண்பாலுக்கே உரிய நாணத்தை ஓர் அணியாக ஒப்பிடுகின்றார் திருத்தக்க தேவர்.

கற்பு

சங்க இலக்கியங்களில் முல்லை மலர் கற்புக்கு அடையாளமாகக் கருதப்படுகிறது. தமிழர்கள் முல்லையைக் கற்புக்குச் சிறப்பாக எடுத்துக்காட்டி வருகிறார்கள். ஐங்குறுநூற்றில் பேயனார் பாணர்களை முல்லைப் பண்ணைப் பாடிச்செல்ல, தலைவி கற்பின் சின்னமான முல்லை மலரைச் சூடியிருக்க, அவள் அருகிலிருந்த தலைவன் தன் புதல்வனோடு மகிழ்ந்திருந்தான் என்று கூறுகிறார். இதனைப்

**பாணர் முல்லை பாடச் சுடரிழை
வாணுதல் அரிவை முல்லை மலைய
இனிதிருந்தனனே நெடுந்தகை
துனிதீர் கொள்கைத்தன் புதல்வனோடு பொலிந்தே** (ஐங். 408)

எனும் பாடல் வரிகள் விளக்குகின்றது.

சீவகசிந்தாமணி காந்தருவதத்தையின் தோழியர்கள் கற்புக்கு இலக்கணமான முல்லையைத் தலையில் சூடினார்கள் என்பதை பின்வரும் பாடல் விளக்குகிறது.

பண்ணிறச் சுரும்புகுமும் பனிமுல்லைச் சூட்டுவேய்ந்தார் (சீவக. 624)

இதில் கற்பின் சின்னமாக முல்லைப்பூவை எண்ணியதும், அடையாளமாகச் சூடியதும் ஒப்புமைக்காட்டப் பெற்றுள்ளது.

திருமண முறை

சங்ககாலத்திலே நடைபெற்ற திருமணமுறைகளை விளக்குகின்ற பாடல்கள் அகநானூற்றிலே இடம் பெற்றுள்ளன. இதனை

உழுந்து தலைப்பெய்த கொழுங்களி மிதவை (அகம். 86)

என்ற பாடல் அடி விளங்குகின்றது. இதில் புரோகிதர்களும், மந்திரம் ஓதுபவர்களும் கிடையாது. புதல்வர் பயந்த மங்கல மகளிர்தான் அந்தத் திருமணத்தை நடத்துவதாக வருகிறது. ஆனால் நல்லநாள் பார்த்துச் செய்திருக்கிறார்கள். மேலும், உரோகிணியும், திங்களும் கூடிய நாள் திருமணத்திற்குச் சிறந்த நாள் என்பது பண்டைய தமிழர்களின் கருத்தாக இருந்துள்ளது என்பதை இப்பாடலால் அறியலாம்.

**கோள்கால் நீங்கியே கொடுவெண் திங்கள்
கேடில் விழுப்புகழ் நாள்தலை வந்தென (அகம். 86)**

இதனைச் சீவகசிந்தாமணியில் சீதத்தன் காந்தருவதத்தைக்கு யாழ்ப்போர் நிகழ்த்துவதற்குரிய மேடை அமைக்கிறான். அந்த யாழ்ப்போர் தொடங்குவதற்குரிய நல்லநாளைத் தேர்ந்தெடுக்கிறான் யாழ்ப்போரில் வெல்பவருக்குக் காந்தருவதத்தை மாலை சூடுவாள் என்பதால் திருமணத்திற்கு எது சிறந்த நாளோ அந்த நாளைத் தேர்ந்தெடுத்தான் என்று சொல்வார். இதனை

**ஒண்ணிற வுரோணி யூர்ந்த
வொளிமதியொண்பொ னாட்சித்
தெண்ணிற விசம்பி னின்ற
தெளிமதி முகத்து நங்கை
கண்ணிய வீணை வாட்போர்க்
கலாம் மின்று காண்டும் மென்றே (சீவக. 620)**

என்ற பாடல் வரிகள் உணர்த்துகின்றன. அதாவது உரோகிணி, திங்களோடு சேர்ந்திருக்கின்ற நல்ல நாளில் யாழ்ப்போர் தொடங்க ஏற்பாடு செய்தான் என்பது இதன் கருத்தாக உள்ளதால் ஒப்புமையுடையதாகிறது.

