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Editorial

India has travelled a long way in education. Higher education in our country has made much advance than ever imagined by the west. In the emerging global world order, India is trying to position itself as a knowledge driven economy. Higher education assumes tremendous importance in this context. Large scale changes are being talked about and may indeed be implemented. The changes are many and momentous, and a successful transition in arena is full of possibilities

It is no secret that a genuine knowledge has a prerequisite of solid foundation provided by educational institutions characterized by relevance and excellence in training and research. JCS is intended to nurture research and thereby expand realms of knowledge.

Looking forward to the future we can assure that the journal will continue to deliver the best of recent developments in different disciplines and publish good quality findings of high significance and relevance. On this happy occasion I wish to express my sincere appreciation to research & Journal committee for their enthusiastic support and co-operation to this academic venture. I also extend sincere appreciation of the college management and the principal, to the valued readers and authors for their continued interest in JCS, and to every member of the editorial board to this scientific endeavour. We further gratefully acknowledge the enthusiasm and support of the college PTA who provided the financial support for the publication of the journal.

We also welcome valuable suggestions and criticisms of the readers for improvement and augmentation in this regard.

With warm regards

Dr. Jeeju PP

Chief Editor



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REMOVAL OF HEAVY METALS FROM WATER USING RICE HUSK

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Department of Chemistry, S.N.M.College, Maliankara

Abstract

The removal of heavy metal contaminants from aqueous wastewater is one of the most important environmental issues being researched. The main toxic metal ions hazardous to humans as well as other forms of life are Cr, V, Cu, Fe, Se, Co, Ni, Cd, Hg, As, Pb, Zn, etc. A lot of methods are used to remove heavy metals because of the new and effective separation technologies. Rice husk (RH) is a low cost bio-adsorbent which has been studied intensively for the removal of various heavy metals. In this study examine the adsorption characteristics of rice husk to adsorb iron from an aqueous solution. The effect of particle size of adsorbent and concentration of adsorbates were examined. The equilibrium data were analyzed using Langmuir and Freundlich isotherm models

Keywords: Adsorption; Heavy metals and Rice husk.

Introduction

Development of rapidly increasing industry and population growth, utilization of water for various purposes increases tremendously, as a result, sources of water are polluted by discharging wastewater from both industry and domestic sectors. When compared to water pollution caused by domestic sector, pollution caused by industry sector contributes more. Heavy metal contamination is a serious environmental issue of global concern, particularly in developing countries.

Currently, the removal of heavy metal contaminants from aqueous wastewater is one of the most important environmental issues being researched. Once metal ions enter the environment, their chemical form largely determines their potential toxicity [1]. Besides the existence in aquatic ecosystem may cause

harmful effects to organisms living in water and heavy metals also accumulate throughout the food chain and may affect the health of human beings [2-4].

The waste water that consists of heavy metals ought to be treated appropriately because it will harm the ecosystem and public health. The main toxic metal ions hazardous to humans as well as other forms of life are Cr, V, Cu, Fe, Se, Co, Ni, Cd, Hg, As, Pb, Zn, etc. Heavy metals are non-biodegradable and causing various diseases and disorders. Iron overload may lead to debilitating and life-threatening problems such as poor growth, heart failure and diabetes. Surface waters generally contain less than 1ppm. Some ground water and acid surface drainage may contain much higher levels of Iron. Water containing iron greater than 2ppm cause staining of clothes and porcelain and imparts a bitter astringent taste. Iron may be in dissolved state,

in a colloidal state that may be peptised by organic matter inorganic or organic complexes or in relatively coarse suspended particle. The permissible limit for filterable iron in drinking water is 0.5ppm.

A lot of methods are used to remove heavy metals because of the new and effective separation technologies. The most widely used methods for removing heavy metals from wastewaters include ion exchange [5], chemical precipitation [6], preconcentration [7], reverse osmosis [8], membrane filtration [9], and adsorption biological treatment [10-12]. Among these technologies, adsorption is a most common technique for the removal of heavy metal. This process seems to be more user friendly and effective if combined with appropriate bioadsorbent and regeneration steps. Therefore, more interests have recently arisen in the investigation of low-cost adsorbents with a good sorption capacity to remove heavy metal ions from wastewater. Rice husk is a kind of byproduct obtained from the rice mills and usually available in a large quantity of production. Rice husk is mostly used as a fuel and burned in the boiler of various industries to produce steam, thus, conserving both energy and resources. Rice husk is one of the most widely available agricultural wastes in many rice producing countries around the world. In this work, rice husk is used as the adsorbent for the removal of iron from water.

Materials and method

In this project the adsorption of Fe(III) from its aqueous solution were found out using rice husk. Rice husk were collected from the

local mills, washed and dried. The dried rice husk was sieved using sieves of different pore sizes to get two sized powder (RH1 and RH2) having uniform size. Sample I is large sized and sample II is fine powdered.

Five dried stoppered bottles were taken and labeled them from 1 to 5 about 1g of each rice husk (sample I and sample II) was weighed out accurately into these bottles

0.02M Fe(III) solution was prepared. Added by means of burette 5,10,15,20,25 ml of Fe (III) solution into each set of bottles containing rice husk. Total volume was made up to 50ml by adding amount required amount of water. These bottles were shaken for 45 minutes and kept in a thermostat to attain equilibrium. The bottles were taken out of bath and the contents filtered through a quantitative filter paper (Whatman No:1) into separate clean dry conical flask. The few ml of filtrate was rejected as the concentration in the first fraction are likely to be changed by adsorption on the filter paper during filtration. Pipette out 5ml of each filtrate into separate 100 ml standard flasks and added 5ml 4N HCl and 10 ml of 20% ammonium thiocyanate and made up to mark. Optical density was measured at 480 nm. using a spectrophotometer.

A standard Fe(III) solution is prepared. 2,4,6,8 and 10 ml of standard iron (III) solutions were pipetted out in to different 100 ml standard flask. To the solution 5 ml of 4N HC and 10 ml of 20% ammonium thiocyanate were added and make up to the mark. Optical density was measured at 480nm. Equilibrium concentration can be calculated from the standard graph of

optical density vs concentration. By knowing initial concentration and equilibrium concentration, the amount of Fe(III) adsorbed can be calculated. The validity of Freundlich adsorption isotherm was tested by plotting $\log x/m$ (ordinate) against $\log C_e$ (abscissa). The slope and intercept value gives $1/n$ and $\log k$ respectively. Similarly validity of Langmuir adsorption was tested by plotting $C_e/x/m$ values (Ordinate) versus C_e (abscissa). A linear plot was obtained. The slope and intercept on the ordinate axis gives the constants a and b respectively. The experiment was repeated with other sample of rice husk.

Results and discussion

The adsorption experiments were carried out with Fe(III) solutions of different concentrations using rice husk of different particle size (RH1&RH2). It was observed that rice husk was a good adsorbent for the removal of heavy metal ions. Equilibrium data of adsorption with rice husk (RH1 and RH2) are shown in the Tables 1 and Table 2 respectively.

Effect of initial concentration of metal ions The adsorption experiments were carried out with metal ion of different concentrations using 2g of Rice husk. Results indicate that lead removal efficiency decreases from 99.37 % to 95.70% for RH1 and from 99.18% to 96.17% for RH2 as the initial concentration of iron increases. At low metal ion loads, adsorption involved the high energy sites. Under these conditions, the ratio of number of moles of metal

ion to the available adsorption sites was low, and therefore, the amount adsorbed per unit mass increased slowly. With an increase in metal ion load, the higher energy sites would be rapidly saturated and the metal ions would gradually occupy the lower energy sites, resulting in a continuous increase in the amount adsorbed per unit mass

Figure 1&4 show the variation of % removal of Fe(III) by RH1 &RH2. % removal decreases with concentration of Fe(III). Results indicate that above 90% Fe(III) ions are removed by rice husk. This may be due to availability of adsorption sites decreases.

Figure 5 shows the comparison of effect of initial concentration of Fe(III) on RH1 and RH2. It is observed that small sized sample RH2 has more adsorption power than the large sized RH1. In small sized sample surface area is large and hence more surface sites are available for adsorption.

The Langmuir, Freundlich, isotherms of iron adsorption onto the rice husk at $25 \pm 5^\circ C$ are shown in Figures. Adsorption equilibrium data of Fe(III) was fitted to the Langmuir and Freundlich isotherm models. Figures 2 and 6 show the linear graphs on plotting C_e against $C_e/x/m$ which reveals that Langmuir adsorption isotherm is verified for two samples of rice husk.

Freundlich adsorption isotherm is also verified by plotting $\log x/m$ against $\log C_e$. A straight line graph (Fig.3 and 7) confirms the validity of the isotherm.

Table 1 Adsorption of Fe(III) on Rice Husk sample 1(RH 1)

S.No.	Mass of RH1	Initial concentration C ₀ (g)	Equilibrium concentration C _e (g)	Amount of Fe(III)adsorbed x/m (g)	log x/m	log C _e	C _e /x/m
1	2	0.0049	0.00003	0.002435	-2.6135	-4.5228	0.01232
2	2	0.0098	0.0002	0.0048	-2.3187	-3.6989	0.04167
3	2	0.0147	0.00062	0.00704	-2.1524	-3.2076	0.08807
4	2	0.0196	0.0009	0.00735	-2.0292	-3.0457	0.09626
5	2	0.0245	0.00114	0.01168	-1.9325	-2.9431	0.09760

Table 2.Adsorption of Fe(III) on Rice Husk (RH 2)

S.No.	Mass of RH2	Initial concentration C ₀ (g)	Equilibrium concentration C _e (g)	Amount of Fe(III) adsorbed x/m (g)	log x/m	log C _e	C _e /x/m
1	2	0.0049	0.00002	0.00244	-2.6126	-4.6989	0.008196
2	2	0.0098	0.00006	0.00487	-2.3124	-4.2218	0.01232
3	2	0.0147	0.00012	0.00724	-2.142	-3.9208	0.01657
4	2	0.0196	0.0006	0.0095	-2.1022	-3.2218	0.06315
5	2	0.0245	0.00074	0.0118	-1.9252	-3.1307	0.06228

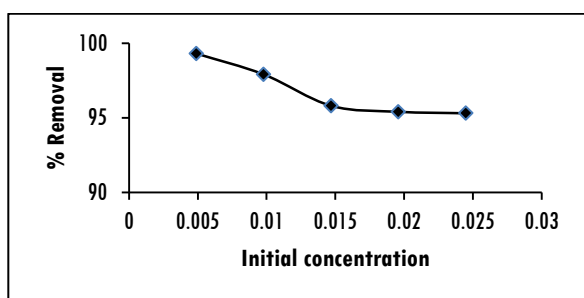


Figure 1. Effect of initial concentration on removal of Fe (III) by RH1

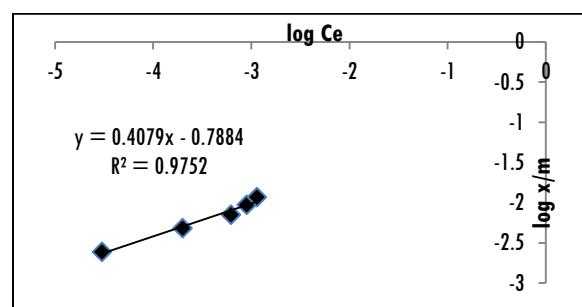


Figure 3. Freundlich adsorption isotherm(RH 1)

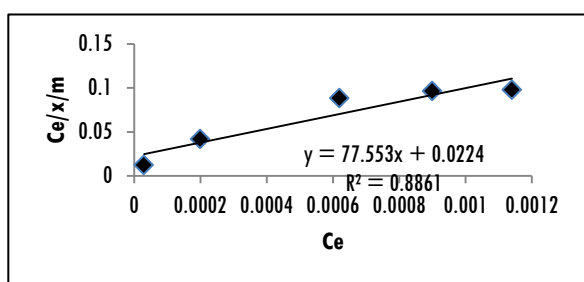


Figure 2. Langmuir adsorption isotherm(RH 1)

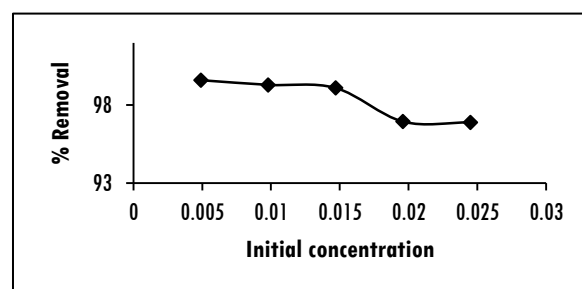


Figure 4. Effect of initial concentration on removal of Fe (III) by RH2

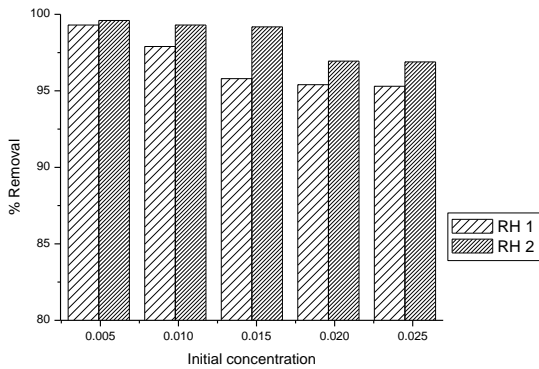


Figure 5. Comparison of % removal of Fe(III) by RH1 &RH2

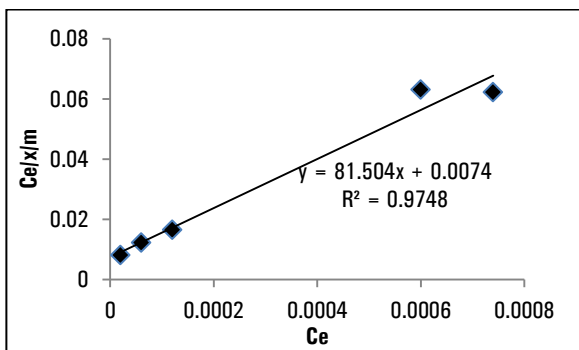


Figure 6. Langmuir adsorption isotherm (RH 2)

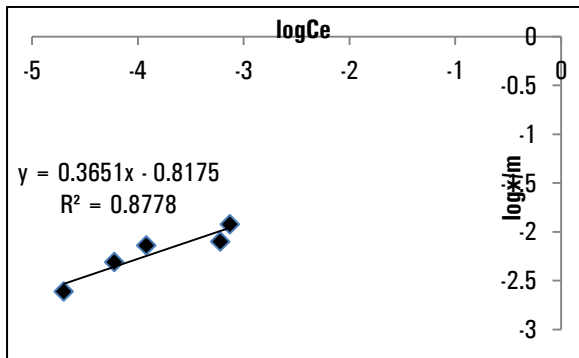


Figure 7. Freundlich adsorption isotherm(RH 2)

Conclusion

The adsorption experiments were carried out with Ferric iron of different concentrations using rice husk of different particle size.

From the above study it is inferred that

- As low cost adsorbent Rice husk can be efficiently used for the removal of heavy

metals without giving any chemical treatment for adsorbent.

- Maximum removal efficiency of iron was 98%
- Fine powdered sample RH2 has more adsorbing power than large sized RH1sample
- As the initial concentration of metal ion increases, adsorption decreases marginally.

Adsorption data are fitted to both Langmuir and Freundlich adsorption isotherm

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MORPHOLOGY AND MECHANICAL PROPERTIES OF NYLON COPOLYMER AND ETHYLENE PROPYLENE DIENE BLENDS

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Abstract

In the present work, a systematic study has been carried out to investigate the effect of incorporation of varying amounts of EPDM on morphology and mechanical properties of nylon(6,66)/EPDM binary blends. First we have studied the effect of blend ratio on the mechanical properties of nylon/EPDM blends. From this we selected three blend ratios viz. 30/70 (EPDM rich blend), 50/50 (co-continuous blend) and 70/30 (nylon rich blend) for further studies. The phase morphology of the blends was investigated using scanning electron microscopy with special reference to blend ratio. Mechanical properties of the blends were correlated with the morphological parameters. Explanations and illustrations based on the results of above studies are presented in this communication.

Keywords: Blends, Mechanical properties, Morphology

Introduction

Blending of an elastomer with a selected plastomer provides thermoplastic elastomers (TPEs) of diverse nature. These materials have significant commercial interest [1-5]. Today, polymer blending is a versatile and widely used method for optimizing the cost-performance balance and increasing the range of potential application. TPEs are reprocessable materials [6]. The physical properties of the blends are controlled by the size of the dispersed phase, its dispersibility and its interfacial interactions [7,8]. The key factors affecting the mechanical properties of TPEs are the morphology and the compatibility between the blend components [9].

Nylon and EPDM could form blends with very interesting properties because nylon offers

very good mechanical properties and EPDM offers good barrier to moisture. Nylon/rubber blends have been extensively studied by several researchers [10-18]. In contrast to nylon 6 and nylon 66 blends, less information is available on the properties of nylon copolymer blends. Therefore it is challenging and interesting to develop super tough thermoplastic elastomers with nylon copolymer. It was observed that as the time of mixing increases the dispersed domain size decreases in the case of nylon/EPDM blends. Thomas and Groeninckx. [19] studied the effect of processing conditions on the morphology development of nylon6/EPM blends in 1999. Paul and co-workers [20] studied the mechanical properties of blends of nylon/EPM-g-MA. They observed strain hardening and cold drawing for the nylon rich blend systems.

Experimental

Materials and Methods

Nylon used in this work is a copolymer of nylon66 and nylon 6,(Tufnyl F-120) was procured from Sri Ram Fibers Ltd. Madras, India. The EPDM (Keltan 720) was obtained from DSM, Netherlands

Blend Preparation

Nylon was preheated in vacuum oven at 80°C for 24 hrs and kept in vacuum decicator.

This preheated and cooled nylon was used for blend preparations.

The blending was performed in Haake Rheocord 600 mixer. Nylon was first charged into the melting chamber and melted at 180°C for 2 minutes at a rotor speed of 60 rpm. The EPDM was masticated for 5 minutes and then fed in to the mixer. The mixing was continued for 6 more minutes. Total mixing time was fixed at 8 minutes to ensure homogeneity. Time and torque were also noted while mixing. The formulation of the blends is given the Table 1.

Table 1: Formulations of the blends

Material	N ₀	N ₂₀	N ₃₀	N ₄₀	N ₅₀	N ₆₀	N ₇₀	N ₈₀	N ₁₀₀
Nylon (6,66)	0	12	18	24	30	36	42	48	60
EPDM	60	48	42	36	30	24	18	12	0

Results and Discussions

The processing characteristics of the blends have been studied from the Rheomix time-torque curves, which are shown in the Fig. 1.

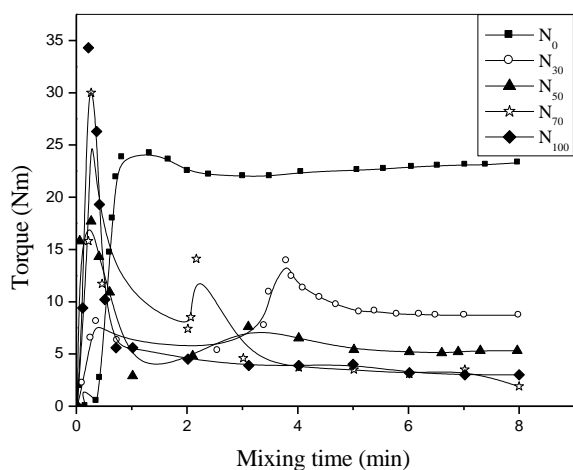


Figure 1: Rheographs showing torque-time relations

The time–torque curves of all blends have two peaks. The first peak is due to the increase in the viscosity by the introduction of the cold nylon granules into the mixer. The viscosity then decreases, showing the complete melting of the

nylon. Upon the addition of EPDM into the nylon, the viscosity again increases which corresponds to the second peak. Thereafter the viscosity comes down showing the complete melting of the second phase and finally the curves level off to give uniform torque value at the end of the mixing. The leveling off of the torque may be related to the attainment of a good level of mixing.

The rotor speed, time of mixing and temperature of mixing were optimized in order to get maximum value for mechanical properties without the material getting thermally or mechanically degraded. It is found that 180°C, 60 rpm and the mixing time of 8 minutes are the ideal conditions for mixing.

Phase morphology of blends

The main mechanism governing the morphology development in the blends is believed to be the result of both droplet breakup and coalescence. The scanning electron micrographs of nylon/EPDM blends (N₂₀, N₃₀,

N_{40} , N_{50} , N_{60} , N_{70} and N_{80}) are shown in the Fig. 2(a) to (g). All the micrographs show a two-phase morphology due to the immiscible nature of the blends as a result of strong unfavourable interfacial interaction.

A careful evaluation of the micrographs suggests that, up to 30 wt % nylon concentrations, the nylon phase is preferentially dispersed in the high viscosity EPDM matrix with a notable difference in the size and its size distribution (Fig. 2 (a & b)). Spherical, elliptical and elongated elliptical domains of nylon can be observed in these blends.

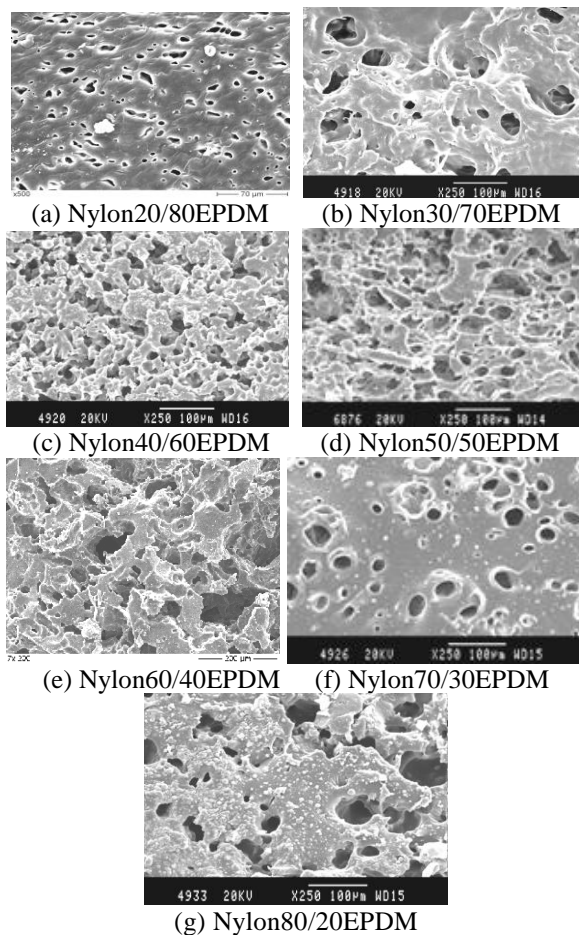


Figure 2: Scanning electron micrograph of nylon copolymer/EPDM blends at a magnification of 250 times (a) N_{20} , (b) N_{30} , (c) N_{40} , (d) N_{50} (e) N_{60}

As the concentration of the nylon increases there is an onset of co-continuous morphology at N_{40} . The blend systems N_{40} , N_{50} , and N_{60} have got a co-continuous phase structure and all other blend systems have got a typical matrix/droplet morphology. The nylon phase and EPDM phase are completely continuous at the co-continuous region. One can see a channel-like co-continuous phases of both components running through one another in Fig.(2d).

In the nylon rich blends (N_{70} and N_{80}) EPDM phase has been extracted (Fig. 2 (f and g)), a phase inversion occurs where nylon forms the continuous phase and EPDM exists as dispersed domains. The blend N_{70} has got a clear and sharp interfacial boundary, which may be attributed to high interfacial tension indicating poor adhesion at the phase boundaries and is a manifestation of the incompatibility of the polymer components in these blends. It is well known that blends based on immiscible polymer components are characterized by high interfacial tension, which makes the dispersion during the blending

Table 2 presents the morphological parameters derived from SEM analysis of cryogenically fractured etched surfaces of the blends.

