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CONTENTS

S.No.	Page No.
1. Age-related Changes in Lipid Peroxidation and Some Antioxidants in the Liver of a Teleost Fish <i>B.K. Patnaik and B.S. Jena</i>	237-243
2. Effect of <i>Terminalia chebula</i> on Oxidative Stress in the Liver of Young and Aged Rats <i>R. Mahesh and V. Hazeena Begum</i>	244-256
3. Correlation Between Balance and Mobility to Physical Function in Healthy Elderly Population <i>Amit Goel and Harpreet Singh</i>	257-266
4. Shoulder Muscles Activation in Physical Active Individuals of Young and Older Age Groups During Dynamic Activities : An Electromyographic Study <i>Davinder Kumar Gaur, Shweta Shenoy and Jaspal Singh Sandhu</i>	267-277
5. Metal Illness and Disability Among Elders in Developing Countries : A Case Study of Nigeria <i>Philip O. Sijuwade</i>	278-293
6. Attitudes Towards Old Age : A Study of the Self-Image of Aged <i>Sree Bala Devi, B.</i>	294-303
7. Stereotypes of Ageing Among School Students <i>Uday Jain and K.L. Sharma</i>	304-313
8. Spiritual Intelligence, Living Status and General Health of Senior Citizens <i>Madhu Jain and Prerna Purohit</i>	314-323
9. Coping with Economic Problems in Old Age and Civil Society's Response <i>Asiya Nasreen</i>	324-335
10. The Position of the Indian Elderly : A Socio-Historical Perspective <i>Anindya Jayant Mishra</i>	336-346
11. For Our Readers	347-348

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Age-related changes in Lipid peroxidation and some Antioxidants in the liver of a teleost fish

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ABSTRACT

Considering the importance of comparative gerontological studies in oxidative stress, attempts have been made to evaluate the extent of oxidative damage as indicated by lipid peroxidation and the status of some antioxidants in the liver of aging teleost fish, Channa punctatus. No significant age-change was observed in the lipid peroxidation of liver. The hepatic ascorbic acid content increased during maturation phase (young to middle-aged) and remained stabilized there after. Neither the uric acid nor the contents of different types of thiols (protein bound - SH, non protein bound - SH and total - SH) exhibited a significant change with advancing age. Since there was no significant change in oxidative damage and no loss of antioxidants, it appears that oxidative stress is of minor importance during the aging of this fish.

Key words : Aging, fish, Oxidative damage, antioxidants.

Some workers have emphasized the use of aquatic organisms as alternative models to mammals in various areas of oxyradical research such as aging and cancer (Winston & Digiulo, 1991). The free radical theory of aging postulates that aging changes are due to oxidative stress caused by the damaging effects of free radicals on cellular components. The validity and generality of free radical theory of aging (Harman, 1992) can be tested through comparative approach by using different animal models. This can be done in two ways, i.e. by estimating the extent of oxidative damage and determining the level of antioxidants.

Oxidative stress is dependent on both prooxidant and antioxidant reactions. The present study deals with measurement of lipid peroxidation and protein bound thiol (PBSH) as indicators of oxidative damages to lipid and estimations of other antioxidants (uric acid, ascorbic acid and non-protein thiol) in the liver of aging Indian murrel (*Channa punctatus*).

Materials and Methods

Male murels (*Channa punctatus*) collected from ponds of Behrampur localities and maintained in the laboratory were divided into three groups (young, middle-aged and old) as described earlier (Patnaik, 2002; Mohapatro and Patnaik, 1993). Fish was killed by stunning, the liver was taken out, quickly washed in reptilian Ringer solution and soaked between the folds of a filter paper. Weighed quantities of tissue were used for biochemical estimation.

Estimation of Lipid peroxidation : The measurement of concentration of thiobarbituric acid (TBA) reactive substances (RS) as described by Sestini *et al.* (1991) was followed with minor modifications (Jena *et al.*, 1995). From 2% liver homogenate prepared in distilled water, TBA-RS substance was extracted with chloroform glacial acetic acid (3:1, V/V) and the absorbance was measured at 535 nm in a Spekol (Germany). The TBA-RS were expressed as malonaldehyde (MDA) equivalent (n moles /g. tissue wet-weight) using the molar extinction coefficient of $1.56 \times 10^5 \times M^{-1} \times C_m^{-1}$ for MDA (Sinhuber *et al.*, 1958).