பிரிவு

தலைவன் பிரிந்துவிட்டால் அந்தத் தலைவியினுடைய உடலில் நிறம் வெளிருவதைப் பசலை என்று சொல்லுவார்கள். இந்தப் பசலை என்பது பல்வேறு விளங்கங்களுக்கு உட்பட்ட சொல்லாக அமைந்துள்ளது. ஓர் இடத்தில் பீர்க்கம்பு போல மஞ்சள் நிற உடல் என்று சொல்வார்கள். கலித்தொகையில் பாலைக்கலியில் ஆசிரியர் பசலை என்பது சந்திரனைப் பனி மூடிக்கொண்டால் எப்படி இருக்குமோ அப்படி ஒரு நிலை என்று சொல்கிறார்.

**இவட்கே
செய்வுறு மண்டிலம் மைய்யாப் பதுபோல
மையில் வாண்முகம் பசப்பூ ரும்மே (பாலைக்கலி 6)**

சீவகன் கேமசரியைவிட்டு இரவில் பிரிந்துவிடுகிறான். வருந்துகின்ற நிலையில் பசப்பு வருவதற்கு ஓர் எடுத்துக்காட்டு சொல்கிறார்.

**பனிகொண் மாமதி போற்பசப் பூரயான்
தனிய ளாவது தக்கது வோசொலாய் (சீவக. 1510)**

என்று தானே பேசிக்கொள்வதுபோல் அமைக்கிறார். கலித்தொகையிலிருந்து திருத்தக்க தேவர் எடுத்துக்கொண்ட செய்தி ஒப்பீடுக்கின்றார்.

அகநானூற்றில் பாலை பாடிய பெருங்கடுங்கோ, பொருள்வழிப் பிரிவைக் கருதிய தலைமகன், தன் நெஞ்சிற்குச் சொல்லிய செய்தியை ஒரு பாடலில்

அமைக்கிறார். தலைவனின் பிரிவுச் செய்தியை ஆராய்ந்து அறிந்த தலைவியானவள். தன் மார்பில் அணைத்திருந்த மகனுடைய தலையில் சூடப்பட்ட செங்கழுநீர் மாலையை மோந்து நெடுமூச் செறிந்தபோது அம்மாலையில் பெரிய மலர் வெப்பத்தால் கருகித் தன் நிறத்தை இழந்தது. அதனால் தலைவன் தற்காலிகமாகப் பிரிவை ஒத்திவைத்தான் என்று சொல்கிறார். இதனை

**ஆகத் தொடுக்கிய புதல்வன் புன்தலை
தூநீர்ப் பயந்த துணையமை பிணையல்
மோயினாள் உயிர்த்த காலை மாமலர்
மணியுரு இழந்த அணிஅழி தோற்றம்** (அகம். 5)

என்னும் பாடல் அடிகள் பிரிவை உணர்த்துகின்றன.

சீவகன் கனகமாலையை விட்டுப் பிரிய நினைக்கிறான். அந்தச் செய்தியை அறிந்த கனகமாலையினுடைய நிலையைப்பற்றிச் சொல்லவந்த திருத்தக்கதேவர் அவள் கையிலிருந்து செங்கழுநீர் மலர், பெருமூச்சின் காரணமாகக் கருங்குவளையாக மாறியது என்று அழகாக ஒப்பீட்டு சொல்லுகிறார் திருத்தக்கதேவர். இதனை

**கையிறு
புள்ளாவிச் செங்கழுநீர்க் குவளைசெய்தாள்** (சீவக. 1887)

என்னும் பாடல் அடிகள் விளக்குகின்றன.