Table 2: Morphological Parameters of nylon/EPDM Uncompatibilised Blends from SEM analysis

Sample code	Composition of nylon/EPDM	\overline{D}_n (μm)	\overline{D}_w (μm)	$\frac{\overline{D}_w}{\overline{D}_n}$	A_i ($\mu\text{m}^2/(\mu\text{m})^3$)	IPD(μm)
N_{20}	20/80	8.6	13.9	1.61	0.23	4.6
N_{30}	30/70	13.8	20.3	1.47	0.14	3.4
N_{70}	70/30	15.8	21.9	1.39	0.30	3.5
N_{80}	80/20	14.5	19.1	1.32	0.28	2.8

It can be seen from the table that the dispersed phase domain size increased as the concentration of the dispersed phase increased. The extent of increase in the particle size (\overline{D}_n) suggests that the phenomenon of coalescence is more predominant at high concentrations of the dispersed EPDM phase. However, on the other hand, when nylon is the dispersed phase, the influence of increasing nylon concentration on the coalescence is less predominant than the situation where EPDM is dispersed phase. This is associated with the high viscosity of the rubber phase (matrix) which resists the agglomeration of the nylon domains. In fact when the matrix phase is more viscous, the higher shear forces and, hence, the decreasing collision times along with a more difficult matrix interlayer film drainage between the colliding droplets reduce the coalescence probability. This is, in general, related to the droplet agglomeration during melt mixing, which is well known to be a random process. As the result of mixing, drops of dispersed phase may tend to collide and coalesce eventually. The distribution of dispersed particles in continuous matrix can be evaluated from the polydispersity, $\overline{D}_w / \overline{D}_n$.

It is obvious from the table that N₃₀ has got lower value of interfacial area per unit volume than N₂₀. Interfacial area is a measure of interfacial thickness, which in turn is a measure of compatibility of blends. N₃₀ blend is highly incompatible. So it has got a very narrow interface compared to other blends, which may fail to transfer stress between the phases. The low values of the interparticle distance (IPD) indicate that the blends are not very brittle.

Mechanical properties

Tensile stress–strain behaviour of the simple blends at a crosshead speed of 50mm/min is shown in Fig. 4. The difference in the deformation characteristics of the blends under an applied load is evident from the stress-strain curves. Addition of non-crystalline elastomer in small amounts to semicrystalline nylon changes the nature of the curve considerably. At the crosshead speed of 50mm/min, neat nylon has got a well defined stress-strain curve typical that of a flexible plastic. Blends of varying component ratio show different failure characteristics. Stress- strain curves of nylon and nylon rich blends (>50%) show a linear elastic region followed by yielding in the inelastic region. The curve up to the yield point shows clear elastic deformation, thereafter the plastic deformation predominates. In the case of neat nylon, the sharp increase in stress with strain beyond the yield point is associated with the orientation of the crystalline hard segments of the nylon. As the rubber content increases, the initial modulus as well as the yielding tendency decrease. The phase change morphology can be understood from the stress-strain curves. In the case of N₃₀ the stress initially increases slightly and then decreases till the failure occurs.

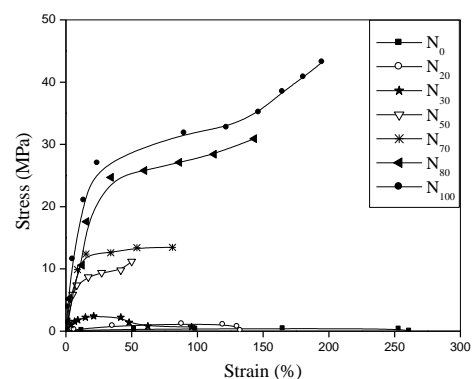


Figure 4: Tensile stress-strain curves of nylon/EPDM blends

The blend N_{50} which is having a co-continuous morphology exhibits a stress-strain behaviour, which is intermediate to those of the other blend compositions. It is also observed that upon the addition of EPDM the strain increases and the stress decreases. Various tensile properties such as tensile strength (σ_m), elongation at break (E_b) and Young's modulus (E) were determined from the stress-strain curves. The variation of tensile strength with wt% of nylon is shown in the Fig. 5.

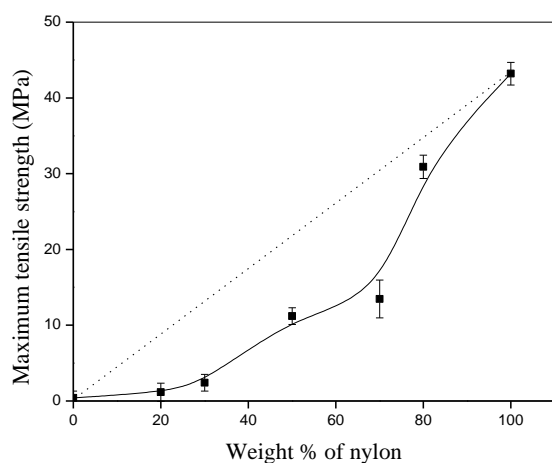


Figure 5: Variation of tensile strength with weight % of nylon

The tensile strength of the nylon/EPDM blends depends on the strength of the nylon matrix which in turn depends on the crystallinity of the nylon phase. As evident from the Fig. 5, nylon is a semi crystalline material having very good tensile strength, while EPDM is an amorphous material having very poor tensile strength. The curve shows a negative deviation. The blends show much lower tensile strength than projected from the additivity line. The negative deviation is due to the poor interfacial adhesion between the crystalline polar nylon and amorphous non-polar EPDM rubber, which prevents the stress transfer between the matrix

and the dispersed phase. The failure stress depends on the interfacial interaction between the two polymer phases. The lowering of the tensile strength in the nylon/EPDM blends may be attributed to the presence of rubbery EPDM particles acting as stress concentrators. It is clear from the Fig. 5 that tensile strength increases as the nylon content increases. A sudden increase in the tensile strength is seen in blends where the nylon concentration is greater than 50%. This sharp increase in the tensile strength is associated with the phase inversion of nylon from dispersed to continuous phase. A clear change in the slope of the tensile strength-composition curve is seen between the composition ranges N_{30} - N_{50}

The Young's modulus of nylon/EPDM blends as a function of blend ratio is given in the Fig. 6. Young's modulus values followed a trend opposite to the strain at break. Modulus is a measure of the strength of the material at low strains. So nylon rich blends give comparatively good Young's modulus values. Pure nylon has got a Young's modulus of ≈ 205 MPa. Addition of EPDM decreases the Young's modulus. The curve has got a negative deviation. This is due to the high interfacial tension between the two phases and the low modulus value of EPDM phase. From 60wt% of nylon onwards the modulus increases remarkably due to the presence of high modulus of nylon as continuous phase. The yield stress also got the same trend as that of young's modulus.

The decrease in the tensile modulus in the blends may be due to the softening effect of the EPDM copolymer, since the tensile modulus of EPDM is considerably lower than that of pure

nylon. The introduction of EPDM, a low modulus material, in to the nylon matrix causes an overall lowering in the tensile modulus of the blends, and this in fact is contributed by the low interfacial adhesion between the two mixtures.

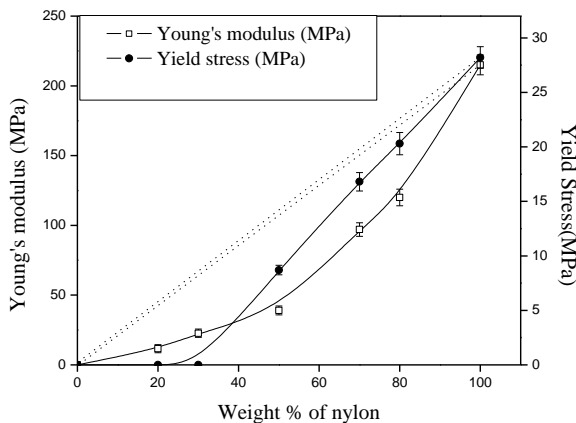


Figure 6: Effect of blend composition on the Young's modulus and yield stress of nylon/EPDM blends

As seen from the Fig. 7 the elongation at break also shows a negative deviation. EPDM has got higher elongation at break value than nylon. The value decreases as the nylon content increases and is found to have more or less same values for N₄₀, N₅₀ and N₆₀ composition. Thereafter the elongation at break is found to be increased. The blends have intermediate values which are much lower than projected from additive level. The low value of the elongation at break for the blends are due o the incompatibility and the poor adhesion between the phases.

The tension set after failure also increases as the nylon content increases (Fig. 3.8). The considerable increase in the tension set values for the blends of high nylon content greater than 40% is attributed to the poor elastic recovery of the nylon phase after deformation.

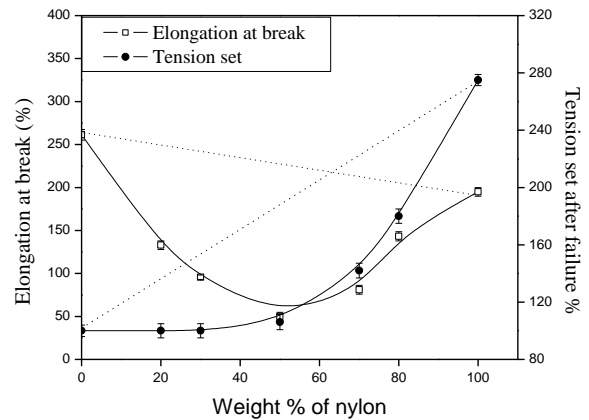


Figure 7: Effect of blend ratio on elongation at break and tension set of nylon and EPDM blends

The variation of tear strength with weight % of nylon is shown in the Fig. 8. The tear strength values of the blends also exhibit same trend as tensile strength. Tear strength decreases as the rubber content increases. This is due to the decreases in the crystallinity caused by the incorporation of the rubber phase. Nylon copolymer is a semi crystalline plastic with much better strength and EPDM is an amorphous elastomeric material with poor strength. From the Fig 8, it is clear that blends with higher wt % of nylon have got higher tear strength. In these blends nylon behaves as a continuous phase.

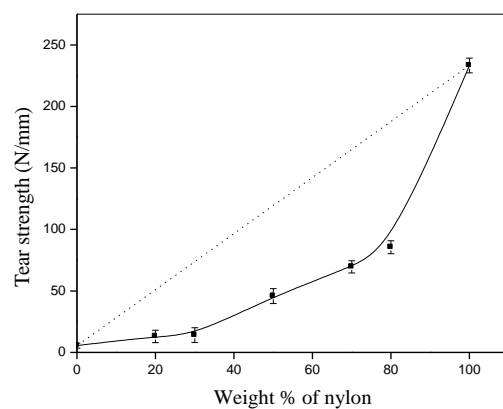


Figure 8: Effect of blend composition on the tear strength of nylon/EPDM blend

One of the important advantages of TPEs is that, they exhibit wide range of hardness. In Fig. 9 the Shore A hardness as a function of blend composition is given. The hardness values ranges from 31 to 99 Shore A.

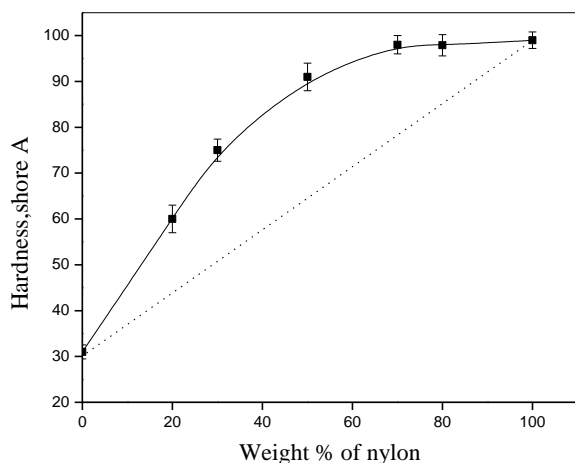


Figure 9: Variation of Shore A hardness with wt% of nylon

The neat nylon shows the highest value of Shore A hardness, while EPDM shows the lowest. The curve shows a slope change beyond 50wt% of EPDM. The reduction in the hardness and the slope change in the curve at higher concentration of EPDM can be explained by the phase inversion of EPDM from dispersed to continuous phase. The useful working range [21] of the Shore hardness measurements is in between 10 and 90 for Shore A. Therefore reliable results were obtained for blends. It is interesting to note that the hardness values show a positive deviation. The values lie above the additive line because it is a surface property and is much less related to the interfacial bonding.

It is interesting to note that as the wt % of the minor phase increased the properties decreased. This is in good agreement with the morphological parameters, which showed that as the weight % of the minor phase increased, the

morphological stability decreased. In short, all the properties except hardness show a negative deviation from additivity line. The inferior mechanical properties of the uncompatibilised nylon/EPDM blends are due to the lack of interfacial interactions between the phases.

Conclusions

Morphology of nylon/EPDM blend system indicated a two-phase structure in which low viscosity nylon phase was dispersed as domain in the continuous high viscosity EPDM matrix up to 40 wt% of nylon concentration. A co-continuous morphology was obtained for 40/60, 50/50 and 60/40 nylon/EPDM compositions. At high nylon concentrations (70wt%), the EPDM phase was dispersed as domains in the continuous nylon matrix. All the results confirmed that the blends of nylon with EPDM show poor mechanical properties because of their immiscibility and owing to their poor interfacial adhesion due to the coarse morphology and lack of favourable interactions at the interface between nylon and EPDM. We observed a definite correlation between the phase morphology and mechanical behaviour. The mechanical properties of the blends were found to be strongly influenced by the blend ratio. Mechanical properties such as tensile strength, Young's modulus, tear strength, and hardness increased with the increase in nylon content. The increase was sharper when the nylon content was more than 60% where it formed a continuous phase. It is found that when the elastomer content increased, Young's modulus decreased and elongation at break increased. All the mechanical properties except hardness were found to have a negative deviation due to the high level of incompatibility.

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A RESULT BASED EVALUATION OF 'KARAL ROGA MUKTHI PROJECT'

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Abstract

As per the international estimates, there are about 18000 deaths every year due to liver cirrhosis, mainly caused by hepatitis. Even though the number of patients with liver diseases has been increasing steadily, the treatment outcomes are still considered poor. Numerous Ayurvedic formulations are used for treatment of liver diseases. In our country more than eighty medicinal plants are used in different combinations as herbal drugs for liver diseases. Ayurvedic medicines can safely manage liver disorders. In Kerala, many of the poor and middle class people depend on Government Ayurveda Hospitals for effective treatment. 'Kartal Roga Mukthi Project' was a special endeavor implemented by the Indian Systems of Medicines (ISM), Government of Kerala for providing the treatment for the liver disease patients, especially to the middle class and the down trodden groups. Thousands of years of traditional experience is the real base of Ayurvedic treatment. Recently, the number of patients seeking ayurvedic treatment is growing in a significant manner. The drugs used under the Kartal Mukthi Project have shown the significance and possibilities of ayurvedic medicines in the treatment of liver diseases. Factors such as metabolism, absorption, distribution and intrinsic concentration of the drug need to be known accurately to determine the dosage and duration of the ayurvedic treatment. In Kartal Roga Mukthi Project, various combinations of drugs were used, which are already mentioned in Ayurveda, in different contexts. In this context this is an attempt to assess the efficacy of the health service delivered under 'Kartal Roga Mukthi Project' initiated by the Department of Indian systems of Medicine, Government of Kerala during the year 2016.

Keywords: *Kartal Mukthi Project, Liver diseases, Hepatitis, Ayurvedic medicines, Fatty liver, Alcoholic Hepatitis, Alcoholic Cirrhosis Etc.*

Introduction

Chronic diseases, frequently classified as a major component of non-communicable diseases (NCDs), usually affects the middle or old age individuals after prolong exposure to an unhealthy lifestyle relating mainly to economic transition, rapid urbanization and 21st-century lifestyles: tobacco use, harmful consumption of alcohol, unhealthy fast food diet, insufficient physical activity and extended office working hours. In India, the disease profiles and its types are changing quite alarmingly. The WHO has recognized India as one of the nations with

maximum number of lifestyle-related disorders in the near future. India is already been considered as the diabetes capital of the world. The most common sedentary lifestyle disorder includes obesity, hypertension and heart-related diseases. The liver is our largest internal organ and it has 500 different roles. One of the liver's most important functions is to break down food and convert it into energy when we need it. Liver also helps the body to get rid of waste products and plays a vital role in fighting infections, particularly in the bowel. And yet, when the liver is damaged, it may not be known until things get serious. Drinking alcohol can increase

the risk of developing liver disease and cause irreparable damage to liver, which is an important organ of human body. There are many types of liver disease but the main types are:

1. Alcohol-related fatty liver-disease.
2. Non-alcoholic fatty liver disease.
3. Viral (Hepatitis).
4. Autoimmune (Chronic Hepatitis).

All of the types of liver disease listed above can cause damage to the liver. Liver disease is the term used to describe damage to the liver and there are two types. Acute is when liver problems develop over a few months and chronic is damage over a number of years. There are lots of different causes of liver disease, including drinking alcohol to excess which causes 'alcoholic liver disease'. Scientists are not sure exactly why drinking too much alcohol can damage the liver but the reasons include: 1).Oxidative stress. When the liver tries to break down alcohol, the resulting chemical reaction can damage its cells. This damage can lead to inflammation and scarring as the liver tries to repair itself. 2). Toxins in gut bacteria. Alcohol can damage our intestine which lets toxins from our gut bacteria get into the liver. These toxins can also lead to inflammation and scarring.

Objectives of the Study

The important objectives of 'Kara Roga Mukthi Project' implemented by Indian systems of Medicine (ISM) Department were to give a message to the public that the liver disorders can be effectively treated by using Ayurvedic Medicines, to give an awareness to the public about the various causes of liver disorders and its seriousness, provide an ideal treatment

especially to the socially and economically backward classes.

The major objectives of this paper are:

1. To describe the different formulations of Ayurvedic Medicines used in the treatment of different conditions of liver diseases under the 'Kara Roga Mukthi Project'.
2. To assess the efficacy of the 'Kara Roga Mukthi Project' in the treatment of different conditions of liver diseases.

Methodology of the Study

Thaluk Ayurveda Hospital Thalipparamba, Kannur was one of the institution implemented 'Kara Roga Mukthi Project' during the fiscal year 2015-2016. It is a fifty bedded Government Ayurveda Hospital.

Table-1 Gender wise Classification of the Patients

Sl. No	Sex	Patients selected for treatment		Patients selected for treatment	
		Number	Percentage	Number	Percentage
1	Male Patients	113	81.8 %	44	67.69
2	Female Patients	25	18.2 %	21	32.31
TOTAL		138	100.00	65	100.00

Source: Primary Data

After screening subjectively and objectively, finally 138 patients were selected for the treatment under this Project. Out of this 65 patients were cooperated with this Project and completed their treatment successfully. Therefore this study report is confined to a sample of 65 patients.

Anatomy and Physiology of the Liver- An Overview.

The liver is the largest organ of the human body. Liver is located in the upper right corner

of the abdomen. The normal color of the liver is brown and the external surface is smooth. The liver is about 2 percent of body weight in the adult, which amounts to approximately 1400 gm in females and 1800 gm in males. The liver consists of four lobes. It receives about 1.5 quarts of blood every minute via the hepatic artery and portal vein. The organ is closely associated with the small intestine, processing the nutrient-enriched venous blood that leaves the digestive tract. The liver performs over 500 metabolic functions. The liver receives thirty per cent of the resting cardiac output and acts as a giant chemical processing plant in the body. These chemical reactions, called metabolism, are central in the regulation of body homeostasis.

The liver cells, called hepatocytes, contain thousands of enzymes essential to perform vital metabolic functions. They are supermodels in the world of cellular metabolism. The liver metabolises both beneficial and harmful substances. It stores nutrients and other useful substances, as well as detoxifying or breaking down harmful compounds. These can be then excreted from the body in bile via the liver; in urine via the kidney, or by other means.

Functions of Liver

The liver is the largest glandular organ in the human body. It performs multiple critical functions to keep the body pure and free from various kinds of toxins and harmful substances. The liver regulates most chemical levels in the blood. It excretes a product called bile. Bile helps to break down fats, preparing them for further digestion and absorption. All of the blood leaving the stomach and intestines passes through the liver. The liver processes this blood and breaks

down, balances, and creates nutrients for the body to use. It also metabolized drugs in the blood into forms that are easier for the body to use. Many vital functions have been identified with the liver. The most important functions of liver can be identified as: Liver produces bile. It helps to break down fats in the small intestine during digestion. It helps in the conversion of harmful ammonia to urea. Urea is one of the end products of protein metabolism that is excreted in the urine. Liver store glucose and release as and when it is needed. Production of cholesterol and special proteins to help carry fats through the body is done by the liver. Liver processes hemoglobin for the use of its iron content and the liver stores iron. Liver clears the blood by eliminating the harmful chemicals and other substances. It regulates the clotting of blood. Liver produces certain proteins for blood plasma. It helps in resisting infections by producing immune factors and removing bacteria from the bloodstream. It clears bilirubin. If there is a buildup of bilirubin, the skin and eyes turn yellow.

Common Liver Diseases and Its Symptoms

There are more than hundred types of liver diseases. It is true to state that liver failure is always life-threatening unless it is properly treated. It is due to the relevance of vivid functions that are carried out by the liver, Common liver diseases include hepatitis infection, fatty liver disease, and cancer, as well as damage from alcohol, the pain reliever acetaminophen, and some cancer drugs. Cirrhosis of the liver occurs when the organ becomes scarred and hardened so that it cannot function properly. This is most often caused by

chronic liver disease brought on by long-term alcohol abuse. Liver dialysis is relatively a new treatment. It cannot support a person longer than a few years. Dialysis is normally used in the time between liver failure and liver transplant surgery. In the case of dialysis, a machine performs the detoxification function of the liver.

Liver is responsible for performing different functions in human body. Disruption of these functions can lead to complications throughout the body. Any type of damage to liver, due to several reasons such as alcohol abuse, smoking, unhealthy eating habits, etc. can disrupt these functions and lead to complications throughout the body. The important common symptoms of liver diseases can be described as: Nausea and vomiting is a common symptom that accompanies a lot of diseases. Nausea refers to experiencing an urge to vomit and may be accompanied by sweating and excessive salivation. Vomiting on the other hand refers to the actual ejection of the contents of stomach through mouth and is usually painful. Pain in the right upper part of the abdomen is another important symptom of liver diseases. If there is a feeling of pain in that area, it may be an indication of the existence of liver disease. The liver is one of the vital organs involved in digestion. Any kind of damage caused to liver can disrupt the normal process of digestion. Hence indigestion is considered as another symptom of liver failure. Liver is responsible for the absorption of many minerals and vitamins in body. If it stops functioning properly, patients may experience symptoms like weakness and fatigue. Many types of liver disease can cause decreased appetite as the body is not able to digest the food properly. Liver disease also

disrupts the metabolism leading to unexplained and sudden weight loss. People suffering from hepatitis or liver cancer may also suffer from jaundice, which causes yellow discoloration of skin and eyes. Liver disease can cause several other complications also. Therefore, it is important that even common man must be alert about liver diseases and also should take necessary care for our health before it's too late.

Fatty Liver

This is the commonest alcohol induced liver injury. Fatty liver is excessive accumulation of fat inside the liver cells. The liver is enlarged, causing upper abdominal discomfort on the right side. Liver tests are generally normal. This can be observed on ultrasonography of abdomen.

Alcoholic Hepatitis

Alcoholic hepatitis is an inflammation of the liver, accompanied by the destruction of individual liver cells and scarring. Symptoms may include fever, jaundice, and enlarged, tender liver and spider-like veins in the skin. If consumption is not controlled it leads to cirrhosis which is end-stage liver disease. Severe alcoholic is associated with significant mortality.

Alcoholic Cirrhosis

The harshness of liver disease depends on the duration and quantity of alcohol consumed by the patient consumes. Alcoholic cirrhosis is the permanent destruction of normal liver tissue, leaving non-functioning scar tissue. Pain in right upper side of abdomen, fever, yellowing of the skin and eyes, spider-like veins in the skin are common features of alcohol related liver

damage. Some other serious symptoms may include hematemesis, that is vomiting of blood along with passage of tarry black stools; lump or heaviness in left upper side of abdomen because of enlarged spleen, ascites, that is fluid build-up in the abdominal cavity leading to abdominal distension along with swelling on feet, kidney failure and in more severe situation confusion, drowsiness, stupor, coma can be seen. Consumption of alcohol also accelerates preexisting damage due to other causes like hepatitis C infection. A complete medical history and physical examination are required along with few other tests. Liver function tests include a series of special blood tests that can determine liver function.