Estimation of ascorbic acid : Ascorbic acid from liver was extracted twice with 5% TCA. After centrifugation the supernatants were pooled and ascorbic acid was estimated following the method of Roe (1954) as modified by Tewary and Pandey (1964).

Estimation of uric acid : This biochemical constituent was determined following the method of Oser (1965) using 2.5% liver homogenate prepared in distilled water. The absorbance of coloured product obtained after adding uric acid reagent in final stage was measured at 680 nm in a colorimeter 101 (Systronics, Ahmedabad). The result was expressed as mg. uric acid/100 g. tissue wet-weight using a standard curve prepared with uric acid.

Estimation of Thiols : The total - SH, non protein-SH (NPSH) and protein bound - SH (PBSH) were estimated (Sedlak and Lindsay, 1968) using 2% liver homogenate in 0.02 M EDTA. While total-SH was determined in whole homogenate, the NPSH was estimated in supernatant after precipitating protein with 50% TCA. In both the cases 0.01 M DTNB was used as coloring reagent. The absorbance was measured at 412 nm in a Jasco Spectrophotometer. Results were expressed as n moles/100 g tissue wet weight using the extinction coefficient of GSH (SRL, Bombay) as $0.194 \times 10^5 \times M^{-1} \times C_m^{-1}$ calculated on the basis of readings of standard. PBSH was calculated by deducting the value of NPSH from that of total-SH.

Results

No significant change was observed in the lipid peroxidation of liver during aging in murels. The ascorbic acid content of liver increased between young and middle-aged groups and remained almost stabilized thereafter (Table 1). The change in the level of uric acid was not found to be age-dependent.

Table 1 : Lipid Peroxidation, ascorbic acid and uric acid contents of liver in male murels (*Channa punctatus*).

Age-group	Lipid Peroxidation (TBA-RS n moles/g tissue wet wt.)	Ascorbic acid (mg/100g tissue wet wt.)	Uric Acid (mg/100 g tissue wet wt.)
Young (< 1 year)	104.53 ± 25.43 (8) NS	6.71 ± 1.81 (9) < 0.001	7.04 ± 2.01 (8) NS
Middle aged (2-3 yr)	108.26±14.24 (13) NS	11.02 ± 2.14 (8) NS	8.23 ± 2.67 (11) NS
Old (4-6 yr)	114.62 ± 29.44 (14)	9.82 ± 1.96 (11)	6.16 ± 2.42 (7)

Mean ± SD

NS, not significant at 0.05 level.

All the three type of thiols (total, non-protein and protein bound) did not show significant change with advancing age (Table 2).

Table 2 : Thiol contents (n moles/100g. tissue wet wt.) of liver in male murrels (*Channa punctatus*)

Age-group	Total-SH	NPSH	PBSH
Young (< 1 year)	1.42 ± 0.24 (8) NS	0.92 ± 0.021 (8) NS	1.33 ± 0.23 (8) NS
Middle aged (2-3 yr)	1.42 ± 16(10) (10) NS	0.088 ± 0.018 (10) NS	1.33± 0.15 (10) NS
Old (4-6 yr)	1.61 ± 0.26 (8)	0.085 ± 0.007 (8)	1.36 ± 0.26 (8)

Mean ± SD

NS, not significant at 0.05 level.

Discussion

Lipid peroxides (LP) are products of oxidatively damaged lipids resulting from lipid peroxidation reactions induced by reactive oxygen species (Yu, 1994). The LP quantified by thiobarbituric acid represent the extent of oxidative damage (Shedahl and Tappel, 1974). Similarly, loss of protein bound SH (PBSH) is considered to serve as index of protein oxidative damage (Radi *et al.*, 1991; Agarwal and Sohal, 1994). Neither the lipid peroxidation nor the PBSH in liver of murel was found to be age-dependent. These results suggest that there is no significant oxidative damage to lipid and protein in the liver.