சங்க இலக்கியங்களில் அகஇலக்கியங்கள் சிறப்புடையன. அகஇலக்கியங்களில் தலைவி, தலைவன், தோழி, நற்றாய், செவிலி, தந்தை என்று பல்வேறு வகையான மாந்தர்கள் இருப்பர். அந்தப் பாத்திரங்களில் தோழி பாத்திரம் ஒரு தியாகப் பாத்திரம். ஏனென்றால் தோழியும் தலைவியும் ஒத்தவயதுடையவர்கள். ஒத்த உள்ளம் உடையவர்கள். கபிலர் தலைவிக்கும் தோழிக்கும் இடையிலான நட்பின் ஆழத்தைப்பற்றிக் கூறும்போது, இவர்கள் இருவருக்கும் உடல்தான் இரண்டு ஆனால், உயிர் ஒன்று என்று தோழியின் சொற்களால் கூறுகிறார்.

**யாமே பிரிவின்றி இயைந்த துவரா நட்பின்
இருதலைப் புள்ளியின் ஒருயிர் அம்மே** (அகம். 12)

என்னும் அடிகளால் தோழியின் பண்பைப் படம்பிடித்துக் காட்டுகிறார்.

சீவகன் காந்தருவதத்தையை மணந்த பின்னர் சூழ்நிலை காரணமாக குணமாலையார், கேமசரியார் ஆகியோரை மணந்து கொள்கிறான். என்றாலும் அவன் காந்தருவதத்தையின் பால் கொண்டுள்ள காதலின் ஆழம் குறையவில்லை. கேமசரியாரை மணந்த பின்னர் பிரிந்த சீவகன், ஏமாங்கதபரம் நகரத்தில் உள்ள பொய்கைக் கரையில் அமர்ந்து காந்தருவதத்தையை எண்ணி ஆற்றாமையால் வருந்துகிறான். அப்பொழுது தன் பிரிவுத் துயரத்தால் காந்தருவதத்தை இறந்துவிட்டிருப்பாளோ என்று எண்ணுகிறான். இந்த இடத்திலே ஈருயிர் ஓர் உடல் என்ற சங்க இலக்கியப் பாடல் திருத்தக்க தேவருக்கு நினைவுக்கு வருகிறது. சீவகன் நினைக்கிறான். தானும் காந்தருவதத்தையும் உடல்களால்தான் வேறுபட்டவர்கள். ஆனால், உயிர் ஓர் உயிர்தான். அப்படி அவள் இறந்திருந்தால் என் உயிரும் போயிருக்கும். நான் உயிரோடு இருக்கின்ற காரணத்தினால் அவளும் உயிரோடு இருப்பாள் என்று சீவகனை அகநானூற்றுப் பாடல் வாயிலாக ஒப்பீடுகிறார் திருத்தக்கதேவர் இதனைக்

**காதலாளு டலுள்ளுஉயிர் கைவிடின்
ஏதமென்னுயிர் ரெய்தி யிறக்கும்மற்
றாதலால்ழி அழிவு வொன்றில** (சீவக. 1631)

என்னும் பாடல் வரிகள் குறிப்பிடுகின்றன.

முடிவுரை

சிந்தாமணியில் சங்க இலக்கிய அகக்கூறுகள் குடும்பத்தைப் பின்புலமாகக் கொண்டு அமைந்துள்ளன. சங்க இலக்கியம் என்பது தொன்மையும் பழமையும் மாறாத இலக்கியமாக இருப்பதால் இஃது சிந்தாமணிக் காப்பியத்திற்கு தூண்டுக்கோலாக அமைந்தது. சிந்தாமணியில் சங்க இலக்கிய அகக்கூறுகளை ஒப்பிட்டுக் காணும் போது காலந்தோறும் அழியாத சிந்தாமணியாக விளங்குகின்றது.

சீவகசிந்தாமணியில் சங்க இலக்கியக் கருத்துக்கள் அதிகமாக இருப்பதால் சிந்தாமணியை 'ஒளி விளங்கும் நந்தாமணி' என்று சான்றோர் கூறுவது நன்கு பொருத்தமானதாகும். மேலும் சமணசமயத்தின் வீழ்ச்சியில் இருந்து சீவகசிந்தாமணி காப்பியம் எழுச்சிக்கு வித்திட்டது என்றே குறிப்பிடலாம்.

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