Alcoholic Liver Disease

This is the most commonly existing liver disease in our country. It is caused by excessive consumption of alcohol generally beyond safe dose. It is a preventable disease. The three primary types of alcohol-induced liver injuries are fatty liver, alcoholic hepatitis and liver cirrhosis. There is a close relationship between alcohol abuse and liver damage. Alcoholic liver injury appears to progress from fatty changes through alcoholic hepatitis to cirrhosis. Majority of the individuals who abuse alcohol will develop fatty changes in their liver at some stage of their drinking career. However only in twenty per cent of such individuals will develop *cirrhosis* and approximately in the case of fifty per cent of individuals alcoholic *hepatitis* may persist for several years. If alcoholic cirrhosis once established is irreversible and hepatic function may not improve over time, management consists of

abstinence from alcohol, treatment of complications and *liver transplantation* may be a viable option in carefully selected patients. *Liver transplantation* should not be done in patients with pure alcoholic *hepatitis*.

Fatty Liver (NASH)

Fatty liver is the accumulation of fat in liver cells. Simple fatty liver is not a disease, since it does not damage the liver. Another term often used to describe this condition is fatty infiltration of the liver. Fatty liver is also known as NASH, which stands for non-alcoholic steatorrheic hepatitis or non-alcoholic fatty liver Disease (NAFLD). Fatty liver is the collection of excessive amounts of triglycerides and other fats inside liver cells. The major feature in NASH is fat in the liver, along with inflammation and damage. Most people with NASH feel well and are not aware that they have a liver problem. Nevertheless, NASH can be severe and can lead to cirrhosis, in which the liver is permanently damaged and scarred and no longer able to work properly.

Fat accumulates in the liver usually in connection with heavy use of alcohol, extreme weight gain or diabetes mellitus. Fatty liver can also occur with poor diet and certain illnesses, such as tuberculosis, intestinal bypass surgery for obesity, and certain drugs such as corticosteroids. It most often occurs in persons who are middle-aged and overweight or obese. NASH is usually a silent disease with few or no symptoms. Patients generally feel well in the early stages and only begin to have symptoms--such as Fatigue, Weight loss, Weakness. Once the disease is more advanced or cirrhosis develops. The progression of NASH can take

years, even decades. NASH can slowly worsen, causing scarring or "fibrosis" to appear and accumulate in the liver. As fibrosis worsens, cirrhosis develops; the liver becomes seriously scarred, hardened, and unable to function normally. NASH is a condition that can be identified by taking a sample of liver tissue (liver biopsy) and examining it under a microscope. The only means of proving a diagnosis of NASH and separating it from simple fatty liver is a liver biopsy. NASH is diagnosed when examination of the tissue under the microscope shows fat along with inflammation and damage to liver cells. If there is fat without inflammation and damage, simple fatty liver or NAFLD is diagnosed. An important piece of information learned from the biopsy is whether scar tissue has developed in the liver. Currently, no blood tests or scans can reliably provide this information.

Symptoms of Liver Diseases

The important symptoms of liver disease include: nausea, vomiting, right upper quadrant abdominal pain, and jaundice (a yellow discoloration of the skin due to elevated bilirubin concentrations in the bloodstream). Fatigue, weakness and weight loss may also occur. However, since there are a variety of liver diseases, the symptoms tend to be specific for that illness until late-stage liver disease and liver failure occurs. Examples of liver disease symptoms due to certain conditions or diseases include: A person with gallstones may experience right upper abdominal pain and vomiting after eating a greasy (fatty) meal. If the gallbladder becomes infected, fever may occur. Gilbert's disease has no symptoms, and in an

incidental finding on a blood test where the bilirubin level is mildly elevated. Individuals with cirrhosis will develop progressive symptoms as the liver fails. Some symptoms are directly related to the inability of the liver to metabolize the body's waste products. Others reflect the failure of the liver to manufacture proteins required for body function and may affect blood clotting function, secondary sex characteristics and brain function. Symptoms of cirrhosis of the liver include: easy bruising that occur due to decreased production of clotting factors. Bile salts can deposit in the skin causing itching, gynecomastia or enlarged breasts in men may occur because of an imbalance in sex hormones; specifically an increase in estradiol. Impotence (erectile dysfunction, ED), poor sex drive and shrinking testicles are due to decrease in function of sex hormones. Confusion and lethargy may occur if ammonia levels rise in the blood stream (ammonia is a waste product formed from protein metabolism and requires normal liver cells to remove it). Ascites (fluid accumulation within the abdominal cavity) occurs because of decreased protein production. Muscle wasting may occur because of reduced protein production. Additionally, there is increased pressure within the cirrhotic liver affecting blood flow through the liver. Increased pressure in the portal vein causes blood flow to the liver to slow down and blood vessels to swell. Swollen veins (varices) form around the stomach and esophagus and are at risk for bleeding.

Diagnosis of liver diseases

The precise diagnosis of liver disease involves a history and physical examination

performed by a health care professional. Understanding the symptoms and the patient's risk factors for liver disease will help guide any diagnostic tests that may be considered. Sometimes history is difficult, especially in patients who abuse alcohol. These patients tend to minimize their consumption, and it is often family members who are able to provide the correct information. Liver disease can have physical findings that affect almost all body systems including the heart, lungs, abdomen, skin, brain and cognitive function, and other parts of the nervous system. The physical examination often requires evaluation of the entire body. Blood tests are helpful in assessing liver inflammation and function. Specific liver function blood tests include:

1. AST and ALT (transaminase chemicals released with liver cell inflammation);
 2. GGT and alkaline phosphatase (chemicals released by cells lining the bile ducts);
 3. Bilirubin
 4. Protein and albumin levels.
 5. Other blood tests may be considered, including the following:
 - Complete blood count (CBC), patients with end stage liver disease may have bone marrow suppression and low red blood cells, white blood cells and platelets. As a result, patients with cirrhosis may have bleeding.
 - INR blood clotting function may be impaired due to poor protein production and is a sensitive measure of liver function.
- Lipase to check for pancreas inflammation.
 - Electrolytes, BUN and creatinine to assess kidney function.
 - Ammonia blood level assessment is helpful in patients with mental confusion to determine whether liver failure is a potential cause.
 - Imaging studies may be used to visualize, not only the liver, but other nearby organs that may be diseased. Examples of imaging studies include
 - CT scan (computerized axial tomography)
 - MRI (magnetic resonance imaging)
 - Ultrasound (sound wave imaging, which is especially helpful in assessing the gallbladder and bile ducts.
 - Liver biopsy may be considered to confirm a specific diagnosis of liver disease.

Ayurvedic Aspects of the Liver and Its Disorders

Ayurveda is a science famous for time immemorial and is still emerging as a leading alternative health care system. Ayurveda is the world's oldest science of health care. The written tradition dates back more than five thousand years. There are three basic fundamental biological humours described by Ayurveda- The Vata, Pitta and Kapha also called the "tri-energies". These are the ones who are totally controlling the universe and are responsible for planetary movements (Vata), their formation and destruction (Pitta) and generation and maintenance of new life (Kapha). Same tri-energies are found inside every living

being and are responsible for health and disease. Their balance is health or harmony whereas the imbalance is disease or chaos. These three doshas govern all the processes in all levels of our life. Vata governs all movement, Pitta all heat and transformation and Kapha all growth, structure and lubrication.

Vayupitham kaphaschethi thrayo dosha
samasatha

Vikrthavikrtha deham gnanthi the varthayanthi
cha

Our diet, our behavior, the seasons, emotions and our life style all have impact on balance of trienergies. The main principal of healing in Ayurveda is to maintain the balance of Vata, Pitta and Kapha by alteration in our lifestyle, our thoughts, our diet and understanding nature and through herbal medicines.

Samdosha samagnisch samadhatu malakriya

Prasanna, atmendrya mana swastha ithi
abhidhiyate

Having a balanced state of Doshas, Agni (Digestive Fire), Dhatus (tissues) and normal functioning of Mala (waste products), cheerful state of Atman (soul), sensory organs, and mind are the symptoms of healthy life.

- If Vata gets out of balance, for instance, it leads to overactive mind, poor circulation, poor nerve conduction, loss of memory, irregular elimination, uncomfortable menses, etc. - all things related to movement.
- If Pitta is out of balance, we can get excessive digestive fire, resulting in heartburn, excess stomach acid, a hot

temper, inflammations, etc. -all things related to heat and digestion.

- If Kapha gets out of balance, it can lead to chronic congestion, weight gain, cellulite, cholesterol buildup, acne, oily skin, etc. - all things related to structure and lubrication.

Liver is the main seat of metabolism. It is one of the most important organs in the body. According to Ayurveda, it is seat of all metabolism i.e. seat of "Pitta" or Fire energy of the body. Almost everything is processed in the liver, the food, vitamins, enzymes, hormones, neurotransmitters, drugs, alcohol, bacteria, viruses, proteins, carbohydrates, fats are all metabolized by liver. This is not enough but all the preservatives, synthetic flavors, chemicals, food additives, coloring agents, taste maskers etc. put extra burden on liver. Liver has to work hard to process them.

Visceral organs are generally explained in terms of anatomy and physio-pathological derangements. However, Ayurveda Samhitas treat these aspects under one heading of "Sharir". Liver is a vital organ for chayapachaya (metabolism) of consumed food. Acharyas have opined about the genesis of Yakrit from RaktaDhatu as Ayurveda narrates the basic principles including Panchamahabhoota, Tridosha, Saptadhatu, etc., in view of embryology and organogenesis. The various organs generate from different combinations of mahabhuta and specially Raktadhatu (Blood tissue) in the context of liver. Even conventional anatomy states that an abundant quantity of blood is responsible for the formation of sinusoids of the liver. The liver is a well-known

organ in Ayurveda. In Vedas, it is named as “Takima” or “Yakna”. Synonyms like Kalakhanda, Jyotisthana, Yakritkhanda, Yakritpinda, Raktadhara and Raktashaya are found in the ancient literature for liver. Yakrit is a site of RaktaDhatu, where Blood is stored therefore, Raktadhara or Raktashaya words are perceived as synonym of liver and used in Ayurveda Samhitas.

Utpatti In relation to the development of body parts, Yakrit is developed or generated from Matrijabhava, as stated by Acharya Sushruta and Charaka in ShariraSthana. Acharya Sushruta, in Sharirasthana states that Yakrit is also engendered from RaktaDhatu. According to Acharya Arunadatta, the three Bhavapadarthas, i.e. Samana Vayu, Dehoshma, and RaktaDhatu take part in the formation of Yakrit, Pleeha, and Kloma. While considering these verses, it has been cleared that all the Acharyas were sure about the major role of RaktaDhatu in the development of Yakrit (liver).

Varna (Color) In the classics, various references regarding the color of Yakrit can be seen during the elucidation of signs and symptoms of diseases. The color of Vidradhiis similar to the color of Yakrit, i.e. Krishnalohitam (reddish brown).

Svarupa (Appearance) According to Brihadaranyaka Upanishad, the appearance of Yakrit and Pleeha are solid structures like mountains.

Sthaana (Site) Acharya Arundattahas stated that the site of the liver is below and right to the heart.

Karya (Physiology of liver) Many Acharyas have stated that the main function of

Yakrit is to offer red color to Rasa Dhatu, i.e. Ranjana of Rasa Dhatu. However, according to Acharya Vagbhata, this function is carried out in Amashaya, (stomach). According to Sushruta, the function of Pitta, which has its seats in the liver and spleen, consists of imparting its characteristic pigment (Ragakrit) to the Rasa Dhatu (lymph chyle) and hence it is known as Ranjakagni. Acharya Sharangadhara also has a similar opinion about the formation of blood. Sushruta explains that foetal nutrition usually depends on Ahara Rasa, categorized under maternal factors and Vayu present in Jyotisthana, responsible for cell division. The Ahara Rasa is first received by Jyotisthana, which further nourishes the whole body. Therefore, Jyotisthana is perceived as “liver”.

Problems of Liver with an Ayurvedic Perspective

Because the liver is the seat of Pitta dosha, Pitta-based problems of skin inflammation can be a direct result of liver imbalance. The liver is composed of five bhutaagnis(digestive fires) that correspond to the five elements of earth (prithvi), fire (tejas), water (apu), air (vayu) and space (akasha), each specializing in digesting that particular element in the food and transform Rasa Dhatu (clear part of plasma) to blood tissue. If their flame burns too high, or too low, or burns unevenly, then the Rasa Dhatu will not be properly converted into blood tissue, and toxins will enter the blood. All of these functions are governed by Ranjaka Pitta, and if it loses its balance, it can affect the blood and skin and result in inflammatory problems such as skin breakouts, acne, cold sores, including psoriasis. Also, toxins stored in liver can lead to allergic

conditions, Hypercholesteremia, hypoglycemia, constipation, digestive problems, or fatigue. If the imbalance continues for a longer duration, serious diseases of the liver, including hepatitis, cirrhosis, jaundice and cancer, may develop.

Various kinds of liver disorders that are described in Ayurveda can be stated as madathyam, pandu, kamila, kumbakamila, udaram, anaham, ashteela etc.

A Profile of the Karal Roga Mukthi Project'

The Department of Indian Systems of Medicine (I.S.M), Government of Kerala has decided to implement a Project named, 'Karal Roga Mukthi' in order to identify the liver disease patients and provide them effective ayurvedic treatment for the relief, at low cost. As a part of this, the Thaluk Ayurveda Hospital has also selected for the implementation of Karal Roga Mukthi Project in the fiscal year 2015-2016.

Thaluk Ayurveda Hospital Thalipparamba is located in Koovode, four kilometers south away from Thalipparambu Municipal Town. It is a fifty bedded Ayurveda Hospital which offers quality treatment especially to the socially and economically backward rural people.

Significance of 'Karal Roga Mukthi Project'

In the modern world the liver disorders became a life style disease. It has emerged as a silent killer other than the infectious and hereditary diseases. By changing the life style and unhealthy food habits we can successfully prevent liver disorders. Liver is a master organ which performs vivid functions. So any kind of disorders occur in this major organ badly affect

the smooth functioning of human body. In the absence of timely treatment that may lead to chronic stages and ultimately lead to the entire failure of liver, results in death.

Various studies have revealed that the intensity of liver diseases has increased considerably in India as well as in Kerala. Ayurvedic medicines can safely manage liver disorders. Many of the poor and middle class people depend on Government Ayurveda Hospital for effective treatment. Karal Roga Mukthi Project was a special endeavor implemented by the Indian Systems of Medicines (ISM), Government of Kerala for providing the treatment for the liver disease patients, especially to the middle class and the down trodden groups.

Aims of the 'Karal Roga Mukthi Project'

The important objectives of 'Karal Roga Mukthi Project' implemented by Indian Systems of Medicines (ISM), Government of Kerala through Thaluk Ayurveda Hospital, Thalipparamba, Kannur during the year 2016 were:

1. To give a message to the public that the liver disorders can be effectively treated by using Ayurvedic Medicines.
2. To give an awareness to the public about the various causes of liver disorders and its seriousness.
3. To provide an ideal treatment especially to the socially and economically backward classes.
4. To assess and project the efficacy of different formulations of Ayurvedic Medicines in the treatment of different conditions of liver diseases in a scientific way.

Mode of Implementation of ‘Kara! Roga Mukthi Project’

The Ayurvedic and modern aspects of liver and its disorders were observed in the study. To reach the diagnosis both subjective and objective parameters were considered. The selection of patients was carried out mainly from OP and IP department of Thaluk Ayurveda Hospital, Thaliparamba. A few number of patients were also screened and selected from HOPE, Institution functioning at Pilathara, Kannur District. Totally 138 patients were screened and out of this 65 patients were cooperated with this Project and completed their treatment successfully. The lab tests were carried out by rendering the service of an expert lab technician by using facilities of the Hospital. Liver function Test Kits (LFT Kits) were supplied by the office of the ISM Department, Kannur. The facility for doing Ultra Sonographic Test (USG) was not available in the Hospital. Therefore the patients were advised to do it outside the hospital. The expenditure incurred for this USG Test was met by the ISM Department Kannur. After screening subjectively and objectively, finally 138 patients were selected for the treatment. But the number of patients successfully completed the treatment were only sixty five.

After screening the selected patients, based on their nature of dosha, dooshya, agni and ama conditions, they were grouped into three. The medicines were selected and prescribed according to the nature of the patients.

Group-1 The patients with more agnimandya, aruchi anaham and with vatakapha dosha predominancy were belonging to this group

Group-2 In this group, patients with theekshnagni or vishamangni and vatapaitika dosha predominancy were incorporated.

Group-3. This group included the patients with no symptoms subjectively but the objective parameters were abnormal.

Limitations Involved in the Implementation of ‘Kara! Roga Mukthi Project’

The Department of Indian Systmes of Medicine (I.S.M), Government of Kerala has decided to implement a Project named, ‘Kara! Roga Mukthi’ in order to identify the liver diseased patients and provide them effective ayurvedic treatment for the relief, at low cost. As a part of this, the Thaluk Ayurveda Hospital has also selected for the implementation of Kara! Roga Mukthi Project in the fiscal year 2015-2016.

The important limitations noticed in the implementation of the Kara! Roga Mukthi’ were:

- The USG examination was not done in all patients came for treatment mainly due to insufficient allocation of fund.
- The total number of patients screened for the treatment was 138 but all of them were not came for the treatment. Only 65 patients cooperated and completed the treatment.
- The total number patients came for treatment was less.
- Some of the patients hesitated to follow diet and regime.

- Basically this was not a research study. A group of patients with placebo medicines was not maintained.
- Some patients who were relieved from the alcoholic liver disorders began to use alcohol after the treatment.
- Patients with serious and advanced liver disorders were not taken for the treatment under this project.

If sufficient fund is allocated, these types of projects can be successfully implemented for the sake of poor patients who are suffering from liver related diseases.

Major Medicines Used under the 'Kara Roga Mukthi Project'

The core medicines used in the Kara Roga Mukthi Project implemented during the 2016 were: Kaidaryadi Kashayam, Padolakaduku rohiniyadi Kashayam, Vasaguluchyadi Kashayam, Dhraakshadi Kashayam, Rasayana Chooram (Yashti Chooram, Guloochi Chooram, Thriphala Chooram in 1:2:3 combination), Avipathi Chooram, Anna bhedi Sindhooram, Vilwadi Gulika, Navayasam Gulika, Rohithakarisham, Punarnavasavam Etc.

The Concept of Treatment in Kara Roga Mukthi Project'

Majority of the diseases are outcome of malfunctioning of the agni which rightly has been called as central to health. The term **Agni** is best represented by **biological fire** and it is vital at physiological and pathological levels. Agni not only plays vital role in absorption of macro as well as micronutrients, but also act as a destructive to pathogens. The food that in not properly digested is referred as "ama" in

Ayurveda and it nothing but a toxin or pathogen responsible for array of diseases. Proper functioning of digestive fire is evident from normal tone of the digestive-system circulatory-system, strong immunity or resistance against diseases, proper tissue growth, and above all the complexion. This description better deals with physiological significance of agni.

Agni converts food in the form of energy, which is responsible for all the vital functions of our body. If digestive fire is not functioning properly, one has poor digestion, languid blood-circulation, poor complexion, low energy levels, flatulence and poor immunity against diseases. Thus promoting proper functioning of the digestive fire is treating the root cause of the diseases, according to Ayurvedic principles.

The main Ayurvedic medicines used under the Kara Roga Mukthi Project-2016 aims for:

1. The correction of vitiated agni.
2. The use of medicines specifically acting at liver.
3. The use of Medicines for protecting the health of the liver cells (Rasayana Drugs).

Mode of Treatment

In this Kara Roga Mukthi Project various combinations of drugs were used, which are already mentioned in Ayurveda, in different contexts .By observing the symptoms and conditions of the patients and by assessing the stage of vitiated doshas, dadhus, mala and agni the suitable combinations of drugs were prescribed. By reviewing the condition of the patient in every 15 days, the drugs were changed, if necessary or continued the same.

According to the symptoms of the patients, there were three groups of patients. These were:

1. Patients with less appetite, gas trouble, weight feeling or pain of abdomen. (Vata Kapha dosha predominancy)
2. Patients with acidity, burning sensation, vertigo and fatigue (Paithika dosha predominancy)
3. The patients with no symptoms, but with high LFT values. and abnormal USG reports.

The First Group was treated initially with Kaidaryadi Kashayam.Vilvadi Gulika and Triphala Chooram.

The Second Group was treated initially with Vasaguloochyadi Kashayam, Avipathi Chooram and Annabhedi Sindooram.

The Third Group was initially treated with Kaidaryadi and Vilvadi Gulika for seven days then after that the Padolakadurohnyadi and Drakshadi Kashayam were given.

In all these groups Drakshadi Kashayam and Rasayana Chooram were prescribed in the last two or three weeks by observing their condition.

Logic behind the Selection of Medicine

In the case of **First Group** agni mandya and ama were more and therefore the Kaidaryadi

Kashayam.Vilvadi Gulika were given because these drugs have good amapachana property and shows vata kapha samanam.

In the case of **Second Group** agni theeshnathwam and the predominance of dosha was pitham. Therefore Vasaguloochyadi Kashayam, Avipathi Chooram and Annabhedi Sindhooram were prescribed. These drugs have pttha samana property

In the case of **Thid Group**, Kaidaryadi Kashayam.Vilvadi Gulika were given initially because of its deepana pachana property.

In all the groups Drakshadi Kashayam and Rasayana Chooram were given for the last three weeks, by considering its rasayana property.

Properties and Main Indications of Important Medicines Used

The significant medicines used in the Karal Mukthi Project and its Ayurvedic aspects are summarized as follows.

1. Kaidaryadi Kashayam

Kaidaradidi Kashayam has vatha kapha samana property. It has also special action in jadara (koshtam). It is a very good ama pachana preparation.

Table-2

SI.No	Medicine	Rasam	Gunam	Vipakam	Veeryam	Dhoshaharathwam
1	Sundi	Kadu	Lagu, Snigdham	Maduram	Ushnam	Kaphavatham
2	Kaidaryam	Kaduthiktha kashayam	Lagu rooksham	Kadu	Ushnam	Kaphaharam
3	Padolam (Stem)	Thiktham	Lagu rooksham	Kadu	Ushnam	Kaphaharam
4	Pathya	Kashayam, Thiktham, Madhuram, Amlam, Kadu	Lagu rooksham	Maduram	Ushnam	Thridhasha Samanam (specially Kaphaharam)

2. Padolakaduku Rohinyadi Kashayam

Padolakadurohnyadi kashayam has kapha pitha samana property.

Kadukurohini acts actively in liver diseases.

Table-3

Sl.No	Medicine	Rasam	Gunam	Vipakam	Veeryam	Dhoshaharathwam
1	Padolam	Thiktham	Lagu, Rooksham	Kadu	Ushnam	Kapha Pitha Samansam
2	Kadukurohini	Thiktham	Lagu rooksham	Kadu	Seetham	Kaphaharam
3	Chandanam	Thiktham, Madhuram	Lagu rooksham	Kadu	Seetham	Kaphapitta samanam
4	Madhusravam	Madhuram, Thiktham	Saram, Guru	Kadu	Ushnam	Kaphapittasamanam
5	Guluchi	Thiktham, Kashayam	Guru,snigdham	Madhuram	Ushnam	Thridoshasamanam
6	Pada	Thiktham,	Lagu, Theeshnam	Kadu	Ushnam	Kaphapittasamanam

3. Vasaguloochyadi Kashayam

Vasaguloochyadi kashayam has the property of pithasamana. It is usually used in

curing jaundice and other liver related problems.

The properties are shown below.

Table-4

Sl.No	Medicine	Rasam	Gunam	Vipakam	Veeryam	Dhoshaharathwam
1	Vasa	Thiktham, Kashayam	Rooksham Lagu,	Kadu	Seetham	Pitha Kapha Samansam
2	Guluchi	Thiktham Kashayam	Guru Snigdham	Madhuram	Ushnam	Thridosh samanam
3	Yashti	Madhuram	Guru Snigdham	Madhuram	Seetham	Pitta Vata samanam
4	Kataka	Madhuram, Kashayam Thiktham	Guru Snigdham	Madhuram	Seetham	Kapha Pittasamanam
5	Valakam	Thiktham, Kashayam	Lagu	Madhuram	Seetham	Kaphapittasamanam
6	Nimbam	Thiktham, Kashayam	Lagu,	Kadu	Seetham	Kaphapittasamanam

4. Drakshadi Kashayam

Drakshadi kashayam has vata pitha samana property.