Ascorbic acid is a scavenger of free radical (Yu, 1994) and is regarded as an effective antioxidant (Chatterjee *et al.*, 1995). Uric acid, an oxidized purine base, is also a scavenger of free radicals and provides antioxidant defence (Ames *et al.*, 1981). Non protein thiols which includes glutathione serve as central physiological antioxidant detoxifying the reactions of reactive oxygen species (Meister, 1995). Loss of non protein thiols indicate weakened antioxidant status (Otto and Moon, 1996) The present results indicate that there in no loss of antioxidants in the liver of murel during aging.

Since oxidative damage to lipids and protein is not evident and there is no loss of antioxidant potential, it is suggested that oxidative stress is of minor importance during aging in murels. No significant decrease in the activities of enzymes also corroborates the view that there is no weakening of antioxidant capacity in the old murels (Nayak *et al.*, 1999). Due to difference in the availability of oxygen between poikilothermic vertebrates as compared to homeotherms, it is possible that the free radical generation and their effects during aging may also differ among the two groups of vertebrates as envisaged by some authors (Sohal *et al.*, 1989) However, extensive investigation on a number of fish species would provide evidences in favour of this interpretation.

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Effect of *Terminalia chebula* on oxidative stress in the liver of young and aged rats

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ABSTRACT

Free radical damage has been postulated to play a role in the changes that occur both during the normal aging process and related degenerative diseases. Increased free radical production leads to devastation of normal cell functions. The present study was aimed to evaluate the effect of Terminalia chebula on normal age-related changes. In the liver of aged rats, an increased level of oxidation products and decreased enzymatic, and non-enzymatic antioxidants were noted. However, their levels were reverted to normal after administration of Terminalia chebula extract at the dose rate of 200 mg/kg body weight for 4 weeks. The present result shows that the administration of Terminalia chebula acts as a free radical scavenger with potential antioxidant effects in the liver of aged rats.

Key words : Aging, Antioxidant enzymes, Liver, Oxidative stress, *Terminalia chebula*.

Aging has been defined as the changes that occur in living organisms with the passage of time that lead to functional impairment and ultimately to death. Aging is usually associated with increasing levels of oxidation and it has been suggested that senescence may result from the accumulation of unrepaired structural damage to cells, which disrupts the cellular functions when the organism enters into contact with different endogenous and exogenous agents. Reactive

oxygen species (ROS) being the most important members of these toxins (Harman, 1984; Allen, 1998). ROS alters proteins, carbohydrates, and lipids, and inactivate enzymes and transporters; they damage DNA and the transcriptional machinery (Yu and Yang, 1996; Vendemiale *et al.*, 1999), and initiate a chain reactions that peroxidize polyunsaturated fatty acids (Cand and Verdeti, 1989; Rikans *et al.*, 1997).

An imbalance between the formation and removal of ROS and the development of oxidative stress has been widely purported to play a important role in toxicity, ischemic damage, neoplastic transformation and metastasis, cardiovascular, neurodegenerative, and age-associated diseases (Allen, 1998), as well as in differentiation, development, and aging (Kitani, 1988; Allen, 1998; Rikans *et al.*, 1997) thus inactivating antioxidant defenses. The antioxidant defense system consists of free radical scavengers such as superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, glucose-6-phosphate dehydrogenase, glutathione-s-transferase, reduced glutathione, vitamin C and vitamin E. Decreased functional efficiency in the antioxidant defense system has been suggested to be one of the primary factors that contributes to the ageing process (Reiter *et al.*, 1996).

Consumption of fruits and vegetables containing high amounts of antioxidative nutraceuticals have been associated with the balance of the free radicals/antioxidants status, which helps to minimize the oxidative stress in the body and to reduce the risk of diseases (Kaur and Kapoor, 2001). Chebolic myrobalan (*Terminalia chebula* Retz.) belonged to the family Combretaceae and known, as 'Kadukkai' in Tamil is a native plant in India and found in the deciduous forests. Its dried ripe fruit tissues have traditionally been used to treat various ailments in Asia. It is a carminative, deobstruent, astringent and expectorant agent (The Wealth of India, 1978). Its principle constituents contain chebulagic, chebulinic acid and corilagin (Harborne *et al.*, 1999). A ellagitannin-terchebulin along with punicalagin, terflavin-A, shikimic, gallic, tricontanoic and palmitic acids, beta-sitosterol, daucosterol, triethyl ester of chebolic acid and ethyl ester of gallic acid, a triterpene -chebupentol and arjungenin, terminoic acid and arjunolic acid were isolated in fruits. Antioxidant constituents of plant - phloroglucinol and pyrogallol, isolated along with ferulic, vanillic, p-coumaric and caffeic acids (Ram Rastogi and Mehrotra, 1994). The carbohydrates, glucose and sorbitol, about

one per cent each of fructose and sucrose, a smaller amount of gentiobiose, and traces of arabinose, maltose, rhamnose and xylose are present in myrobalan (The Wealth of India, 1978).