It is widely used for treating alcohol related liver diseases.

Table-5

Sl.No	Medicine	Rasam	Gunam	Vipakam	Veeryam	Dhoshaharathwam
1	Draksha	Madhuram	Snigdham Guru Mridu	Madhuram	Seetham	Pithasamanam
2	Madhookkam	Madhuram Kashayam	Snigdham Guru	Madhuram	Seetham	Vathapithasamanam
3	Madhukam	Madhuram	Snigdham Guru	Madhuram	Seetham	Vathapithasamanam
4	Lodram	Kashayam	Lagu Roosham	Kadu	Seetham	Kaphapithasamanam
5	Kashmari	Thiktam Kashayam Madhuram	Guru	Kadu	Ushnam	Tridoshasamanam
6	Saribaa	Madhuram Thiktam	Snigdham Guru	Madhuram	Seetham	Kaphapithasamanam
7	Mustha	Thiktam Kadu Kashayam	Lagu Roosham	Kadu	Seetham	Kaphapithasamanam
8	Amalaka	Pancharasam	Guru Rooksham Seetham	Madhuram	Seetham	Tridoshasamanam
9	Hreeberam	Thiktam Kashayam	Lagu	Madhuram	Seetham	Kaphapittasamanam
10	Patmakam	Kashayam Thiktham Maduram	Lagu Pichilam Snigdham	Madhuram	Seetham	Kaphapithasamanam
11	Patmakesaram	Kashayam Thiktham Maduram	Lagu Pichilam Snigdham	Madhuram	Seetham	Kaphapithasamanam
12	Mrinalam	Kashayam Thiktham Maduram	Lagu Pichilam Snigdham	Madhuram	Seetham	Kaphapithasamanam
13	Chandanam	Kashayam Thiktham Maduram	Lagu Roosham	Kadu	Seetham	Kaphapithasamanam
14	Useeram	Thiktham Maduram	Lagu Roosham	Kadu	Seetham	Kaphapithasamanam
15	Neelolpalam	Kashayam Thiktham Maduram	Lagu Snigdham Pichilam	Madhuram	Seetham	Kaphapithasamanam
16	Parushakam	Maduram Thiktham Kashayam	Lagu Seetham	Madhuram	Seetham	Kaphapithasamanam

Discussion and Conclusion of the Study

The liver is one of the busiest organs of the body. The liver is performing as the natural multi-tasker and it plays a large role in metabolism, helps to build proteins, breaks down hormones, clears toxins from the bloodstream, and produce bile for digestion. The liver performs a lot of functions in our human body. Unfortunately the fast food culture of the modern society and the changed lifestyle including high stress levels, heavy drinking habits, continual smoking and self-medication leads to the damage of liver in the long run. Doctors have observed that in the last few years, liver diseases are emerging rapidly

Ayurvedic medicines have been used in the treatment of liver diseases for a long time. A number of ayurvedic preparations are available in the market. The efficacy of these ayurvedic preparations need to be evaluated in a well designed clinical manner. The Karal Roga Mukthi Project was such an attempt. The main aim of this project was to cure the patients suffering from liver diseases. The first attempt of this project was the identification of liver diseased persons. For that purpose Liver Function Test (LFT) and Ultra Sonography (USG) of abdomen were carried out in suspected patients. Liver disease is a dangerous condition characterized by the inflammation and decay of healthy liver cells. This results in slow loss of functional efficacy of the organ. Alcoholism, hepatitis B and C, and fatty liver disease are the major causes of the disease. Other causative factors include autoimmune hepatitis, hereditary factors, Wilson's disease, bile duct disorders, nonalcoholic fatty liver disease and nonalcoholic

steatohepatitis. Lack of prompt treatment leads to edema and ascites; portal hypertension; easy bruising and excessive bleeding; esophageal varices; hepatic encephalopathy; gall stones; coma and complete liver failure.

The medicines used in this project showed positive and promising results. The high level presence of LFT existed in the patients has become normal within three to six weeks after the treatment. The symptoms of patients with grade one and two, fatty liver has reduced considerably. In addition to the medicine the strict diet and regimen has also played an important role in curing and preventing liver damage. The existence of LFT in high level does not always means the advanced impairment of hepatocytes but it is a crucial warning.

In many patients with report of fatty liver as per USG also showed renal calculi. The patients with liver cirrhosis as per USG and symptoms with ascites and pedal oedema also responded very well to the medicines. The numbers of patients with advanced impairment of liver cells were less in number. Even though advanced hepatocytes damage reported as per the USG test, but in many such cases the LFT level was near to normal range. No doubt that by using Ayurvedic medicines and following strict diet and regimen can cure and prevent liver disorders.

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21ST CENTURY CHALLENGES OF INDIAN FISHING INDUSTRY

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Abstract

Keywords:

Introduction

The Fishing Industry in India is contributing significantly to the agricultural export of the country and thereby helping poverty alleviation and generating employment to millions of people in the coastal area. During the financial year 2016-17, exports of marine products reached an all-time high of USD 5.78 billion with USA and South East Asia continuing to be the major importers while the demand from the European Union grew substantially during the period. Increased production of Vannamei Shrimp, diversification of aquaculture species, sustained measures of quality and increase infrastructure facilities for production of value added products were largely responsible for India's positive growth in exports of seafood. The international trading regulations are dynamic in nature due to increasing stringent quality measures of EU, US and other developed countries. Sustaining competitive advantage depends on the availability of raw material with international quality and best market access strategies. This paper examines challenges of fishing industry and to study the

impact on Marine fish exports from India. Compound Annual Growth Rates (CAGR) were estimated to examine the growth trends in marine exports from India.

An Overview of Challenges in the Fishing Industry

One of the major challenges faced by exporters of fish and fishery products in developing countries is the progressively stricter food safety requirements in major industrialized countries (Henson et al., 2004). Developed countries have established new requirements for fish imports, including labeling requirements, Hazard Analysis and Critical Control Point (HACCP) plan, to alleviate consumers concerns. Meeting these new requirements for documenting the safe handling, processing, and origin of fish products requires considerable experience, skill, and investment (Delgado et al., 2003). In order to cope up with the International quality standards, the challenges faced by export processing firms are to develop innovative technologies and efficient management to raise productivity to meet the growing demand for fish and fishery products at the lowest cost. An

effective technology transfer inventions and innovation would play a crucial role in confronting a number of supply side obstructions and numerous demand side opportunities. It would greatly help in bridging the wide gap between the potential and the realized productivity. And the opportunities would be in augmenting income, generating foreign exchange earnings, productive employment creation and involving a number of additional beneficiaries in the value chain of fisheries sector.

Four Phases of Fisheries Scenario

The fishing industry in India is of vital importance in the economic development of the country. Due to the economic impact of rapid growth of population which leads to manifold effect of social and economic issues especially poverty and under-employment and diminishing economic returns, requisite for development of fisheries along with other industries as a means to resolve the problems has been greatly highlighted in recent years. This paper traces the growth and contribution of fish production in the economy of India and also analyses the exports of marine fish production in India. Fisheries scenario has been categorized into four Phases which examines the profile, the production, export trends, destination changes, product diversification, technological innovations, recent challenges and issues explored.

Marine fisheries in the India, are currently passing through a crisis mainly due to stagnation in production, higher operational cost and low profitability. For an understanding of the real status of the fishing industry in India it is necessary to divide the period from 1960 to 2014 clustered into four phases. This division is based on the foremost issues faced by the fishing

industry and can be explained on the basis of the compound annual growth rate of marine product exports and fish production from India summarized in the Table No.1. Compound annual growth rate is calculated by using the following formula.

$$Y = ab^t$$

$$\text{Log } Y = \text{Log } ab^t$$

$$\text{Log } Y = \text{Log } a + t \text{Log } b$$

$$b = [\text{Antilog of Log } b - 1]100$$

$$\text{Compound Annual Growth Rate} = [\text{Antilog of Log } b - 1]100$$

Y is the Fish Production, Quantity and Value of marine product exports from India .

t is the time period.

TableNo.1 Compound Annual Growth of Marine Export Trend and Fish Production from India

Period	CAGR fish production	CAGR Marine Export	
	India	INDIA	
		QTY Tonnes	Value Rs. (Crores)
I PHASE 1960- 1985	10.9	9.2	24.6
II PHASE 1985-1997	6.3	16	26.9
III PHASE 1997-2004	2.8	4.7	6.3
IV PHASE 2004-2014	4.7	8.8	16.7
OVER ALL 1960-2014	5.2	8.4	17.3

Source: Computed from data collected from MPEDA Government of India, Kochi.

Economic Review, Government of Kerala, Various Years. CMFRI, Government of India, Kochi.

The first phase covers the period 1960 to 1985 and is termed as slow modernization phase due to high demand for prawns from the international market. The second phase is from 1985 to 1997 and witnessed a rapid expansion period. This period faced the challenges of economic and ecological impact of motorization, exploitation of deep sea region, ban on monsoon trawling and the era of New Economic Policy with liberalization, privatization and

globalization which stimulated the marine export trends that lead to changes in the product components and also the destination of the marine product exports. The third phase is from 1997 to 2004 and is observed as quality revolution period which is observed the European Union ban period, implementation of stringent international quality assurance standards and HACCP. Quality concept has undergone tremendous changes in this period. Earlier the quality control was done at the end product stage. Quality control has changed into Quality Assurance which in the case of fish, starts right from the point of catch, ensuring hygienic handling and storage, onboard the fishing vessel. At every stage of handling, transportation, storage, preprocess handling, processing, packaging, storage of finished product to the end market, strictest standards of hygiene are to be ensured. Quality involves so many other aspects like the quality of water used for seafood freezing industry. EU countries insist on continuous monitoring which sternly demanded the establishment of good analytical laboratories, fully equipped with best trained and highly qualified technologist.

Thus human resource development has become a major need and has revolutionised the seafood processing export industry. Compared to the other phases, the compound annual growth rate of quantity and value of marine product exports from India has drastically declined especially in the third phase. The major reason for the marginal increase in the value share has been the rising export of low frozen fishes such as ribbon fish and mackerels to China and Hong Kong. Another reason for the decline is the problems in the 1990's, which was hit by disease

and environmental concerns and the total output from this sector declined 18 percent during the decade. The fourth phase was from 2004 to 2014 which highlights the issues of antidumping duty on Indian shrimp and the effect of global recession on seafood export processing industry. Consequently, the study attempts to converse the various aspect of anti-dumping mechanism, and the various problems and issues faced by the seafood export processing industry.

Destination Changes and Product Diversification

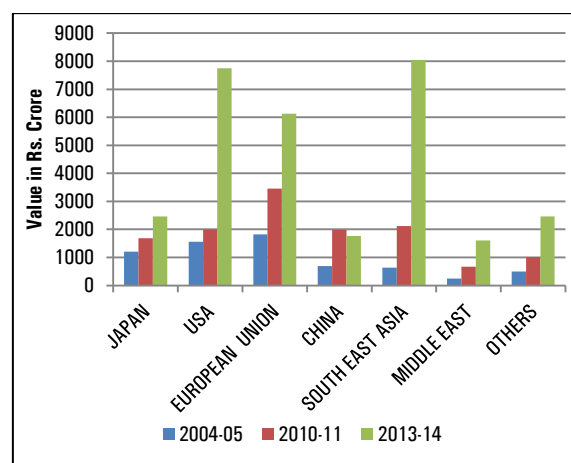
Between 1950 and 1960 India's exports was dominated by traditional items like fish oil, salted and dried fish, dried shrimp, shark fins and fish maws India exported to traditional markets such as Sri Lanka, Burma, Singapore, Malaysia and Hong Kong. This situation changed with the development of technology and modernization, dried products gave way to canned and frozen items. The product shift also resulted in market shift. Initially, canned shrimp exports were mainly focused and then due to non-availability of suitable cans in the country, the industry was shortly compelled to move to exports of frozen shrimp. Since 1961 the export of dried marine products was overtaken by export of frozen items leading to a steady progress in export earnings. With the devaluation of Indian currency in 1966 the export of frozen and canned items registered an increase and led to more processing plants mushrooming across the country. The export of other varieties of Fish like Squid, Cuttlefish, Octopus, Crabs, Clams and Mussels started later.

In the year 2004-05 European Union collectively became the largest buyer from India. During 2004 to 2006 European Union as the

chief importer of seafood from India. India is exporting raw material to China, Thailand and Vietnam for value addition and re-exports to Japan, the EU and the US. Thus the scope for value-addition in marine exports sector should be further explored. The European Union continued to be the largest market with a share of 26 percent in dollar realisation. However, there was a marginal decline of 1 percent in the quantity exported to these countries. The U.S. regained the second place with a share of 16 percent, followed by South East Asia, also with a share of 16 percent, China with a share of 15 percent, Japan 14 percent, West Asia 5 percent and other countries 8 percent. The exports to the U.S. registered a growth of 104 percent in dollar realisation and 47 percent in terms of quantity. The exports to Japan also registered a positive growth of 11 percent in quantity and 36 percent in dollar terms. The exports of all items to Japan, except those frozen, showed an increasing trend. The South-east Asian countries had registered a positive growth of 44 percent in quantity and 38 percent in dollar terms. The exports to China showed only an increase of 5 percent in quantity and 9 percent in dollar terms.

The figure 1 depicts the destination changes due to global recession and international trade barriers in the seafood industry in India. South East Asia continued to be the largest buyer of Indian marine products with a share of 26.38 percent in terms of US \$ value realization. USA is the second largest market with a share of 25.68 percent followed by European Union, 20.24 percent, Japan 8.21 percent, other countries 8.20 percent, China 5.85 percent and Middle East 5.45 percent.

Figure 1 Market wise Export of Marine Products IV Phase



Source: MPEDA, Government of India, Kochi.

Quality Revolution

In the third Phase, Stringent Quality Standards followed by EU, USA, Japan and the implementation of HACCP in seafood processing plants become mandatory. HACCP is a tool that properly used will help build confidence in the consumer's perception of seafood and the seafood industry. The 1990s have witnessed important international agreements and accords relating to the intentions of the international community to achieve sustainable fisheries and to which India has been a party. These agreements represent milestones in international efforts over many years and include UN Programme of action includes programme areas relating to coastal areas and the oceans; the 1992 International Conference on Responsible Fishing (held in Cancun, Mexico) and the 1993 and agreement to promote compliance with International Conservation and Management Measures by fishing vessels on the high seas.

In 1998, only 36 percent of the world fish underwent some form of processing. Improved post-harvest processing is seen as a way of

developing the fishery industry without increasing harvests. In the marine sector, the available landing and berthing facilities is able to meet the requirements of about 25 percent of the available fishing fleet, leading to congestion and spoilage of fish. In the inland sector, marketing is again the weakest link. Value addition is also poor in India. Even though production in Japan is less than half of India, value realization per kg of Japan is US \$ 4.37 compared to 1.11 \$/kg of India. Reducing losses through proper handling and improved processing can increase fish production and also add value to the catch. Sanitary and phyto-sanitary measures are expected to play a major role in both domestic marketing and exports. Incorporation of HACCP and ISO 9000 into the post-harvest activities is a dire necessity and adequate attention would have to be paid in this area for providing better trade opportunities to the producer.

Above all the issues, the major concern was due to the raw material scarcity i.e. lack of availability of sufficient quantities of raw material at a reasonable price that resulted many processing industry to work at a low capacity utilization level. The period also witnessed worldwide demand for a new item frozen prawn especially from Japan and Western Countries including USA. The modernisation of Indian seafood industry began after the country's independence in 1947. Besides, the post-independence days the importance of fisheries development was realized and coastal and maritime states, especially along the south west coast, registered a phenomenal increase in annual fish landings. Fisheries sector has witnessed a steady growth from the first five year Plan onwards with the annual fish

production increasing from around 0.53 million tonnes in 1950-1951 to 9.65 million tonnes during 2013-2014.

Conclusion

The fisheries sector must develop an effective quality assurance systems to comply with increasing stringent international standards of international markets. Quality control measures and increase in infrastructure facilities for production of value added items are expected to overcome the challenges in the fisheries sector. It is vital to examine the impact of international quality assurance standards on marine product exports from India as they have emerged as a non-tariff trade barrier.

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GOODS AND SERVICES TAX AND ITS IMPACT ON SMALL AND MEDIUM SCALE INDUSTRIES IN INDIA

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Abstract

Goods and Services Tax popularly known as GST is an indirect tax levied in India on the sale of goods and services. The tax came into effect from July 1, 2017 through the implementation of one hundred and first amendment by the Government of India. The implementation of GST is one of the most significant reforms in the economic history of the country. GST implementation is likely to have an impact on prices, volume of sale and tax revenue of the states across the country. The new GST system will replace a complex web of existing taxes. It brings uniform tax rates and rules and simplifies sales procedures. The GST shall have two components: one levied by the Centre referred to as Central GST, and the other levied by the States (referred to as State GST). Rates for Central GST and State GST would be approved appropriately, reflecting revenue considerations and acceptability. The Central GST and the State GST would be applicable to all transactions of goods and services made for a consideration except the exempted goods and services. This paper is an attempt to assess the impact of Goods and Services Tax (GST) on Small and Medium Scale Industries (SMS Industries) in India.

Keywords: Goods and Service Tax (GST), Small and Medium Scale Industries, Value Added Tax (VAT), Khadi and Village Industries etc.

Introduction

Small Scale Industries (SSIs) play an important role in the economic development of a country. Their role in terms of production, employment generation, contribution to exports and facilitating equitable distribution of income is very critical. The small scale sector consists broadly of 1) the traditional cottage and household industries viz., khadi and village industries, handicrafts, handlooms, sericulture and coir industries; and 2) modern small scale industries. The traditional village and cottage industries as distinguished from modern small scale industries are mostly unorganised and located in rural areas and semi-urban areas. They

normally do not use power operated machines/appliances and use relatively lower levels of investment and technology. But they provide part-time employment to a very large number of poorer sections of the society. They also supply some essential products for mass consumption and exports. The modern small scale industry is mostly defined in terms of the size of investment and labour force. The Industries (Development & Regulation) Act 1951 defines SSI having less than 50 workers with the aid of power or less than 100 workers working without the aid of power. The more formal definition is in terms of the fixed assets less than Rs. 35 lakh (1981). In 1991 the limit

was raised to Rs. 60-75 lakh. The Ninth Plan fixed the ceiling at Rs. 100 lakh and the Tenth Plan increased to it to 50 crores in the case of hi-tech and export oriented sectors. Government is extending various steps to the SSI. In India, a unique instrument called reservation in the sense of legal ban on production by large units introduced in 1970s was for the protection and promotion of SSI. During Ninth Plan period, SSI was producing about 8000 items out of which 812 items (15 per cent) were reserved for protection in the small scale sector. In addition, the SSI has been supported and encouraged by various government policies for infrastructure support, technology up gradation, preferential access to credit, preferential policy support, etc. Over the last five decades the small scale industries (SSIs) have emerged as a dynamic and vibrant sector of the Indian economy by helping to generate more new employment avenues, supplying variety of products, contributing to exports facilitating equitable distribution of income, emerging as outsourcing designations. The SSI sector has been able to achieve 1 to 2 percentage points higher growth than the growth achieved by the whole industries sector (www.brainkart.com).

MSME (Micro, Small & Medium Enterprises) are mostly privately owned companies in India defined as per the size of their investments. SME enterprises India they form a very important role in nation's economy. Their contribution is major when it comes to output, employment, and export. The majority of unskilled labours are employed with them significantly raising manufacturing sector and exports. Though the primary responsibility of promotion and development of MSMEs is of the

State Governments, the centre has passed an Act in 2006 to empower the sector and also has formed a Ministry (Ministry of MSMEs). It was the Micro, Small and Medium Enterprises Development (MSMED) Act which was notified in 2006 that defined the three tier of micro, small and medium enterprises and set investment limits. The Classification of MSM enterprises on the basis of investment in India is illustrated below.

Classification of the MSME	Ceiling on Investment in Plant and Machinery (in Rs)
Micro	Below 25 Lakhs
Small	25 lakhs to 5 crores
Medium	5 crores to 10 crores

For the service sector, the investment limits are Rs 10 lakh, 2 crores and 5 crores in terms of investment made in equipment. In 2015, the government has introduced an amendment bill to enhance the investment limit in all categories. These entrepreneurs and MSME's have grown tremendously even after facing several highs and lows due to the challenging environment. The Indian economy is expected to emerge as one of the leading economies in the world and likely to become a \$5 trillion economy by 2025, the major impetus is being given to strengthening the backbone of our economy, the MSME sector (www.tooldunia.com).

Objectives of the Study

The major objectives of the study are:

- 1) To examine the basic concepts and features of Good and Service Tax in India
- 2) To assess the impact of GST (Goods and Services Tax) small and medium scale industries in India.

Materials and Methods

This study is descriptive in nature and this paper is prepared through illustrative research. This study is based on secondary data and other information provided by different journals, research articles, newspapers and magazines. After considering the different aspects of the topic, a descriptive research design has been adopted to make the research more accurate. This can provide a meticulous examination of the research topic. In fact, the secondary data is the major base of this study. This research paper is an attempt to highlight the positive and negative impact of the GST on the small and medium scale industries in India.

Meaning of Small and Medium Enterprises (SMEs)

Small and Medium Enterprises (SMEs) have been considered as the primary growth driver of the Indian economy for decades. For a developing country like India and its demographic diversity, SMEs have emerged as the leading employment-generating sector and has provided balanced development across sectors.

The economic significance the MSME (micro, small and medium enterprises) sector in

India, with 48 million enterprises, can be observed as follows

- SMEs contributes 37.5 per cent to gross domestic product out of 2.44 trillion in 2017
- It provides employment to 120 million persons out of 1.35 billion population.
- It accounts for more than 46 per cent of India's exports out of 275 billion in 2017.
- SMEs are contributing almost 50 per cent of the country's industrial output
- SMEs are contributing to almost 7 per cent of the manufacturing GDP and 31 per cent of the services GDP (blog.capitalfloat.com).

Any tax-regime should ensure such an environment in which the proper growth of small scale industries may be assured. The First Discussion Paper (FDP) produced by the Empowered committee of state finance ministers and report of the thirteenth finance commission's Task Force have provided some important suggestions with respect to this sector. Imposition of CGST and SGST as per above said reports on turnover of goods and services are furnished below.

Turnover of goods	Turnover of services	Applicable taxes(according to FDP)
Below 10 lakhs	Below 10 lakhs	Both SGST and CGST are not applicable
Between 10 lakhs and 150 lakhs	Between 10 lakhs and 'Y' figure	Only SGST
Above 150 lakhs	Above 'Y' figure	Both SGST and CGST

But the Task Force is of the view that the small dealers (including service providers) and manufacturers should be exempted from the purview of both CGST and SGST if their annual aggregate turnover (excluding both CGST and SGST) of all goods and services does not exceed

Rs.10 lakhs. However, those below the threshold limit may be allowed to register voluntarily to facilitate sales to other registered manufacturers / dealers, so that the cascading effect or tax may be avoided, if desired. Further, the Task Force has suggested that to reduce administrative and

compliance burden, small dealers with annual aggregate turnover of goods and services between 10 lakhs to 40 lakhs may be allowed to opt for a compounded levy of one percent, each towards CGST and SGST. However, no input credit should be allowed against the compounded levy or purchases made from exempt dealers. Although the compound levy scheme will make the day to day working easier, yet the cascading effect of tax will not be removed by the compounded levy. So the compound levy scheme should not be compulsory. At present the small scale industries are entitled to exemptions from payment of CENVAT in respect of their turnover up to 1.5 crores. However, there is no such threshold exemption in respect of state level VAT. As per the recommendations of Department of Revenue (DOR), the threshold for goods and services should be common between the Centre and the State, on one hand and between goods and services, on the other. Also the DOR has suggested that the annual turnover threshold could be Rs. 10 lakhs or even more than that. This threshold exemption should not apply to dealers and service providers who undertake inter-state supplies. This would not be in the favour of small dealers, as it will restrict their growth or force them to get registered. Hence a provision of threshold limit should be there to allow the small dealers to indulge in inter-state sale (lawcrux.com).

So far, unorganised MSMEs have grown faster than organised peers because of lower cost

structures stemming from tax avoidance, and not having to pay social security benefits to employees (such as provident fund and gratuity), and excise duty (if turnover is less than Rs.1.5 crores). Some MSMEs also understate employee base or set up multiple ventures to avoid breaching tax thresholds. Such sharp practices helped them price products and services competitively over the past few decades and also maintain operating margins at organised player levels.

The vicissitudes resulting from the impact of GST are many. To wit, for manufacturers, the reduction in the threshold for GST exemption to Rupees twenty lakhs from Rupees 1.5 crores means tens of thousands of unorganised MSMEs will soon be cast into the tax net. And digital transaction trails created by dual authentication of invoices under GST will strengthen tax compliance. Additionally, a lower tax burden under GST will reduce the cost of raw materials and logistics. For example, a study by CRISIL shows that freight costs could decline 1.5 to 2 per cent once GST kicks in (businessline.com).

Swadeshi Jagran Manch has shown solidarity with some groups opposing Goods and Service Tax in its present form and demanding the government to address their concerns for a balanced GST. "Swadeshi Jagran Manch has stated that for long that though GST will make compliance easier for big businesses and multi-state operators, but at the same time onus of compliance for small scale industries may cause a host of problems, putting them at loss,".

According to Swadeshi Jagran Manch, while deciding the rates of the GST, care has not been taken to keep rates low for commodities being produced by small scale industries.

Beedi, crackers, beverages, biscuits, pickles, confectionery, scissors and host of other products produced by SSIs and cottage industries are attracting higher rates of GST, which is likely to affect their competitiveness. "The Beedi industry provides direct and indirect employment to nearly 5 crore people and needs to be protected. In the new GST, Beedi attracts highest tax rate of 28 percent endangering the employment of crores of tendu patta collectors and Beedi rolling workers, especially women (business-standard.com).

For an industry that's already neck-deep in crisis, the Goods and Services Tax (GST) has come as a major blow. First, it was the pictorial warning of skulls and bones on the packets in which they are sold. Then, due to agitation by workers, it was replaced by warning symbols of scorpion, damaged chest and heart, and later the pictures of cancer. the World Health Organisation (WHO) has said that tobacco taxes have the potential to reduce tobacco use, save lives and generate revenues. "Scientific studies have shown that beedi smokers are at a greater risk of cardiovascular diseases, besides cancers in various parts of the body". By taxing beedi at the same rate as cigarettes and chewing tobacco, the government has ensured that millions of beedi users will quit, and millions of youth will be prevented from initiating tobacco usage.

Beedis were the most commonly used tobacco product in the country, accounting for sixty four per cent of all tobacco consumption and are disproportionately consumed by the poor. They contribute to the majority of the ten lakh deaths attributable to tobacco as also to the staggering economic burden caused by tobacco use. (deccanchronicle.com).

As per industry experts, SMEs and start-ups will be affected the most with the rollout of the GST and the impact will be favourable in ways more than one. Some of the ways GST will benefit SMEs and start-ups are:

- 1) Ease of starting business: A business having operations across different state needs VAT registration. Different tax rules in different states only add to the complications and incur high procedural fees. GST enables a centralized registration that will make starting a business easier and the consequent expansion an added advantage for SMEs.
- 2) Reduction of tax burden on new business: As per the current tax structure, businesses with a turnover of more than rupees 5 lakh need to pay a VAT registration fee. The government mulls the exemption limit under GST to twenty five lakh giving relief to over 60 per cent of small dealers and traders.

The present threshold prescribed in different State VAT Acts below which VAT is not applicable varies from State to

- State. The existing threshold of goods under State VAT is Rs. 5 lakhs for a majority of bigger States and a lower threshold for North Eastern States and Special Category States. A uniform State GST threshold across States is desirable and, therefore, the Empowered Committee has recommended that a threshold of gross annual turnover of Rs. Ten lakhs both for goods and services for all the States and Union Territories may be adopted with adequate compensation for the States (quora.com).
- 3) Improved logistics and faster delivery of services: Under the GST bill, no entry tax will be charged for goods manufactured or sold in any part of India. As a result, delivery of goods at interstate points and toll check posts will be expedited. According to an estimate by CRISIL, the logistics cost for manufacturers of bulk goods will get reduced significantly by about twenty per cent. This is expected to boost ecommerce across the nation.
 - 4) Elimination of distinction between goods and services: GST ensures that there is no ambiguity between goods and services. This will simplify various legal proceedings related to the packaged products. As a result, there will no longer be a distinction between the material and the service component, which will greatly reduce tax evasion.
 - 5) Small scale industries can compete better with imported goods and foreign manufacturers as VAT, excise duties, surcharges, entry taxes and cesses are subsumed in GST. Since GST is a destination based tax, both imported goods and locally manufactured goods will be paying the same amount of tax. Hence, this will encourage companies to localise their manufacturing in India. This will benefit small scale industries in a big way.
 - 6) Impact on Manufacturing Sector; According to Deskera, a leading cloud-based business management software provider catering to SMEs in South East Asia, the GST will enhance competitiveness of enterprises in the manufacturing sector by mainly mitigating the cascading effect of various taxes. Headquartered in Singapore, the company offers GST ready Enterprise Resource Planning software to global SME markets, with small and medium enterprises contributing over 70 per cent of the company's business across the world. A prominent provider of cloud ERP solutions, Deskera has been extensively working with various organizations in countries such as Singapore and Malaysia with their GST requirements. The company offers Deskera MRP, a fully GST compliant MRP solution in India to help manufacturers and traders to seamlessly migrate to the new regime once the GST law is implemented across the nation.

Complying with this tax reform may be a bit complex at first for small and medium businesses. But in the long run, it will benefit both consumers and the businessmen (flexiloans.com).

The GST System and the Small and Medium Businesses: The Pros and Cons.

1. It will be easier to start new businesses: At present the Sales Tax Department has many turnover slabs which require VAT registration. A lot of businesses operate in multiple states, and this complicates their tax burden. This is because different states follow different tax rules. Complying with these rules and also payment of procedural fees burdens Small Businesses. It affects their cash flow and prevents growth. With GST there will be uniform procedures, uniform payment of fees, and a smooth and uniform tax structure in all states, thus easing out the process to start a business in multiple states.

2. SME's will be able to expand their business: Currently small enterprises limit themselves to intra-state trade only because they will have to bear taxes in case of inter-state trade, and this will increase costs for customers ultimately reducing their customer base. With GST this will be eliminated as tax credit can be transferred irrespective of location of buyer and seller. As a result SME's will be able to expand their business across borders. The pro

3. Businesses will have lesser tax burden: GST will eliminate the cascading effect of various state and central taxes. State taxes that will be subsumed within the GST are VAT,

entertainment tax, entry tax, and luxury tax, tax on betting and gambling. Various central taxes that will be subsumed are Central Excise Duty, Additional Excise Duty, Service tax, Additional Custom Duty, Special Additional Duty and Central Sales tax. Businesses will be able to take input tax credit too with GST. This reduces tax burden on businesses, making goods cheaper and increasing profit margins for SMEs.

4. Logistics and delivery will become faster: GST will eliminate time-consuming border tax procedures and toll check posts and encourage supply of goods across borders. According to a CRISIL Analysis, the logistical cost for companies manufacturing bulk good would be reduced by around 20 per cent. Such costs can be crucial for the survival of SMEs. No entry tax will also be charged for goods manufactured anywhere in India. Thus, GST can make logistics and delivery of goods faster and smoother in the case of small and medium businesses.

5. There will no longer be any confusion between a "good" and a "service": At present there is great confusion between a service and a good. Each attracts a different tax. Goods attract VAT and services attract service tax. For e.g. A restaurant can be partly a good and partly a service. This distinction will be eliminated with GST. It will ensure that there is no ambiguity between goods and services. It will simplify various legal proceedings related to the packaged products and there will no longer be a distinction between the material and the service component. Ultimately this will greatly reduce tax evasion.

6. Single or Unified market: GST will allow flexibility in transfer of goods across states and reduce the cost of doing business, as the reform will cut down multiple taxes imposed by state and central government.

7. Online compliance procedures: Under GST all compliance procedures such as registration, payments, refunds and returns will be carried out through online portals. The burden on SME's (due to current taxation system) to interact with department officers carrying out compliances will be eliminated. In this way GST will save time and effort of SME's.

8. Encourage manufacturing sector: With the implementation of GST, burden of tax is expected to reduce both for the manufacturer and the end user. Manufacturer will get the benefit of input tax credits and the end user will have to pay only the tax charged by the last dealer or the retailer in the supply chain. This will increase competitiveness and the demand for the 'Made in India' products would also increase immensely.

9. Higher exemptions to new businesses: At present businesses with a turnover of 5 lakhs have to register and pay VAT. But with GST this limit has been increased to 10 lakhs. Also any business with a turnover between 10-50 lakhs will be taxed at lower rates.

10. Use GST to manage working capital: GST impacts working capital and working capital is very important for any business. However businesses can use GST to manage their working

capital. They can harness GST to their benefit. This is further explained in the next article. To know more visit our website www.flexiloans.com.

India is a global manufacturing hub and SMEs form around ninety per cent of the industrial units in the country, according to IBEF. The 'Make In India' campaign promoted by the Indian government will get a boost with the rollout of the GST. Currently, excise duty on pre-packaged products for retail consumption is levied not on the transaction value at the ex-factory but on a fixed percentage of the maximum retail price (MRP) on the package. This leads to a higher MRP, which indicates a higher cost burden for the consumers. Under the GST regime, tax is paid by the manufacturers while purchasing raw materials for the products. The amount can be credited for subsequent resellers till the product reaches the final consumer. This will ease the tax burden significantly.

A sizeable portion of SMEs are of the opinion that GST is not all good for the sector and their fears may not be totally vacuous. The tax neutrality that the SMEs enjoy may be one of the prominent benefits. However, reduction in duty threshold is one of the key concerns that have led them to be wary of the GST bill. Under the existing excise tax, no duty is paid by a manufacturer having a turnover of less than rupees 1.50 crores. But, post GST implementation; the exemption limit will get significantly lowered as low as rupees 25 lakh. As a result, a large number of SMEs and start-ups will be mandated to come under the tax net

and will have to pay a large chunk of their earnings towards tax. Furthermore, there are other flip sides to the proposed tax neutrality. GST regime won't differentiate between luxury goods and normal goods; this will it hard for the SMEs to compete against large enterprises. GST that is ultimately levied on supply will not be

available for input credit. This will lead to an increase in the cost of the products for businesses that supply directly to end users.

Below we have provided a high level impact analysis of GST on small and medium businesses in India with respect to electronic dealings (cleartax.in).

Compliance Procedure	Positives	Negatives
Registration	Online registration will ensure timely receipt of certificate of registration and minimal bureaucracy interface	Not all the SMEs have technical expertise to deal with online systems, thus most of them will need intermediaries to obtain registration for them. This will add to their registration cost.
Payment	Electronic compliance will bring transparency and will also reduce the compliance cost.	Since funds are required to be maintained in the form of electronic credit ledger with the tax department, it may result in liquidity crunch.
Refund	Electronic refund procedures will fast track the process and enhance liquidity for SMEs	Refunds can be claimed only after filing of relevant returns. Also it depends on the compliances done by the supplier and his rating.
Returns	All returns are required to be filed electronically and input tax credit and tax liability adjustment will happen automatically on the basis of these returns	Minimum of thirty-seven returns are required to be filed by every registered taxpayer during a financial year. Thus SMEs will have to deploy additional resources and eventual cost of compliance will increase

No doubt that GST is aimed to increase the taxpayer base, majorly SMEs into its scope and will put a burden of compliance and associated costs to them. But in the long run, GST will turn these SMEs more competitive with a level playing field between large enterprises and them. Furthermore, these Indian SMEs would be able to compete with foreign competition coming from cheap cost centers such as China, Philippines and Bangladesh (cleartax.in).

Government of India has stated that, 'Large part of the tax collection about ninety five per cent comes from large taxpayers... Smaller ones have low tax burden, but it was felt their compliance burden is high,'. "Small ones

should remain in the tax net for the expansion of the base, but we have significantly reduced their compliance burden. The implementation of GST can play an important role in the development of Indian economy. The introduction of GST in the country should further boost the ease of doing business in India. The government is also planning to give ratings to MSMEs on some 50 parameters that will enable the sector to improve the quality of manufacturing and may give an additional advantage in the international market. Other initiatives such as setting up of Bankruptcy Bill will also help.

A Case of Hosur: Hosur Small and Tiny Industries Association consist of 2,500 small units and 85,000 men and women are working

there. Their main issue is that the tax rates increased from 17.5 percent including excise duty and Value Added Tax to 28 percent after the implementation of GST. The tax burden of small-scale industries has increased significantly. But it not ends here. They supply raw materials to the large automobile manufacturers doing business in that industrial town. Large-scale manufacturers generally clear their payments in the time duration of three months. This clearly indicates that small-scale enterprises have to borrow money from moneylenders or NBFC to pay the higher taxes under GST and have to bear the interest cost of three months. Financial Institutions prefer to lend money to renowned companies such as Tata's and Birlas whereas leaving small business enterprises (SMEs) for money lenders and Non- Banking Financial Companies (NBFC). SMEs borrow money from NBFC or money lenders at rates which lies in the range of 20 percent to 100 percent. Post GST Era, enhances the borrowing cost and also increases the interest rate to a certain limit and they are afraid of that it will wipe out all their margins. SMEs want the tax rate to be reduced to 18 percent. They are supplying input materials to automobile companies and the tax rate they are being charged at is not justified at all. There is a wide difference between the rates they are being charged at and the governments final tax rate.. Auto assemblers' consider their payment as input credit. The price paid by the consumers for the automobiles determines the amount collected by the government from the entire value-added chain and supply chain which leads to the

manufacturing of the fully assembled automobile. The 28 percent GST is an excessive rate that should be charged on a handful of goods and not imposed on intermediate parts, for moneylender it helps to generate business as well as to drive small units of the business (Subodh Kumawat, 2017).

Under the proposed composition scheme, a small scale manufacturer would be required to pay a much lower rate of duty than the prevailing 12 per cent CENVAT rate with a minimal compliance burden. This flat rate could be as low as 1 per cent of the total turnover. However, the manufacturer will have the option to pay full duty and claim credit for tax paid on inputs. The scheme is consistent with the proposed GST. Currently, small scale industries with an annual turnover of up to Rs 1.5 crores are exempt from excise duty. But the GST proposes to bring down the exemption threshold for the levy of tax to Rs 10 lakh. The government is keen to lower the turnover threshold to expand its tax base. This means a unit with a turnover between Rs 10 lakh and Rs 1 crores can opt for a much lower compounded levy on its taxable turnover instead of the excise duty of 12 per cent. A manufacturing unit opting for the composition scheme will not be required to maintain records, but it will not get the facility of input tax credit. Experts say such a scheme will make the transition to GST easier. "Composition scheme may not be ideal from a credit flow perspective," said Bipin Sapra, partner at accounting firm Ernst & Young. "But it can work as a transitional mechanism for the small

taxpayers to get into GST framework." States have demanded that the Centre continue with the turnover threshold of Rs 1.5 crores for its component in GST, but the Centre has been firm on keeping it common for both Central and state GST at Rs 10 lakh. The empowered committee of state finance ministers had suggested a composition scheme for entities having turnover below Rs 50 lakh and a floor rate of 0.5 per cent across states. Under the current value-added tax regime there is a compounding scheme for businesses below a turnover of Rs 50 lakh with a flat tax rate of one per cent in many states. But it has not been much of a success as floor rate of the value added tax itself is low at 4 per cent. However, the industry that has enjoyed complete exemption until now, may find the changes hard to gulp. "We think the sector would strongly react to composition scheme being contemplated for units having turnover from Rs 10 lakh to Rs 1 crores," said Anil Bhardwaj , secretary general of small scale producers association, FISME. "It would bring in large number of small enterprises into excise net, which are currently in exemption (economictimes.indiatimes.com).

Though GST has an overall benefit for SMEs there are certain concerns SMEs may have about GST. A lot of SMEs fear that GST is not entirely beneficial to them. This is because currently under the present excise tax regime, no duty is paid by a manufacturer with a gross turnover of less than Rs 1.50 crores. However, after GST implementation, this exemption limit would get considerably lowered to Rupees

twenty lakhs. But this will prevent any tax evasion and everyone will be under a uniform taxation system. As a result, a large number of SMEs and start-ups would come under the net of the GST tax. At the same time, the GST may not be applicable to alcohol and petroleum, thus widening the gap between these products and other products. These are the few other minor concerns are looming around minds of the owners of small and medium business enterprises. It is believed that the GST system will be beneficial to the nation and people in the long run.

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DEPENDENCE OF SPRAY RATE ON THE TRANSPARENT ELECTRODE PROPERTIES OF ALUMINIUM DOPED ZINC OXIDE THIN FILMS PREPARED BY SPRAY PYROLYSIS.

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Abstract

Zinc oxide is one of the promising material in optoelectronic applications. The objective of our work is to study the effect of variation of spray rate on the structural, optical and electrical properties of ZnO:Al thin films. ZnO:Al thin films were deposited by spray pyrolysis. All the coated films were characterized by X-ray diffraction, Hall effect measurements, UV-Vis-NIR spectroscopy and Photoluminescence.

Keywords: Zinc oxide (ZnO), X- ray diffraction (XRD), nanostructure

1. Introduction

ZnO an important technological material , is gaining consideration of the optoelectronic research group. The absence of a centre of symmetry in wurtzite, along with large electromechanical coupling, results in good piezoelectric and pyroelectric features and the subsequent use of ZnO in mechanical actuators and piezoelectric sensors. Besides, ZnO is a wide band-gap (3.37 eV) compound semiconductor having short wavelength optoelectronic applications. Excellent excitonic emission at room temperature is ensured by the the high exciton binding energy (60 meV) and room temperature ultraviolet (UV) luminescence has been reported in chaotic nanoparticles and thin films. ZnO is transparent to visible light and can be made highly conductive by doping with suitable dopants.[1-3]]. ZnO thin films can be fabricated through

various deposition techniques like rf magnetron sputtering[4], chemical vapour deposition[5], molecular beam epitaxy[6], pulsed laser deposition[7], sol-gel[8] electrodeposition[9] and spray pyrolysis. Compared to other deposition techniques, spray pyrolysis is hopeful since this method is capable of large area deposition in a commercial way[10]. Highly efficient Al doped ZnO based Solar cells [2], LEDs [11], Transistors [12], etc. have been realized.

The properties of the thin films developed by spray pyrolysis are affected by several factors like geometry of the liquid nozzle, surface nature and temperature of the substrate, solution composition, solution flow rate, deposition time and nozzle-to-substrate distance etc. Hence by changing these factors, the structure and properties of deposited film can be tailored Here, we examine the influence of variation of spray

rate on the structural, electrical and optical properties of Al doped ZnO films developed by Chemical Spray pyrolysis technique.

2. Experimental details

ZnO thin films were deposited on soda-lime glass substrates using CSP technique. Substrates were cleaned using soap solution. After immersing in chromic acid for 2 hours, the glass slides were ultrasonically cleaned in distilled water for 30 minutes and further washed with acetone. Spray solution was prepared by dissolving Zn $(\text{CH}_3\text{COO})_2 \cdot 2 \text{H}_2\text{O}$ (Sigma-Aldrich, 99.5%, Germany) and aluminium chloride (AlCl_3 , MERCK, $\geq 98\%$), source material and dopant respectively in the solvent, deionized water and propanol in 1:7 volume ratio. This salt of Zn was selected due to its high vapour pressure at low temperature. Molarity of this solution was fixed as 0.2M. 3ml acetic acid was added to the aqueous solution to prevent the formation of hydroxides. Substrate temperature was fixed at 450°C . Doping concentration was fixed at 2 at%. Pressure of the gas fed in to the nozzle has to be measured using the mechanical gauge and the pressure was fixed at 1 barr. The nozzle to substrate distance was kept at 10cm and the spray rate was changed. The prepared solution was sprayed on to glass substrates for 10 minutes. Through this arrangement it was possible to have consistency in the results as well as large area deposition. After deposition, the films were removed immediately from the hot plate to a wooden surface. It was then allowed to cool.

The structural, electrical and optical properties of all the samples were carried out in detail to analyse the quality of films. Structural properties of the samples were examined by X-ray diffractometer (Bruker D8 Advance) using CuK_α radiation ($\lambda = 0.15406 \text{ nm}$). A four point probe setup (Keithley Source Measure Unit, Model 2450) was employed to measure the conductivity of the samples. UV-Vis-NIR spectroscopy (SCHIMADZU) was used in order to evaluate the transmittance properties. Thickness measurements were done using Surfext 120.

3. Structural Analysis

X-Ray diffraction measurements were carried out to investigate on the main crystalline phases of the prepared thin films. The diffraction patterns were recorded from 20° - 80° for all the samples prepared at various spray rates and are shown in figure 1. The XRD patterns exposed the single phase of the ZnO films with hexagonal wurtzite structure. The peaks match with the JCPDS file no: 89-0510. All samples show preferential growth along (002) plane except the one prepared at the spray rate of 8ml/min. For this sample growth along (100) plane dominate, even though with feeble intensity. The intensity of (002) peak is maximum for the sample prepared at a spray rate of 6ml/min. The surface energy density of the 002 plane is minimum in ZnO crystal. Grains with lesser surface energy become larger as the film grows. Then the growth orientation develops into the crystallographic direction of the lowest surface energy. This implies that 002 texture of the film may easily develop. The

increased intensity of (002) peak shows the improved crystallinity of the samples along c-axis. Mean crystallite size was calculated for the (002) diffraction peak using Debye-Scherrer formula [13]. Grain size shows a variation from 48 nm to 37 nm due to the change in rate of deposition. The lattice constants 'a' and 'c' were calculated using the equation 1.[14]

$$\frac{1}{d_{(hkl)}^2} = \frac{4}{3} \left[\frac{h^2 + k^2 + hk}{a^2} \right] + \frac{l^2}{c^2} \quad (1)$$

Where, d_{hkl} , (hkl) and a,c represents the interplanar distance, miller indices and lattice parameters respectively. The observed 'c' and 'a' values are in agreement with the standard values [JCPDS data card (089-0510)]. The calculated 'c' value for all the samples are found to be less than that for bulk ZnO and this confirms the presence of residual strain in the films due to the substitution of Al^{3+} ions with shorter ionic radius ($Zn^{2+} = 0.072$ nm, $Al^{3+} = 0.053$ nm). The average uniform strain ϵ_{ZZ} , developed in the sample was calculated from the lattice parameters using formula (3). [15].

$$\epsilon_{ZZ} = \frac{c_{film} - c_{bulk}}{c_{bulk}} \quad (2)$$

where c_{bulk} refers to unstrained lattice parameter for bulk ZnO with value of 0.5205 nm (JCPDS no: 089-0510) and c_{film} is the calculated lattice parameter of samples. Stress σ_{film} in the films were calculated using (3). [15].

$$\sigma_{film} = \left[\frac{2C_{13}^2 - C_{33}(C_{11} + C_{12})}{C_{13}} \right] \times \epsilon_{ZZ} \quad (3)$$

Where, $C_{11} = 208.8$, $C_{12} = 1197$, $C_{13} = 104.2$ and $C_{33} = 213.8$ GPa, are elastic stiffness constants of

bulk ZnO. The quality of the preferred orientation of a thin film can be quantified by the texture coefficient (TC) which is calculated from the XRD of (hkl) plane using relation (4). [16]

$$TC(hkl) = \frac{I(hkl)/I_0(hkl)}{(N)^{-1} \sum I(hkl)/I_0(hkl)} \quad (4)$$

Here $I(hkl)$ is the intensity of (hkl) peak in AZO film, $I_0(hkl)$ is the intensity of (hkl) peak in bulk ZnO and 'N' is the number of diffraction peaks considered. The variation of the texture coefficient implies the film growth in preferred orientation. $TC(hkl)$ is calculated for different preferred orientations viz., (100), (002) and (101). Table 1 gives information on the variation of crystallite size, stress, strain and texture coefficient as a function of spray rate. It is very evident that the value of TC (002) is greater than TC(100) and TC(101) in all samples except the one prepared at 8ml/min. These TC results suggest that (100) plane was substituted by (002) plane, as the preferred orientation when the spray rate is reduced below 8ml/min.

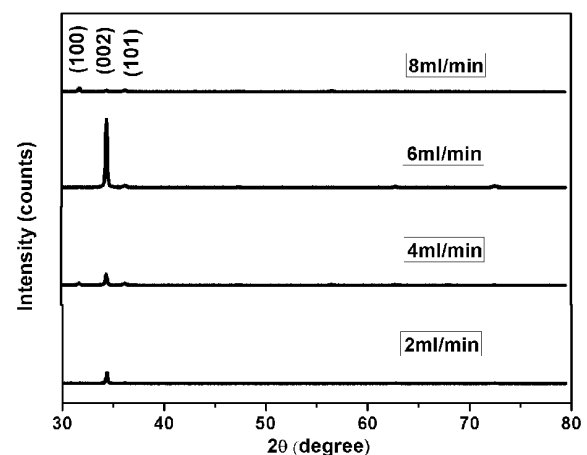


Figure 1. XRD patterns of AZO films prepared

Table 1 Details of Structural analysis from X-ray diffraction of samples prepared at different spray rates.

Spray rate(ml per minute)	Grain size(nm)	Lattice parameters(A ^o)	Strain	Stress	TC(100)	TC(002)	TC(101)
2 (AZO2)	47.4	a=3.2161,c=5.1334	-0.0137	3.1071	0.1748	2.7910	0.0343
4 (AZO4)	43.23.01	a=3.2033,c=5.1364	-0.0131	2.9711	0.2814	2.563	0.1555
6 (AZO6)	48.64	a=3.1988,c=5.1334	-0.0137	3.1071	0.0070	2.960	0.0330
8 (AZO8)	37.4	a=3.1966,c=5.1266	-0.0151	3.4247	1.891	0.6444	0.4641

4. Electrical Studies

Keithley SMU Four probe setup was used for electrical conductivity measurements . Table 2 shows the variation of electrical properties with spray rate. Change in conductivity may be due to both change in carrier concentration as well as the mobility as indicated by hall measurements. The increase in carrier concentration may be due

to the formation of metal rich oxide films. The best film properties in terms of conductivity and transmission were obtained for the sample prepared at a spray rate of 6ml/min. All the samples exhibit n-type conductivity, which indicates successful realization of n-type ZnO by doping with aluminium.

Table2. Details of electrical properties of the samples

Spray rate (ml/min)	Carrier concentration n ₀ (cm ⁻³)	Resistivity (Ω.cm)	Mobility cm ² V ⁻¹ S ⁻¹	Carrier Type
2	2.085 × 10 ¹⁸	5.628 × 10 ⁻¹	5.319	n
4	6.551 × 10 ¹⁹	2.434 × 10 ⁻¹	0.3914	n
6	2.129 × 10 ²⁰	6.704 × 10 ⁻³	4.374	n
8	1.256 × 10 ²⁰	4.735 × 10 ⁻²	1.050	n

3. Optical studies

Fig.2. depict the PL spectra of the samples prepared at different spray rates respectively. We can see that the sample AZO4 exhibits an emission peak with reduced intensity around 405 nm. The peak at 405 nm is due to ultraviolet emission of ZnO which can be attributed to the Zn vacancies [17,18]. The samples AZO2,AZO6,AZO8 exhibits emission peaks around 436 and 562nm nm which are not present in AZO4 The blue PL emission at about 2.84 eV (436 nm) was attributed to the recombination of carriers trapped at Zn_i (electrons) and V_{Zn} (holes) [19].Peaks around 449 nm,466nm are seen in the PL spectrum of all samples with decreasing emissions in AZO8,AZO6,AZO2 and AZO4 respectively. The violet blue emission

peak around 449 nm may be credited to the exciton recombination between the holes in the valence band and electron localized at the interstitial zinc [20,21,22]. The peaks at 466 and 562 nm, respectively, were caused by the various extended Zn_i[23] and the doubly charged oxygen vacancies (V_o⁺²)[24] in the grain-boundary-induced depletion regions •

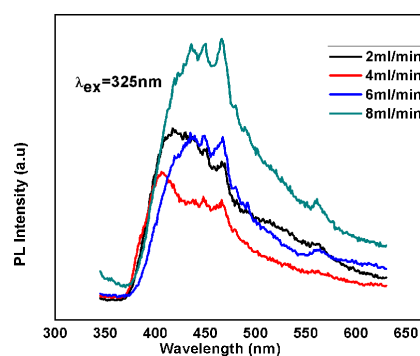
**Fig.2.** PL spectra of the samples

Figure 3 shows the transmittance spectra of AZO films, recorded using a UV-Vis-NIR spectrometer, in the range of 350-1000 nm. An average transmittance of 70% is shown by the film prepared at the spray rate of 6ml/min.

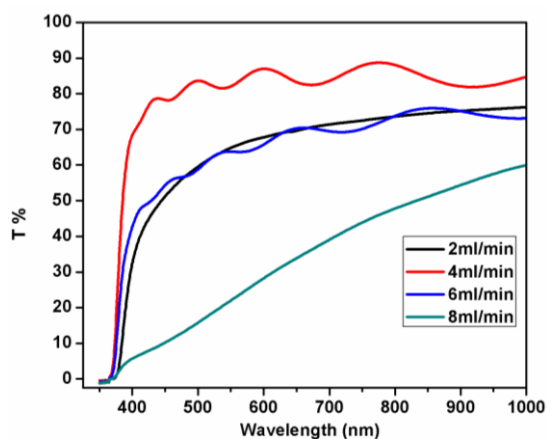


Fig 3. Variation of transmittance with temperature

4. Conclusion

Aluminium doped ZnO thin films have been deposited by Chemical Spray pyrolysis method at various spray rates. The structural, electrical and optical properties of the samples were investigated by employing XRD, four point probe and UV-Vis-NIR spectroscopy measurements. Highly crystalline sample with improved conductivity and transmittance was obtained at a substrate temperature of 450 °C and at a spray rate of 6ml/min. The optimum sample shows a conductivity of $1.492 \times 10^2 \text{ Scm}^{-1}$ with an average transmittance of 70%. These investigations promise the possibility of achieving highly conducting and transparent ZnO thin films doped with aluminium through chemical spray pyrolysis for optoelectronic applications.

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WHY THE 'MAKE IN INDIA' CAMPAIGN MIGHT BE PASSABLE AND NOT NOVEL

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Abstract

There has been much discussion on demonetization, goods and services tax, unemployment etc in the recent times, but one policy initiative which escaped the public view was the 'Make in India' campaign launched by the government in 2014. It was one of the first policy programme or campaign taken up the present government with the objective of making India a hub of manufacturing activities in the world. Overall, this was received favorably by the public because it talked about increasing manufacturing growth, bringing more foreign direct investment (FDI), creating jobs etc. This paper is an attempt at critically looking into this government initiative 'Make in India'. It has two parts, one which looks into why government institutions are not given much importance in this and second, which looks into the policy gap.

Keywords:

Introduction

The Make in India campaign was officially launched on 25th September 2017 by the Prime Minister Narendra Modi, just ahead of his maiden visit to the United States of America (USA). But, the first mention of such an initiative was there in the Independence Day speech given by him almost a month back. What exactly is this 'Make in India' campaign? It is basically an initiative by the government to invite both local and foreign companies to India for establishing their production base in India. In terms of empirical targets, the Make in India seeks to increase the manufacturing share in India's GDP to 25 percent by 2022 and create 100 million jobs in the country. This campaign was launched in an event which was attended by the leading industrialists from India and across the world. The PM while launching the initiative said that the focus would be dual with emphasis on physical infrastructure as well as digital network. The government claims

that it is nothing but a shift of the government role from an authority to that of a business partner or what the PM keeps emphasizing, 'Minimum Government and Maximum Governance'.¹

Sanjaya Baru traces the roots of this initiative to the 'National Strategy for Manufacturing' prepared by the National Manufacturing Competitiveness Council (NMCC) set up the United Progressive Alliance in 2006.² But, if we look deeper there are some connections between the 'import-substitution policy' and the present strategy which we would delve further in this paper.

The logo and publicity of this campaign was done by Wieden and Kennedy (Wieden + Kennedy), the Oregon-based advertising agency famous for ad campaigns of major MNCs such as Nike, Facebook, Coca-Cola, ESPN, Microsoft, Honda, Old Spice etc.³

¹ <http://www.makeinindia.com/home>

² <https://thewire.in/6208/a-closer-look-at-make-in-india/>

³ <https://en.wikipedia.org/wiki/Wieden%2BKennedy>

The Make in India website claims that legal restrictions of the past which are obstructive in nature would be replaced with a transparent system which is user-friendly. This would lead to increase in investment, innovations, skill development, protection of intellectual property rights and infrastructure development in manufacturing sector. A workshop titled “Make in India – Sectorial perspective & initiatives” was conducted on 29th December, 2014 under which an action plan for 1 year and 3 years have been prepared to boost investments in 25 sectors. The 25 sectors which have been identified are: automobile, automobile components, aviation, biotechnology, chemicals, construction, defence manufacturing, electrical machinery, electronic systems, food processing, IT and BPM, leather, media entertainment, mining, oil and gas, pharmaceuticals, ports and shipping, railways, renewable energy, roads and highways, space, textile and garments, thermal power, tourism and hospitality, and finally wellness. All the above sectors have previously been opened for foreign investments and no doubt all these are emerging sectors.

Is the Make in India lion roaring?

If one looks into the Reserve Bank of India data, the total FDI flow to manufacturing sector was \$6,381 million in 2013-14 which show a spectacular rise in 2014-15 to \$9,613 million.⁴ Strangely, this showed a decline in 2015-16 to \$8,439 million. While, the RBI has predicted an increase in FDI flow to manufacturing sector to \$ 11,972 million in 2016-17, but one needs to wait and watch till the actual data comes. If one sees the data till 2015-16, it's mainly mining, business services and education (including research) which

saw a substantial increase in FDI. Also, with other manufacturing countries such as China facing issues such as pollution, rural-urban migration, increased urbanization etc, the government should also be prepared to face such issues. The waste management and environmental degradation are two major things associated with industries or production units. Otherwise, at one time the government would be talking about liberalization of policies and ease of doing business but then other bodies such as the National Green Tribunal or the Ministry of Environment and Forests would come up with counter policies. Thus, there is a need for a holistic approach on issues related to environment.

The BJP-led National Democratic Alliance came to power riding on a promise to generate more jobs which Congress-led UPA couldn't deliver in their last regime. The unemployment rate according to the Economic Survey (2015-16) has seen an increase to 5 percent from 3.8 percent in 2011-12. Only 1.35 lakh jobs were created in eight labour intensive sectors during 2015 while 9.3 lakh jobs were created in 2011 (The Hindu, May 19, 2017). From July 2014 to December 2016, in the eight major sectors – manufacturing, trade, construction, education, health, information technology, transport, and accommodation and restaurant – only 6,41,000 jobs were created. In comparison, these same sectors had added a total of 1.28 million jobs from July 2011 to December 2013. Specifically, jobs created by the Prime Minister's Employment Generation Programme (PMEGP), which generates employment in rural and urban areas by initiating new micro enterprises and small projects, has fallen by 24.4% from 428,000 in 2012-13 to 323,362 in 2015-16 (The Wire, 06/2017).

⁴ <https://www.rbi.org.in/Scripts/AnnualReportPublications.aspx?Id=1221>

Table 1: FDI flow into India

	2012- 13	2013- 14	2014- 15	2015- 16	2016-17 (P)
Manufacturing	6,528	6,381	9,613	8,439	11,972
Communication Services	92	1,256	1,075	2,638	5,876
Financial Services	2,760	1,026	3,075	3,547	3,732
Retail & Wholesale Trade	551	1,139	2,551	3,998	2,771
Business Services	643	521	680	3,031	2,684
Computer Services	247	934	2,154	4,319	1,937
Miscellaneous Services	552	941	586	1,022	1,816
Electricity and other Energy Generation, Distribution & Transmission	1,653	1,284	1,284	1,364	1,722
Construction	1,319	1,276	1,640	4,141	1,564
Transport	213	311	482	1,363	891
Restaurants and Hotels	3,129	361	686	889	430
Education, Research & Development	150	107	131	394	205
Mining	69	24	129	596	141
Real Estate Activities	197	201	202	112	105
Trading	140	0	228	0	0
Others	43	292	232	215	470

P: Provisional.

Source: RBI (<https://www.rbi.org.in/Scripts/AnnualReportPublications.aspx?Id=1221>)

The BJP-led National Democratic Alliance came to power riding on a promise to generate more jobs which Congress-led UPA couldn't deliver in their last regime. The unemployment rate according to the Economic Survey (2015-16) has seen an increase to 5 percent from 3.8 percent in 2011-12. Only 1.35 lakh jobs were created in eight labour intensive sectors during 2015 while 9.3 lakh jobs were created in 2011 (The Hindu, May 19, 2017). From July 2014 to December 2016, in the eight major sectors – manufacturing, trade, construction, education, health, information technology, transport, and accommodation and restaurant – only 6,41,000 jobs were created. In comparison, these same sectors had added a total of 1.28 million jobs from July 2011 to December 2013. Specifically, jobs created by the Prime Minister's Employment Generation Programme (PMEGP), which generates employment in rural and urban areas by initiating new micro enterprises and small projects, has fallen by 24.4% from 428,000 in 2012-13 to 323,362 in 2015-16 (The Wire, 06/2017).

At the inception of the programme, getting an international ad agency to do this policy somewhere led to the whole exercise being looked upon like a branding one. It sounded or at least looked like a branding programme and any MoU now signed with any foreign MNCs are claimed as the success of the Make in India programme. Even though the role of the Department of Industrial Promotion and Policy is not sidelined in this entire scheme but somewhere this industrial policy of the government gave an overall look as an advertising event.

Role of Government Institutions and Public Sector Units (PSUs)

At a time when the Government is pushing for revival of manufacturing sector in the country by promoting FDI with liberalized policies, the logic behind privatization of government-owned production units and PSUs is beyond comprehension. There is a general understanding that public sector units (PSUs) are overly staffed, inefficient management and financially unstable. The Official Public Enterprises Survey 2013-14

mentions that out of 234 enterprises covered under the survey, 163 were profit making which is an increase from 143 in 2004-05. The total profits from PSUs were Rs: 1,49,164 crore while total losses was pegged at Rs:20,055 crore. With the advent of globalisation, the PSUs were considered as a relic from the past pro-socialist pattern of economic system followed by India. But, opening up of the Indian economy saw the emergence of PSUs has a force of reckon with in the market. Consider the case of the capital market, PSUs like Engineers India, Bharat Electronics Ltd (BEL), NMDC, Coal India, ONGC etc have become major players with investors lining up to purchase their shares. The Competition Commission of India views that sectors like cement, pharmaceutical etc, where there is no government companies there is a high element of cartelisation by the private players. The effect of redistribution of wealth, as a model employer and also as an agent which doesn't just function on market principles, PSUs have a major role in the coming years. One can see the presence of PSUs as well as directly government-owned production set up like Ordnance Factories or Rail Factories in almost all the 25 sectors focused by the Make in India campaign.

The NITI Aayog has suggested closure of 26 sick PSUs and strategic sale of nearly 40. The NITI Aayog CEO Amitabh Kant had even suggested handing over schools, colleges and prisons to the private sector. These institutions can be effectively used by the government to implement the policies directly to the economy. With privatization or even with disinvestment, the government is losing out a weapon in its armory.

Conclusion

This entire programme of Make in India looks more like a branding exercise which tries to advertise India as a global destination for FDI similar to the tourism campaign, 'Incredible India'. If government is serious about making India a global manufacturing hub, then it would

have to do much more than branding. One of the initial steps would be to revive the PSUs which nearly contributes 20 percent of the country's GDP and employs nearly 10 lakh workers. The Micro Small and Medium Enterprises (MSMEs) would be the next sector which should be given the focus. The demonetization as well the hasty implementation of the Goods and Services Tax (GST) has no doubt affected the MSMEs the most. Many studies point to the fact that many MSMEs have even shut down. In the era of outsourcing, the relevance of MSMEs is very crucial and any strategy without their involvement would lead to fruitless effort.

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ISSUES RELATED TO THE GROWING DEPENDENCY RATIO WITH A SPECIAL FOCUS ON POPULATION AGEING IN KERALA

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Abstract

Age structure and its dynamics are critical in understanding the impact of population growth on the growth prospects of an economy. The correlation between population growth and economic growth has very much indicated by many of the economists and demographers. Economic behaviour of individuals varies as the age structure of the economy changes. It has several implications for the overall growth of the economy. The dependency ratio relates the number of children and older persons to the working-age population. Trends in dependency ratios indicate the potential effects of changes in population age structures which have diverse effects on the socio economic spheres of the economy. Whenever the fertility levels continue to decline in a society, dependency ratios eventually increase because of the proportion of working age starts declining and the proportion of older persons continues to increase. As populations grow older, increases in old-age dependency ratios add pressures on several matters such as social security and health care. The growth in elderly population is due to the longevity of life achieved because of economic well-being, better medicines and medical facilities and reduction in fertility rates. Percentage share of elderly persons in the population of India is ever increasing since 1961 and since the year 1991 the elderly females outnumbered the elderly males in our country. According to Population Census 2011, there are nearly 104 million elderly persons in India. State-wise data on elderly population reveals that Kerala has maximum proportion of elderly people in its population and it is constituted 12.6 per cent. The living arrangements of sixty plus community or the aged people reflect their need for family, community, or institutional support. Long-term care for older people has become a key issue in our society. In this background this study is an attempt to assess the new trends in age structure of the economy, to examine the nature of ageing population of Kerala and to analyse the various kinds of problems faced by the ageing population. The dependent population requires much care and attention. This care involves a range of support mechanisms such as home nursing, community care and assisted living, residential care, and long-stay hospitals. While the cost of long-term care is a burden to families and society, there are other concerns as well. For example, the staffing needs of caring for aging populations have increased the migration of health workers from lower income to higher income nations.

Keywords: *Population Growth, Ageing Population, Dependency Ratio, Age Structure, Labour Force Participation, Life Expectancy, Female Male Ratio (FMR) etc.*

Introduction

According to the Census Report 2011, Kerala has population of 3.34 Crores and the size of female population is 1.74 crores. Kerala has shown major signs of development in social sector and it is evident from the high standard of living of the people living there. The state also tops the chart in maintaining a highest literacy

rate of 95 percent which is far above the national figure of 74.04 per cent in India. Kerala is an agricultural state and it is known as the land of coconuts and spices is the only state in India which recorded a high female male ratio (FMR). Over the years, the age structure of the population of the State has also changed. Due to better life expectancy women live longer than men. The extent of various kinds of risks faced

by women especially at the time of old age is very severe. Generally old age brings a lot of ailment and diseases to the persons. Kerala finds itself facing a huge human development challenge in the form of its elderly population, burgeoning faster than in any other state. At one time, this population was a showcase for Kerala's health facilities and living conditions. Now, more and more elderly people are being abandoned or tortured by their families. Kerala's aged population, 5.1 per cent of the total in 1961, was just below the national 5.6 per cent. Since 1980, Kerala has overtaken the rest and the 2001 comparison is 10.5 per cent to 7.5. At the other end of the spectrum, the proportion of the young has declined faster than elsewhere.

The global demographic trend reveals that many of the countries in the world have experiencing ageing of population. In many countries the proportion of older persons in the population has increased. This is due to the economic well-being, better health care system, good medicines, etc. At the same time there is also substantial reduction in mortality rate. All these factors together have resulted in increasing number of elderly persons in the population. This phenomenon is called population ageing. This phenomenon started in the twentieth century, especially in developed countries. Recently the developing countries, including our country are experiencing this phenomenon. Over the years, the age structure of our population has also changed. In order to meet the challenges of ageing population every country much care, preparation and planning are needed. Along with that appropriate social and economic policies

should also be framed. Much priority must be given for the preparation of various social welfare programs for the aged population. Women issues also are of vital significance in considering social policies for elderly population. Due to better life expectancy women live longer than men. The extent of various kinds of risks faced by women especially at the time of old age is very severe. Whenever the number of older persons increases it put much strain on health care and social care systems in the country. Old age brings a lot of ailment and diseases to the persons. If there exist a large number of elderly persons in the population then the economy needs more and more health and medical facilities, services and resources. For caring them more and more number of hospitals, doctors, nurses are required. By considering all these aspects the policy makers should give emphasis in framing policies that can provide adequate and appropriate care and support for the aged community ultimately for their well being in the long run. Normally, as the average age of population increases it raises Governmental spending on health care system.

Objectives of the Study

The main objectives of this study are:

1. To assess the new trends in age structure of the economy.
2. To examine the nature of ageing population of Kerala.
3. To analyse the various kinds of problems faced by the ageing population.

Methodology of the Study

The study was conducted on the basis of secondary data. Data from a variety of sources is used. The data on state-wise population and working age population for various years are from the Registrar General of India. The Indian Census is the largest single source of a variety of statistical information on different characteristics of the people of India and the Census Report 2011 was the main source of secondary data.

Ageing Population as a Global Phenomenon

Population ageing is a global phenomenon. Global aging is considered as a success story. People today are living longer and generally healthier lives. This represents the triumph of public health, medical advancement, and economic development over disease and injury, which have constrained human life expectancy for thousands of years. It is applicable to both the advanced countries as well as to the developing countries. The changing demographic profile of India has also thrown many new challenges in the social, economic and political domains. The change in the age structure of the population of our country has led to rapid socioeconomic transformation in the country. This transformation has affected the different aspects of our Society. There is an emerging need to pay greater attention to ageing related issues and to promote holistic policies and programmes for dealing with ageing society. It has really affected the various segments and processes such as migration, urbanisation and the process of Industrialisation.

At the same time the sustained growth of the world's older population also presents challenges. Population aging now affects economic growth, formal and informal social support systems, and the ability of states and communities to provide resources for older citizens. Nations must quickly recognize the scope of the new demographic reality and adjust current policies accordingly. Experience has shown that such adjustments may be painful, changes in retirement ages and medical benefits, for example, are not widely popular. But experience also shows that it is easier to address problems sooner rather than later, when the cost of waiting may become insurmountable.

The phenomenon of population ageing is emerging as an alarming issue all over the world. The increase in the number of elder persons leads to the rise of in the number of problems in our society. Most often the lives of the aged population become complicated due to absence of assured and sufficient income to support their own lives. At the same time there is the need for providing adequate healthcare and other social security to them. The main issues encountered by them include the loss of a social role and their reputation and lack of opportunities for creative and effective use of free time. These are becoming as a matter of great concern for elderly persons. It is true to say that that ageing will emerge as major social challenge in the future. Much consideration to this issues and allocation of resources to address it is required to support and care them.

According to data from World Population Prospects: the 2015 Revision (United Nations,

2015), the number of older persons, that is the number of sixty plus has increased substantially in recent years in most countries and regions, and that growth is projected to accelerate in the coming decades. The U N observes that: Between 2015 and 2030, the number of people in the world aged 60 years or over is projected to grow by 56 per cent, from 901 million to 1.4 billion, and by 2050.

The older population is growing faster in urban areas than in rural areas. At the global level between 2000 and 2015, the number of people aged 60 years or over increased by 68 per cent in urban areas, compared to a 25 per cent increase in rural areas. As a result, older persons are increasingly concentrated in urban areas. While population ageing is a global phenomenon, the ageing process is more advanced in some regions than in others, having begun more than a century ago in countries that developed earlier, and getting underway only recently in many countries where the development process has occurred later, including the decline of fertility. The ageing process is more in advanced high-income countries. Japan is home to the world's most aged population (33 per cent) as per the data of 2015 and it was followed by Germany (28 per), Italy (28 per cent) and Finland (27 per cent). The pace of population ageing in many developing countries today is substantially faster than occurred in developed countries in the past.

New Trends in Age Structure and Projections

National Institute on Aging, U.S. Department of Health and Human Services has identified nine emerging trends in global aging.

It was by using data collected from various sources such as the United Nations, U.S. Census Bureau, and Statistical Office of the European Communities as well as regional surveys and scientific journals. They have presented a snapshot of challenges and opportunities relating to the matters of population aging. These nine emerging trends can be illustrated as follows.

1. It is a fact that the overall population is aging. For the first time in history, and probably for the rest of human history, people age 65 and over will outnumber children under age five.
2. Life expectancy is increasing. Most countries, including developing countries, show a steady increase in longevity over time, which raises the question of how much further life expectancy will increase.
3. The number of oldest old is rising. People age 85 and over are now the fastest growing portion of many national populations.
4. Non communicable diseases are becoming a growing burden. Chronic non communicable diseases are now the major cause of death among older people in both more developed and less developed countries.
5. Some populations will shrink in the next few decades. While world population is aging at an unprecedented rate, the total population in some countries is simultaneously declining.
6. Family structures are changing. As people live longer and have fewer children, family

structures are transformed, leaving older people with fewer options for care.

7. Patterns of work and retirement are shifting. Shrinking ratios of workers to pensioners and people spending a larger portion of their lives in retirement increasingly strain existing health and pension systems.
8. Social insurance systems are evolving. As social insurance expenditures escalate, an increasing number of countries are evaluating the sustainability of these systems.
9. New economic challenges are emerging. Population aging will have dramatic effects on social entitlement programs, labor supply, trade, and savings around the globe and may demand new fiscal approaches to accommodate a changing world. The trends in the age structure in India since independence are illustrated in Table-1.

Table-1 Percentage Distribution of Population by Broad Age Groups, India

Year	Age groups			Total
	Group of 0-14	Group of 15-59	Group of 60 Plus	
1951	38.4	56.1	5.5	100
1961	41.1	53.3	5.6	100
1971	42.0	52.0	6.0	100
1981	39.7	53.9	6.4	100
1991	37.6	55.7	6.7	100
2001	35.3	56.9	7.4	100
2011	30.8	60.3	8.6	100

(Source: Population Census Data)

Based on the Statistics provided by the Population Division, Department of Economic and Social Affairs, United Nations Secretariat,

the Indian demography is gradually moving to a greyer one. The old age dependency ratio will go up from 13.0 per cent in 2000 to 33 per cent by the year 2050. It is expected that this expected trend of demographic ageing will also be accompanied by some other features. These are indicated as follows. A large population of the elderly population living in poverty, or at the subsistence level, and will also remain illiterate. The increase in the number of elderly women will be more than men. Another World Bank publication namely "Old-Age Income Support in the 21st Century: An International Perspective on Pension Systems and Reforms" (May, 2005) pointed out that while the developed world got rich before its people started living longer, in developing countries people are getting older before the countries have got rich. This observation is thoroughly true in the circumstances of India and this raises the crucial issue of ageing. In India, population aging is occurring at the same time as dramatic economic and social developments are transforming much of the country. Economic development has been accompanied by increasing urbanization, higher rates of rural-urban migration, changing patterns of labour force participation and increased participation of females in organised sector. Traditional family support systems are stressed by the rapidly changing socio-economic scenario. All of these changes have raised concerns about pressure and challenges for the health care systems for the sixty plus community for social services and existing pension systems. Responding to these challenges will be one of the most difficult tasks facing government in the first half of this century.

Table-2 Projection-Age Structure

Age Structure	2000	2015	2025	2030	2035	2040	2050
0-14 years	347	345	337	327	313	300	285
% of TP	34.1	27.7	24.6	23.1	21.5	20.2	18.6
15-59	593	782	865	895	919	937	938
% of TP	58.3	62.8	63.2	63.2	63.2	63.1	61.3
60 Plus category	77	119	167	195	223	248	308
% of TP	7.6	9.6	12.2	13.8	15.3	16.7	20.1
Total Population	1017	1246	1369	1417	1455	1485	1531

Ageing Population in India- An Overview

Human resources play an important role in economic development and growth of a country. It can be considered as an asset for every economy. Whenever the proportion of young persons in the population of a country is large, the growth potential of the economy will also be higher. The quality of human resources is influenced by the age structure of the population. Age structure and sex ratio are the two important aspects of composition of population. Age related statistics constitute an important component of demographic analysis. The age based data of population is widely used for analysing and comparing different demographic variables such as literacy rate, educational attainment, marital status, work force participation etc. The age and sex based demographic data are used for various purposes. It includes planning, technical, scientific, and commercial purposes. The dependency ratio, which is the ratio of economically active to economically inactive persons, is dependent on age composition. India has one of the largest proportions of population in the younger age groups in the world. During the year 2016, about 26.80 per cent of the population of India has been in the age group 0-14 years. The percentage

of population belonging to 15-59 age was estimated as 63.90 per cent and the percentage of 'sixty plus' population was 9.30 %.

According to Population Census 2011 there are nearly 104 million elderly persons (aged 60 years or above) in India; 53 million females and 51 million males. Both the share and size of elderly population is increasing over time. During the year 1961 the percentage of the elderly population in India was only 5.6 per cent, however, it has increased to 8.6 per cent in the year 2011. For males it was marginally lower at 8.2 per cent, while for females it was 9.0 per cent. With regard to the rural and urban areas, in our country, seventy one per cent of the elderly population resides in rural areas and the rest twenty nine per cent lives in urban areas. The sex ratio among elderly people during the year 1951 was high as 1028. But since then it has subsequently came down and again it has reached up during the year 2011 as 1033. In the case of India, the old-age dependency ratio has ascended from 10.9 per cent in 1961 to 14.2 per cent in 2011. As per the Census Report 2011, old-age dependency ratio among females and males were 14.9 per cent and 13.6 percent correspondingly. The demographic data has revealed that in rural areas, sixty six per cent of elderly men and twenty eight per cent of elderly women are working. At the same time, in urban areas only fort six per cent of elderly men and about eleven per cent of elderly women are working. The percent of literates among elderly persons increased in our country. It was twenty seven per cent during the year 1991 and it has increased to forty four per cent in 2011. The literacy rates among elderly

females is less than half of the literacy rate among elderly males. According to the Census 2011, the literacy rates among elderly females were twenty eight per cent the literacy rate among elderly males were fifty nine per cent. In our country, the prevalence of heart diseases among elderly population was much higher in urban areas than in rural areas. Most common disability existing among the aged persons in the country was orthopaedic disability and visual disability. In the age-group of 60-64 years, seventy six per cent persons were married, whereas twenty two per cent were widowed. Remaining two per cent were either never married or divorced. The details are furnished in Table-3.

Table-3 An Overview of the Elderly People in India

Sl. No	Description	Male	Female	Total
A. Total Population (in Millions)				
1	Rural	427.8	406.0	833.8 (68.85)
2	Urban	195.5	181.6	377.1 (31.15)
3	Total	623.3 (51.47)	587.6 (48.53)	1210.9 (100.00)
B. Aged Population (60 +) in Millions				
1	Rural	36.0	37.3	73.3 (70.55)
2	Urban	15.1	15.5	30.6 (29.45)
3	Total	51.1 (49.18)	52.8 (50.82)	103.9 (100.00)
C. Share of Elderly Population in Total Population (%)				
1	Rural	8.4	9.2	8.8
2	Urban	7.7	8.5	8.1
3	Total	8.2	9.0	8.6
D. Old age Dependency Ratio				
1	Rural	14.5	15.8	15.1
2	Urban	11.8	13.1	12.4
3	Total	13.6	14.9	14.2
E. Elderly Population Working (%)				
1	Rural	66.4	28.4	47.1
2	Urban	46.1	11.3	28.5
3	Total	60.4	23.4	41.6
F. Literacy rate 60 +				
1	Rural	50.5	18.4	34.2
2	Urban	79.6	52.7	66.0
3	Total	59.1	28.6	43.5
G. Life Expectancy of 61 +				
		16.9	19.0	17.9

(Sources: Population Census 2011, SRS Report 2013)
(Values in parenthesis represent Percentage)

Trends in the Number of Old age People

As per the Census Report 2011, there are nearly 10.4 crores of elderly persons in the country. Out of that 5.3crores are females and 5.1 crores are males. It can be observed that, in our country, up to the year 1991, the number of elderly males exceeded the number of females. However, after 1991 this trend has been reversed and the elderly females outnumbered the elderly males. This is also a major concern for policy makers as elderly women are more vulnerable on all fronts compared to elderly men. It should also be noticed that 71 per cent of elderly population, that is 7.3 crores reside in rural areas while 29 per cent of elderly population, that is 3.1 crores are in urban areas. The details are furnished in Table-4

Table-4 Elderly Population (aged 60 years & above) in India (in millions)

Period	Male Population	Female Population	Total	Rural	Urban
Census 1961	12.4	12.4	24.8	21.0	3.7
Census 1971	16.9	15.8	32.7	27.3	5.4
Census 1981	22.0	21.1	43.2	34.7	8.5
Census 1991	29.4	27.3	56.7	44.3	12.4
Census 2001	37.8	38.9	76.6	57.4	19.2
Census 2011	51.1	52.8	103.8	73.3	30.6

(Source: Population Census Data)

In our country the rise in elderly population is mainly due to the longevity of life which was the result of reduction in fertility rates, better medicines and medical facilities and the economic well-being. The decadal growth in general population has shown a declining trend since the year 1961. However, there is an increasing trend in percentage of elderly

population in the country. However, in the last one decade, the growth in elderly population has shot up to thirty six per cent while the same was twenty five per cent in the previous decade. The general population has grown by merely eighteen per cent, which was twenty three per cent in earlier decade. It can be observed that the growth in the aged population has always been more than the growth in general population. Very high growth rate in elderly population can be observed in our country. Percentage share of elderly persons in the population of India is ever increasing since the year 1961. In 1961, 5.6 per cent of the population was belonging to the sixty plus category and this proportion have increased to 8.6 per cent in the year 2011. The trend is visible both in the case of rural as well as urban areas. In rural areas while the proportion of elderly persons has increased from 5.8 per cent to 8.8 per cent, in urban areas it has increased from 4.7 per cent to 8.1 per cent during the period 1961-2011. It is a fact that in our country, the old age dependency ratio shows an increasing trend. The old age dependency ratio has increased from 10.9 per cent in 1961 to 14.2 per cent in 2011.

Table-5 Decadal growth in General Population and Elderly Population (% change)

Sl.No	Period	General Population (% Change)	Elderly Population (% Change)
1	1951-1961	21.6	23.9
2	1961-1971	24.8	33.7
3	1971-1981	24.7	33.0
4	1981-1991	23.9	29.7
5	1991-2001	21.5	25.2
6	2001-2011	17.7	35.5

(Source: Population Census Data)

Demography of Kerala

Kerala is historically known for its spices trade. Kerala is mentioned in many ancient Sanskrit works. In ancient time, the population of Kerala was combination of different groups of Dravidian. The Chera Dynasty was the first prominent kingdom that ruled ancient Kerala. Trade of various kinds of valuable spices attracted the Portuguese traders to the land of Kerala with the beginning of fifteenth century. Later it has paved the way for the European colonization of India. After independence, Travancore and Cochin joined the Republic of India and Travancore-Cochin was given the status of a state in 1949. Modern Kerala State was formed on 1 November 1956 following the States Reorganization Act by combining Malayalam-speaking regions. Modern Kerala State was formed by consolidating the Malabar province, which was a part of the Madras Presidency and the Travancore - Cochin State, It Spread over 38,863square kilometers.

Kerala is a narrow fertile strip of land situation on the southwest coast of India, sandwiched between the Lakshadweep Sea and the Western Ghats. It is true to say that the landscape of the state is a gift of the sea and the mountains. Kerala region constitute 1.18 per cent of the country. Traditionally, Kerala is an agricultural state and known as the land of coconuts and spices. Probably Kerala is the first state in India which opened up and established a commercial, cultural and religious link with the outside world. More than fifty per cent of the people are forced to be in the agrarian sector. Kerala is located in South-western part of India

and is the leading state in the country in terms of social development. Currently, Kerala is the home to about 2.76 percent of the total population of the country. According to the Census Report 2011, Kerala has population of 3.34 Crores. In the year 2001 it was 3.18 Crores. As per the 2011 census the size of male population in Kerala is 1.60 crores and the female population is 1.74 crores. The total population growth took place during the period 2001-2011 was 4.91 percent while in previous decade it was 9.42 percent. Kerala State has shown major signs of development in social sector and it is evident from the high standard of living of the people living there. The state also tops the chart in maintaining a highest literacy rate of 95 percent which is far above the national figure of 74.04 per cent in India. Kerala is the only state in India which recorded a high female male ratio (FMR). The ratio of female population per 1000 male population is 1084. With a total human count of 3.3 million, Thiruvananthapuram or Trivandrum is the most populous place in Kerala.

Table-6 Demography of Kerala at a Glance

Sl.No	Description	2001	2011
1	Size of population	3.18 Crores	3.34 Crores
2	Male	1.54 crores	1.60 crores
3	Female	1.63 crores	1.73 crores
4	Population Growth	9.42 %	4.91 %
5	Percentage of total Population	3.10 %	2.76 %
6	Sex Ratio	1058	1084
7	Child Sex Ratio	960	964
8	Density/km ²	819	860
9	Area(Km ²)	38863	38852
10	Total Child Population (0-6 Age)	3793146	3472955
11	Male Population (0-6 Age)	1935027	1768244
12	Female Population (0-6 Age)	1858119	1704711
13	Literacy	90.86 %	94.00 %
14	Male Literacy	94.24 %	96.11 %
15	Female Literacy	87.72 %	92.07 %
16	Total Literate	25485688	28135824
17	Male Literate	12753602	13704903
18	Female Literate	12732086	14430921

(Source: Population Census Data 2011)

As per the Census Report 2011, out of total population of Kerala, 47.70 per cent people live in urban regions. The total figure of population living in urban areas is 15,934,926 of which 7,619,358 are males and while remaining 8,315,568 are females. The urban population in the last 10 years has increased by 47.70 percent. Sex Ratio in urban regions of Kerala was 1091 females per 1000 males. For child (0-6) sex ratio the figure for urban region stood at 963 girls per 1000 boys. Total children (0-6 age) living in urban areas of Kerala were 1,649,291. Of total population in urban region, 10.35 per cent were children (0-6). Average Literacy rate in Kerala for Urban regions was 95.11 percent in which males were 96.95 per cent literate while female literacy stood at 102.99 per cent Total literates in urban region of Kerala were 13,586,504.

Table-7 District wise Population of Kerala

Sl.No	District	Population	%	Density
1	Thiruvananthapuram	3307284	9.91	1509
2	Kollam	2629703	7.88	1056
3	Pathanamthitta	1195537	3.58	453
4	Alappuzha	2121943	6.36	1501
5	Kottayam	1979384	5.93	896
6	Idukki	1107453	3.32	254
7	Ernakulam	3279860	9.82	1069
8	Thrissur	3110327	9.32	1026
9	Palakkad	2810892	8.42	627
10	Malappuram	4110956	12.31	1158
11	Kozhikode	3089543	9.25	1318
12	Wayanad	816558	2.45	383
13	Kannur	2525637	7.56	852
14	Kasaragod	1302600	3.90	654
Total population of kerala		33,387,677	100.00	819

(Source: Population Census Data 2011)

The Problem of Ageing In Kerala

According to the Census report 2011, the state-wise data on elderly population reveals that Kerala State has the maximum proportion of elderly people in its population (12.6 per cent).

Kerala was followed by Goa (11.2 per cent) and Tamil Nadu (10.4 per cent). This is mainly due to the lifestyle and better medical facilities prevailing in these states. The least proportion is recorded by Dadra & Nagar Haveli (4.0 per cent) followed by Arunachal Pradesh (4.6 per cent) and Daman & Diu and Meghalaya (both 4.7 per cent). As per the Census Report 2011 Kerala has got the highest life expectancy at birth, followed by Maharashtra and Punjab. The life expectancy at birth in Kerala is 71.8 years and 77.8 years for males and females respectively.

Table-8 Size of Elderly Population (Aged 60 +) of Kerala (Number in Thousands)

SI No	Description	Number
1	Aged Male Population	1884
2	Aged Female Population	2310
3	Total of Aged Population	4193
4	Aged Population in Rural Area	2198
5	Aged Population in Urban Area	1996
6	Percentage of Aged Population in TP	12.6

(Source: Office of the Registrar General, India)

In India, the difference between rural and urban old-age dependency ratio was significantly high in States like Maharashtra, Andhra Pradesh, and Himachal Pradesh etc. But in the case of Kerala the old-age dependency ratio remained almost the same in both rural and urban areas. The State-wise data on economic independence reveals that in rural areas, the proportion of elderly males who are fully dependent on others is highest in Kerala and it is around 43 per cent.

Table-9 Old Age Dependency Ratio by Sex and Residence in Kerala During the Year 2011

SI.No	Category	Dependency Ratio
1	Male Dependency Ratio	18.6
2	Female Dependency Ratio	20.6
3	Total Dependency Ratio	19.6
4	Rural Dependency Ratio	19.8
5	Urban Dependency Ratio	19.5

(Source: Office of the Registrar General, India)

Kerala economy has changed from a traditional backward agrarian economy to modern growing economy. Kerala economy faces structural changes since the formation of the state. Although the real sectors remained as lethargic in growth rate, the service sector achieved a high growth potential. There will be changes not simply in traditional indicators like State Domestic Product and Per capita Income but also in other socio-economic indicators such as literacy rate, life expectancy, birth rate, death rate, infant mortality rate, sex ratio etc. During 2011-12, the contribution from primary, secondary and tertiary sectors to the GSDP at constant prices (2004-05) was 9.48 per cent, 20.22 per cent and 70.30 per cent respectively. This difference in sectoral share between constant and current prices shows that inflationary trends in the primary sectors are much higher than in the secondary and tertiary sector.

Kerala is the third densely populated state in India. Kerala is the third densely populated state in India. As per the Census 2011, the decadal growth rate of population in the state is 14 per cent. Kerala finds itself facing a huge human development challenge in the form of its elderly population, burgeoning faster than in any other state. Kerala's 60-plus population, 5.1 per cent of the total in 1961, was just below the national 5.6 per cent. Since 1980, Kerala has overtaken the rest and the 2001 comparison is 10.5 per cent to 7.5. At the other end of the spectrum, the proportion of the young has declined faster than elsewhere.

Decades ago, the practice of the elderly living with non-relatives or strangers was not common in Kerala. But by 2002, a study by the

Centre for Development Studies in Thiruvananthapuram found, Kerala had 134 old-age homes, a fifth of the total in the country. By 2010, the Kerala total had reached 250-odd, counting only old-age homes that take government aid. Though Kerala has the highest number of old-age homes in the country, a CDS survey in 2009 showed that most of the elderly preferred to stay in their own homes. This is due to the perception around old-age homes, supposedly meant for only the destitute, through that has changed somewhat because of new homes modelled on star resorts. The state has several such modern old-age homes and retreat centres, where the retired have to pay 75 per cent of their pension apart from a deposit of Rs 4 to 5 lakh for spending the last years of their lives.

Problems of The Aged People: Though ageing is the natural stage of human life, it brings with it innumerable problems for the people who have grown old. A detailed analysis of the major problems of the aged in the light of the findings from various studies can be traces as follows.

Housing related Problems: Housing for the aged should be suitable not only to the living pattern which they have established in optimum health, but also to conditions of failing health and illness, commonly associated with later years of life such as, failing eye sight of hearing, slowing and un sureness of step, diminishing energy and more acute disabilities, such as blindness, forgetfulness etc. On this pattern, the housing available to a majority of the senior citizens may be found inappropriate and unsuitable to their requirement. The sizeable populations of older widows as well as the older

males have been facing the problem of “where to live peacefully”.

Economic Problems: As far as economic problems are concerned, they are very basic to all the other problems faced by the aged. With superannuation, a person has to retire from the service, which not only results in loss of employment and social status but also a substantial reduction in his income level. Majority of the elderly people face acute financial problems, which makes older persons economically insecure.

Physiological Problems: With growing age, older persons experience various anatomical and physiological changes. These changes bring many psychological, behavioral and attitudinal changes in them. Consequently, they have to suffer varied sorts of physiological problems such as loss of physical strength and stamina, which become more acute as a person grows older.

Problem of Elder Abuse: Elder abuse is usually defined as any ill treatment to an older person. It refers to “infliction of physical, emotional or psychological harm on an older adult”. Around 81 per cent of the elderly persons face the problem of verbal abuse, while 53 per cent of them face neglect followed by material abuse (37 per cent) and physical abuse (23 per cent).

New Initiatives for the Social Security of the Aged People in Kerala

Kerala has taken the lead to show that state can provide social security to all those in need by harnessing its resources and mobilizing public participation. The Government of Kerala

has given utmost importance to carry out social welfare measures covering the needy sections of the population. Kerala Social Security Mission (KSSM) is a Charitable Society under the Department of Social Justice. The Mission has made tremendous impact on the Social life of Kerala within a short span of time, by implementing various schemes like Vayomithram'. Kerala Social Security Mission is implementing the Vayomithram project which provides health care and support to elderly above the age of 65 years residing at Corporation/ Municipal Areas in the state. The Vayomithram project mainly provides free medicines through mobile clinics, Palliative care, Help desk to the old age. The project implemented as a joint initiative to LSGD in the area. (Municipality/ Corporation).

The project started its function in the year 2010-2011, in Kollam and Trivandrum Corporation. Later it has extended to 12 district head quarters in the fiscal year 2011-2012. As a part of extension of project 9 new projects were started in the year 2012-2013 and two new projects in 2013-2014. Kerala Social Security Mission (KSSM) has decided to start nine more projects. Vayomithram Project provides various kinds of services to the aged population. It includes Mobile clinic service, Palliative care service, Help Desk facility and various other services. Vayomithram provides medicines free of cost by conducting mobile clinics in ward basis in the area. There is no economic criterion for availing the service. Each mobile unit comprises of Medical Officer, Staff Nurse and JPHN. Palliative care service intends to provide palliative care for the bed ridden patients in the project area. Special trained nurses are available

for the service. Vayomithram co-ordinators provide help desk service to the needy old age in the area. The old age can avail the help from the vayomithram office. Other services provided by KSSM include special medical camps conducted for aged people (eye camp etc), special entertainment programmes like Sallapam and Snehayathra in old age homes, conduct programmes with the help of NGO's, conducted special day programmes related to health and welfare and provide counseling services.

Conclusion of the Study and Recommendations

The aged people are most often helpless, deprived of work and they need assistance of others. These people are suffering from all types of physical ailments, and even becoming victims of robbery, assault, and other crimes, especially in the case of women. The World Health Organization has stated that the world is on the brink of a demographic milestone. According to their data during the year 2010, 8 per cent of the world population was aged. By 2050 this ratio is expected to rise about 16 per cent of the world population. Issues related to aging and the living condition of these grey people is an important area for research and it has much relevance in social science studies. An increase in the number of sixty plus reflects the successful outcome of health improvement. The percentage of elderly has increased in our country and it is expected to increase further. Extraordinary growth in the aged population raises many issues for the civil society, policy makers and researchers. Growing percentage of aged population implies the need for a higher quantity and quality of geriatric services. These

people require improved quality of life and income security.

The aged people and their families will have to deal with different challenges occurring due to the increased longevity. Various aspects of increase in ageing population should be discussed with much consideration. Most of the old aged women do not own property and even when they own it they do not manage it. They are completely dependent on the male members of the family for the accomplishment of all their basic needs. Besides these the aging women face specific health problems. Even if the rich educated women may be self-sufficient in appearance but may be facing problems of emotional insecurity and physical vulnerability. The living arrangements of sixty plus community or the aged people reflect their need for family, community, or institutional support. Long-term care for older people has become a key issue in our society. This care involves a range of support mechanisms such as home nursing, community care and assisted living, residential care, and long-stay hospitals. While the cost of long-term care is a burden to families and society, there are other concerns as well. For example, the staffing needs of caring for aging populations have increased the migration of health workers from lower income to higher income nations.

The challenge of caring for an increasingly elderly population in our society is a major issue. It is a fact that a vast number of elderly people are employed in the informal economy. These people have little or no access to any contributory social security schemes. It indicates that this must be a matter of priority to

address the issues of social security provision appropriately. It is understood that social spending is actually necessary for the welfare of sixty plus community. It can be pointed out that well-designed social protection programme, particularly in the form of social security pensions are very effective in preventing poverty and social insecurity prevailing among the aged group. We have to recognize that the ageing population have contributed in their younger days to the prosperity of their society. Therefore it is our duty to ensure that these senior citizens are living with dignity.

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A STUDY ON THE UTILIZATION OF THE INCOME OF WORKING WOMEN IN PERUMBAOOR

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Abstract

The purpose of this paper is to identify the utilization of the income of the working women. This paper draws upon mostly the primary sources. Women are considered. The subject of empowerment of women has become a burning issue all over the world since last few decades. Along struggle going back over a century has brought women the property rights, voting rights etc.in many countries. To what extent our policies and legislative measures have been able to raise the status of women in India is a big question.to be investigated. This paper analyses a very small aspect of women empowerment. In Kerala women earn as much as their husband do and their employment contribute substantially to their family. How many of them enjoy the freedom to handle their income? Majority of them don't have.

Keywords: *Empowerment: Authority or power given to someone to do something*

Gender equity: Fairness of treatment for women and men, according to their respective needs

Income: Money received, especially on a regular basis, for work or through investments.

Introduction

India has experienced rapid growth in many spheres of development. Gender equity is one of them. The Indian development model has does not yet given importance to a model which recognizes the role of women in the socio economic growth of the country. Current governments should address the issue seriously and must recognize that no nation can achieve progress unless its women are given equal access to opportunities and adequate safety and security. India is recognized as a rapidly growing economy by the BRICS countries. Though India attains more progress in recent decades, some groups benefitted more from this than others.

Indian women face many social and structural barriers to participate in the development process. This hinders the development of women and negatively affects its ability to modernize. Gender discrimination prevails in India and it starts from the womb itself. Girls face a range of structural barriers that contribute to unequal education and economic performance. Gender based discrimination and violence discourages women from leaving their homes and is used by some parents for justifying the early marriage of their daughters. Besides this there are numerous cases of rapes and sexual assaults on women and children. Education and employment are considered as the wheels for the

upliftment of women and it provides them the ability to stand on their own feet.

Objectives of the study

- To analyze the utilization of the income of the working women.
- To understand their saving behavior.

Importance of the study

Our constitution provides equal opportunity for men and women. Today the status of Indian women is ridiculous. They hold almost all position equivalent to that of men. Female literacy is also very high in Kerala. Till women face many discriminations, atrocities and are subjected to various types of harassments. She faces many problems in public places, at schools, colleges and even in their own families.

It is said that through education and employment, the status of women will become more independent and able to participate in social, political and economic activities. The work participation rate of women in Kerala is high and they contribute a major share of our GDP. Today majority of our women are working outside along with their household work. Do they enjoy the freedom in spending their income as they like? This is a main problem as far as working women is concerned. This paper tries to analyse the freedom enjoyed by working women over their income.

Methodology

Both primary data and secondary data are used for the study. Primary data is collected from working women in different sectors in Perumbavoor through interview schedule.

Secondary data are collected from different sources like internet, books etc. Average and percentage methods are used for the analysis of data.

Overview

“I work all the time, all the daysthere is no escape from the grind of work”(a woman’s answer to the question “what do you do”) and my wife does not work ,she is at home”(a man’s answer to the question “what does your wife do”). These responses are common to all irrespective of class, caste and region. In fact, women’s work sustains the society. Women run household, rear children, care for the aged and the sick and they perform economic and non-economic activities within the family and outside.

In the pre-independent period it was the subcommittee of National Planning Committee which emphasized in its report the importance of independent means for women and the significance of the economic value of household. Unfortunately the report was lost in the avalanche of events and issues following independence.

After independence, it was the historic report “Towards Equality” (Report of The Committee on The Status of Women in India) which highlighted the neglect of women’s contribution to economic activities especially in the unorganized sector. It clearly stated that the transition to a modern economy had meant the exclusion of an increasing number of women from active participation in the productive process and continuation of women working for no return and no recognition.

The eighties witnessed increasing sensitivity to women issues among scholars and

activists which has some impact on the government. In 1987 a National Commission for Self employed Women and Women in the informal sector was appointed by the government of India with ElaBhat as the chair person to make a comprehensive study of the working and living conditions of women. On the basis of extensive field survey the commission made it clear that all women should be recognized as workers.

In May 2013, The Government of India (Ministry for Women and Child Development) based on the recommendation of the committee of Governors constituted by the President of India, established a High level Committee on the Status of Women in India. The 2013 Committees mandate was to undertake a comprehensive study on the status of women since 1989, and to evolve appropriate policy intervention based on a contemporary assessment of women's economic legal, political, education health and socio cultural needs.

When we deal with women work and their contribution to our economy, we should have awareness about the various complexities involved in it. Probing the issue from a women's perspective, established notions, which are strengthened by old traditions and nurtured by cultural values are being challenged. Some conservative sections of the society do not consider it good for a woman to be in a job. Lack of occupational mobility is also considered as a big challenge. Most of the working women prefer to get employment at a place near to their place of residence. Sometimes they are not treated equally in their work place and are

considered as inferior to their male co-workers. The major problems faced by women in their work place include unequal pay, lack of security, sexual harassment, lack of family support, deficient maternity leave etc.

Table.1.1 Work participation in India

Total Workers	Number	Rate (%)
Persons	402,234,724	39.1
Males	275,014,476	51.7
Females	127,220,248	25.6
Main Workers		
Persons	313,004,983	30.4
Males	240,147,813	45.1
Females	72,857,170	14.7

Source: 2011censes

The total work participation rate in India as per the 2011 census is 39.1% .Women's work participation rate is 25.6% which is very low as compared to the global scenario. But these small percentages contribute to our national income. They earn income but how much they receive as their own is a big question as far as women empowerment is concerned.

Mahatma Gandhi said he would consider India independent the day her daughters could walk free on the streets in the middle of the night. As the modern woman struggles to balance between demanding breakfast menus and spreadsheets, ageing in-laws, looming project deadlines, board meetings and parent teacher meetings, it is time she redefined her independence. While what she wears, what job she picks, how she chooses to balance her work and family life are definitely her own choices to make; how she saves and invests for herself and for her parents should also be her own choices to make. We have come a long way from the time when men would grant the women in the house a

certain sum to manage the household expenses, but we're still a long way off. Because women still think their financial decisions need to be validated by the men in their life. They second guess their every investment decision. They wait for their fathers to instruct them on spending patterns. They wait for their husbands to “plan for the family’s future” and content themselves with the back-seat with their own hard earned money. The decision making with regard to the spending, saving or investing depends on how much share of her hard earned income she got.

Analysis

The study tries to analyses the utilization of the income of working women. Various factors are considered to find out the relationship. A sample of 90 working women are collected for the analysis

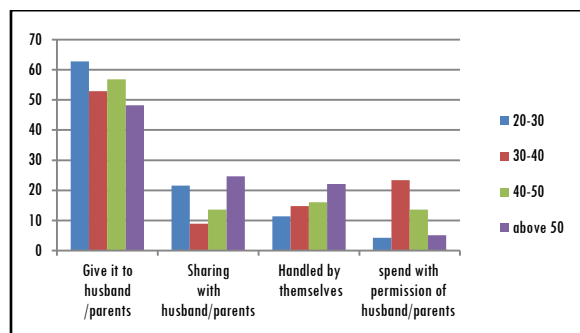
Table 1.2 Age wise categorization of utilization of income

Age	Give it to husband /parents	Sharing with husband/ parents	Handled by themselves	spend with permission of husband/parents
20-30	62.7	21.6	11.4	4.3
30-40	52.9	8.9	14.8	23.4
40-50	56.8	13.6	16	13.6
above 50	48.2	24.6	22.1	5.1

Source: Survey data

Figure 1.1 explains the age wise categorization of the utilization of income. It is clear both from the table and bar diagram that 73.3% of women fall under the age group of 20-30 give their income to their parents or husband.26.7% of women share it with family. The data reveals that irrespective of their age group more than 50% of the women give their income either to their husband or to their parents.

Figure 1.1 Age wise categorization of utilization of income



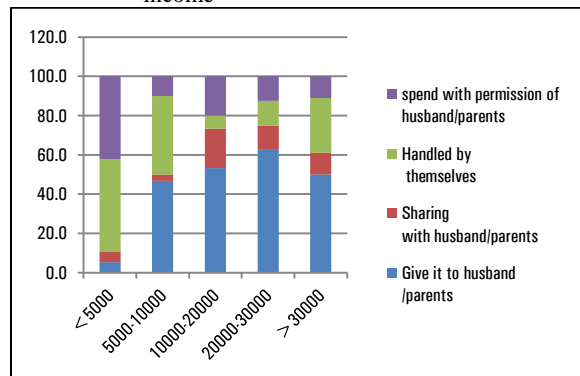
Source: Survey data

Table 1.3 Income wise categorization of utilization of income

Income	Give it to husband /parents	Sharing with husband/ parents	Handled by themselves	spend with permission of husband/parents
< 5000	5.3	5.3	47.4	42.1
5000-10000	46.7	3.3	40.0	10.0
10000-20000	53.3	20.0	6.7	20.0
20000-30000	62.5	12.5	12.5	12.5
> 30000	50.0	11.1	27.8	11.1

Source: Survey data

Figure 1.2 Income wise categorization of utilization of income



Source: Survey data

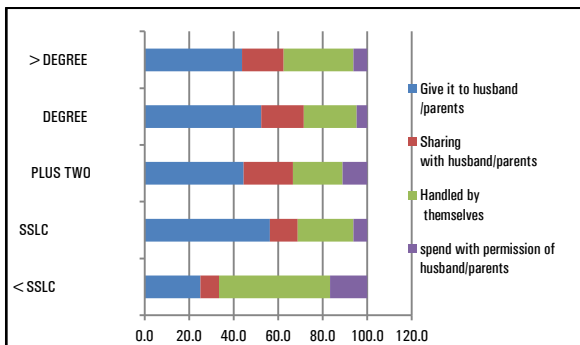
The table 1.3 reveals that around more than 50% women who earn more than 10000 as their salary give their income to their husband .They have no control over their income. But those who earn lower income have a greater control over their income.

Table 1.4 Education wise categorization of utilization of income

Educational qualification	Give it to husband /parents	Sharing with husband/ parents	Handled by themselves	spend with permission of husband/ parents
< SSLC	25.0	8.3	50.0	16.7
SSLC	56.3	12.5	25.0	6.3
PLUS TWO	44.4	22.2	22.2	11.1
DEGREE	52.4	19.0	23.8	4.8
> DEGREE	43.8	18.8	31.3	6.3

Source: Survey data

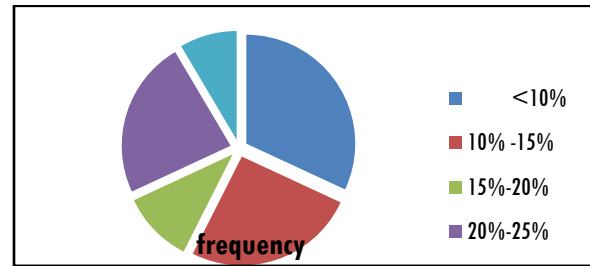
Figure 1.3



Source: Survey data

From the figure 1.3 it is clear that 31.3% of women who have educational qualification more than degree handled their income by themselves. But still 43.8% of them give their income to their husband. 18.8% of them share a particular percentage of their income with their family and only 6% of them spend their income with the permission of their husband. 50% of women who have an educational qualification below SSLC handled their income by themselves, 25% of them give their income to their husband, 16.7% spend with the permission of their husband and only 8.3% of them share their income with their family.

Table 1.4 Saving of working women



Source: Survey data

Figure 1.5 reveals the saving of working women. Among the total 31.9% of the women have a monthly saving of less than 10%, 25.5% save 10%-15% of their income, 10.6% save 15-20% of their income, 23.4% have a saving of 20-25% their income and only 8.5% of them save more than 25% of their income.

Findings and Conclusion

This paper tries to find out the freedom enjoyed by the women workers in handling their income. From this study it is clear that in every category irrespective of their income, educational qualification and their age either give their entire salary to their husband /parents or they spend their income with the permission of their family. This financial freedom depends on so many factors. This paper concentrates only on a few factors which affect the financial freedom of working women. From this study it is clear that with the increase in income they lose control over their money. It may be because of the patriarchy system that prevails in Kerala. Those who earn lower income will have greater freedom in handling their income. Mainly these women are from a lower financial background. Thus the freedom enjoyed

by women is more associated with the social circumstances that prevail.

When decisions or policies are taken by different governments or authorities for the empowerment of women we concentrate on the educational aspect and their social participation. Different policies are therefore taken to improve their educational qualification and reservations are provided to ensure their political and social participation. It is true that these policies are capable for upgrading the status of women. But it is clear that besides all these policies what we need is a change in the attitude of the people towards women.

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INFLUENCE OF YOGA IN MODERN EDUCATION SYSTEM

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Abstract

Better educated, with greater spending power and technically savvy, the youngsters have an enormous role to play in shaping the India of the future. But the intellectual education with holistic approach has declined in our current education policy. Although we read mathematics, science and many things, but man-making ability in our education system has ceased to exist. If we will see the higher education scenario of India as compared with global standard education, it does not come even at 100th position. There is no comparison between our infrastructure and resources in educational institutions with that of the western countries. Moreover, the value of humans' life has deteriorated. The old socialist mantra of "rice in every bowl" has now been replaced with "a cell phone in every hand". There is a need for planned and organised engagement with the youth in order to build their capacities so that they can contribute in all phases of life. So, in this scenario, yoga will help build a fit world. In spite of the study of yoga as a paper in physical education programmes or courses even now yoga has not implemented in our schools or colleges completely. The present article tries to portray the significance and the need of practicing yoga for the youngsters in schools and colleges in this deteriorating world.

Keywords: *Yoga, influence, modern education.*

Introduction

'Yoga' is a technical term it means there are multiple meanings in dictionary, when individual soul and supreme soul are united then we called as 'Yoga' yoga is not only an exercise but also an art. It is a timeless tradition from Rig Veda with a history of over 5000 years. Yoga means uniting individual soul Jeevatma with universal soul Paramatma."¹ "Yoga is one of the art or skill enjoyed by humanity in its cultural tradition and heritage, what are known as the lalitakala or playful arts in Sanskrit."² Yoga is a group of physical, mental, and spiritual practices or disciplines which originated in ancient

India. There is a broad variety of yoga schools, practices, and goals in Hinduism, Buddhism, and Jainism. Among the most well-known types of yoga are Hatha Yoga and Raja Yoga. The origins of yoga have been speculated to date back to pre-Vedic Indian traditions; it is mentioned in the Rigveda. Yoga gurus from India later introduced yoga to the West, following the success of Swami Vivekananda in the late 19th and early 20th century. In the 1980s, yoga became popular as a system of physical exercise across the Western world. Yoga in Indian traditions, however, is more than physical exercise; it has a meditative and spiritual core. Yoga is essential for personal growth and spiritual awakening. An

international day for yoga was declared unanimously by the United Nations General Assembly (UNGA). The idea of International Day of Yoga was first proposed by the current Prime Minister of India, Mr. Narendra Modi during his speech at the UNGA, on 27 September 2014. He stated that Yoga is an invaluable gift of India's ancient tradition. It embodies unity of mind and body; thought and action; restraint and fulfilment; harmony between man and nature; a holistic approach to health and well-being. It is not about exercise but to discover the sense of oneness with yourself, the world and the nature. By changing our lifestyle and creating consciousness, it can help in well being.

Meditation is a big part of yoga. In Adi Shankara's words, as gold purified in a furnace loses its impurities and achieves its own true nature, the mind gets rid of the impurities of the attributes of delusion, attachment and purity through meditation and attains Reality. Meditation is a precise technique for resting the mind and attaining a state of consciousness that is totally different from the normal waking state. Meditation is not a part of any religion; it is a science, which means that the process of meditation follows a particular order, has definite principles, and produces results that can be verified. Yogis have been practicing 'dhyana' (meditation) for millennia. While meditating we really get to focus on our inner being and connect with ourselves in ways we would not have thought possible. The silence and relaxation will help us to get to a place where stress doesn't exist. It helps us let go all our stress and inhibitions and helps us really relax.

When the body is physically healthy, the mind is healthy, stress also under control. We need physical health, mental health, social and spiritual health for a happy and successful life. Through yoga we can attain these goals. Practicing yoga can avoid the disastrous consequences of the sedentary urban life style. A set of yogic postures combined with pranayama if practiced daily can protect from modern life style diseases. Yoga is all about balance of body mind and spirit and living in the moment. Yoga is for everyone, whatever your beliefs regardless of our body shape, whatever our age wherever our path is leading. The main thing is yoga helps people relax and find inner peace and strength. While yoga does help strengthen the core and help people get fit, the impact it makes on soul is amazing. When practicing yoga, we connect with our thoughts and feel at peace with the world and our self. The key to getting the most out of it is to let go the noise and the stress that surrounds our everyday life and really connect with the earth. Once if we got master the art of turning the world off, we can reap all the benefits of yoga. Yoga helps relieve of the damage done to our body on a daily basis. It also helps us shed toxins and unwanted weight. This gets us feeling and looking our best while feeling less stressed and more relaxed.

Yoga has a lot of long-term medical benefits when you make it an integral part of your lifestyle. Some benefits of yoga include:

- **Better posture:** Yoga helps in keeping the spine erect, enabling you to sit straight and not slouch. It also helps alleviate the stress on your spine, exerted through incorrect posture. Consistent

practice of Yoga helps in keeping the spine strong and prevents fatigue.

- **Improved bone health:** Many postures in yoga require you to lift your own weight which helps in making the bones stronger and helps ward off osteoporosis.
- **Increased blood flow:** The inverted and twisting nature of Yoga poses wring out the venous blood from the internal organs and allow oxygenated blood to flow. This also boosts the hemoglobin and red blood cells count.
- **Improved heart health:** When you practice Yoga regularly, you get your heart into the aerobic range. This not only lowers the risk of heart attack but also relieves depression.
- **Lowered blood pressure:** The savasana (corpse pose) helps people with hypertension. This pose is said to be have resulted in great improvement in people with high blood pressure.
- **Improved balance:** Yoga involves focusing on holding postures for extended periods of time. This helps in improving your body balance and developing muscle tone.
- **Relaxation and sleeping aid:** Yoga can help you relieve the stress of modern life and helps you sleep deeper. Yoga encourages you to relax and slow your breath and to focus on the present. It shifts your focus from sympathetic nervous system to parasympathetic nervous system. Restorative asana and

meditation also encourage a turning inward of the senses, which relaxes the nervous system.

- **Improved lung health:** Yoga draws attention to your breathing pattern and makes you aware of breathing correctly which filters the air, warms it and humidifies it removing the pollen and the dirt, supplying fresh oxygen into the lungs.
- **Reduced digestive problems:** Yoga like any other physical exercise can ease constipation and lower the risk of colon cancer. The movements that Yoga involves, improve the transport of food and remove waste through the bowels. This helps in getting rid of the waste from the system more effectively.
- **Eases your pain:** Yoga can ease your pain and help people who suffer from arthritis, back pain and other chronic conditions. When you relieve pain, you're in a much better mood and are inclined to be more active. . Yoga poses help to build our deep abdominal muscles and core strength, which helps us in performing daily activities quickly. With yoga and meditation we can attain a calmness mental power.
- **Becoming a Mindful Eater:** The researchers found that people who practiced yoga were more mindful eaters according to their scores. Both years of yoga practice and number of minutes of practice per week were associated with better mindful eating scores. Practicing yoga helps you be more aware how your

body feels. This heightened awareness can carry over to mealtime as you savor each bite or sip, and note how food smells, tastes and feels in your mouth.

Student's life is that period of our life when we are stuck between schools and colleges, exams, sports, tuition and many other activities which result in our mental and health disorders. Mental health is important in the stage of growth and development. Nowadays students' life gives importance for academic activities, assignments and to score good grades in the examinations, workshops, seminars etc. They don't get enough time to relax. They are getting more stress from their educational institutions. Many institutions based stress management and wellness programs have been encouraged to promote healthy living in students, as a result of which students have gained benefit. But these programmes cannot be benefited for all youngsters. Apart from these programs yoga and meditation directly helps in contributing to improve mental focus and concentration among students. Yoga makes stress free our mind and movement combine yoga which helps soothing cramped and jammed bodies. It also helps students in proper concentration Yoga and meditation helps to gain some positive results that can be quite beneficial for students.

Family pressure, academic standards, financial fear and peer groups are some of the reasons which can make a student's success in their educational institutions. Yoga can eliminate stress from young students. According to behavioral health services and research found that a student who participated in yoga instead of physical education has more exhibited

improvement in mood, perceived stress anxiety. Yoga can help in drawing focus away from the busy and hectic day and reflect calming effects on our body. Students feel happier and have improved mental focus and concentration after practicing yoga and meditations. This will also help them to gain higher grades, as they would easily complete their academic assignments and homework's.

Through Yoga students can increase concentration power and sharpness of brain. Yoga offer mind and body to relax and include increased focus on long, deep, slow breaths as well as coordination of mental concentration. Yoga contribute stress free mind to students. Most benefits of yoga are physical and mental health. It has been reported that Yoga has succeeded in curing Asthma. Doing yoga regularly Asthma can be controlled. Yoga practice also results in low level of anxiety. Yoga helps controlling high blood pressure also. Hypertension also can be controlled by doing yoga regularly.

Doing yoga regularly and meditation helps in increasing muscle strength and mental power. Practicing yoga regularly we can attain flexibility of body. Muscles are also stretched thereby increasing the flexibility of our body. Due to high calories drinks and food intake, students have to face such types of problems. Practicing yoga regularly can help weight management. Stress and fatigue are the main factors that lower the academic advancement and brain development for children and students. Yoga has the power which will help students to stay relieved and handles stress levels. Many researches proved that yoga helps students

improving their grades and improve their brain activities; it was proved that students under consideration scored higher grades and had lower stress level as compared to the other students who do not practice yoga.

It has proved that yoga helps students improving their memory by meditating and concentrating sessions. Yoga helps students increasing their focus which is mainly found lacking in most of the students; yoga has emerged as powerful force to generate focus and attention among students. Yoga offers multiple benefits to a modern day student and helps in increasing stamina in their body to perform different activities actively. It has proved that through yoga reducing mental health disorder among students. It is the important time for development of mental health of the students.

Science proves that there are two hemispheres in our brain, the right and the left. These two hemispheres perform different functions. The functions of the left hemisphere are linear, logical and intellectual. Those of the right hemisphere are artistic, creative and intuitive. The education system does not allow the child to develop the full potential of the right and left hemispheres of the brain. The trend of education has been through books. Have to read, memorize, sit for an exam and get a grade. When practicing yoga, people's attention is focused on their body movement and posture. Their mind is guided and influenced by the yoga instructor's words. "Yoga encompasses five principles or basic guidelines, which include: proper exercise, proper breathing, proper rest, proper diet and positive thinking and meditation. Teaching yoga requires equipments such as music, comfortable

clothes, yoga mat and props for modification such as blocks, blankets, straps and chair."³

Yoga can develop the whole mind and body. "The brain is only the medium through which we educate our mind. The mind is a composition of four different faculties, which in yogic terminology are defined as manas, buddhi, chitta and ahamkara. The word manas means to rationalize, to think about something. Buddhi means intellect. Chitta is an area of consciousness where impressions are stored. Ahamkara is the concept of ego."⁴ Modern education system we are dealing with manas aspect. In Europe, the schools have a psychologist who monitors the performance, behavior and aptitude of the child and who tries to create a support group for the child in the home environment. "When the children who were practicing yoga in the classroom were monitored, a marked improvement in their responses, creativity, receptivity, memory, willpower and behavior was found. The children were more relaxed, focused, one-pointed and tranquil than their counterparts in other classes who were not practicing yoga and who were more destructive, restless, violent and distracted."⁵

Conclusion

Yoga is not a religion in and of itself; it is a philosophy, rooted in Hinduism. A system of various practices included in it. Yoga being taught in educational institutions is a secular form of body exercise focused on mental and physical benefits. According to The Journal of Behavioral Health Services & Research, middle-school students taking yoga reported positive mood and attitude changes, increased energy and improved ability to relax, as well as improved

posture. It also promotes imagination, reduces stress, and increases mindfulness. India has suffered from corruption, scams and other vulnerabilities due to the lack of good character and morality. We have to combine best of the east and best of the west and make a valuable education policy for India. We have to change our attitude, and then only can we lead the world from the front. Inshort it is possible to revive these things and to lead a happy and successful life, by implementing yoga in our educational institutions.

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