Chebolic myrobalan is highly nutritious and could be an important source of dietary supplement for vitamin C, protein, amino acids and mineral nutrients (Bharthakur and Arnold, 1991). *T. chebula* has been reported to exhibit a variety of biological activity, including antibacterial (Shahidi Bonjar, 2004a), anticandidal (Shahidi Bonjar, 2004b), antianaphylactic (Shin *et al.*, 2001), anticaries (Jagtap and Karkera, 1999), cardioprotective (Suchalatha and Shyamala Devi, 2004), antioxidant protection against gamma-radiation (Naik *et al.*, 2004), anticancer (Saleem *et al.*, 2002), antihyperglycemic and antidiabetic (Murali *et al.*, 2004), antimutagenic (Kaur *et al.*, 2002) and hypolipidemic (Shaila *et al.*, 1998).

With this background, the present study was undertaken to investigate the effect of *T. chebula* on age-related changes on the oxidative status and antioxidant defense systems in rats.

Materials and Methods

Chemicals

2-thiobarbituric acid, glutathione (reduced) were obtained from Sigma (St. Louis, MO, USA). All other chemicals were analytical grade marketed by Sisco Research Laboratories Pvt. Ltd., Mumbai and Glaxo Fine Chemicals Ltd., Mumbai, India.

Preparation of *T. chebula* aqueous extract

The fruits of *T. chebula* ripen from November to March and fall soon after ripening. The fully ripe fruits were collected from Kolli hills, Tamil Nadu, during the month of January 2005 from the ground as soon as they have fallen and shade dried. Hundred grams of dried fruit skins were hammered into small pieces and followed by extraction with 800 ml distilled water for 24 h in water bath at 40°C and repeated for two times. The final yield of the aqueous extract was noted and used for treatment of experimental rats.

Dosage Used

Different doses of *T. chebula* aqueous extract (50 mg, 100 mg, 200 mg, 300 mg and 400mg/kg body weight) were pretreated for 4

weeks to 22-24 months aged Wistar rats (380-410 g) to assess the effective dose of the extract and duration of treatment against aging based on the contents of brain lipid peroxidation (LPO) and reduced glutathione (GSH). Pretreatment with *T. chebula* aqueous extract at doses of 200mg, 300 mg and 400mg/kg body weight for 4 weeks were found to be effective in aged rats. The minimal effective dose 200mg/kg dose was fixed as therapeutic dosage for the subsequent studies.

Animals

Young (3-4 months, 120-150 g) and aged (22-24 months, 380-410 g) male albino Wistar rats were used for the experiments. The rats were housed in polypropylene cages on a 12L:12D cycle and fed *ad libitum* on commercial laboratory food pellets and water. All animal experiments were conducted after getting sanction from Institutional Animal Ethics Committee and as per the instructions prescribed by the Committee for the purpose of content and supervisions of experiments on animals (CPCSEA), Ministry of Environment and Forest, Government of India.

Experimental Design

The animals were divided in to four groups of six each :

Group I : Control young rats received sterile water only.

Group II : Young rats were treated with *T. chebula* aqueous extract at a dose of 200mg/kg body weight with 1.5ml sterile water orally for 4 weeks.

Group III : Control aged rats were received sterile water only.

Group IV : Aged rats were treated with *T. chebula* aqueous extract as a dose of 200mg/kg body weight 1.5 ml sterile water through orally for 4 weeks.

Tissue preparation

On completion of the experimental period, animals were anaesthetized with Thiopentone sodium (50mg/kg) and liver was excised immediately and immersed in physiological saline. For the preparation of liver homogenates (1g of tissue plus 10ml homogenization buffer), the frozen pieces were thawed on ice and then homogenized.

Assay of oxidation products

Lipid peroxidation was assessed by determining the level of malondialdehyde(MDA) in the liver homogenates by spectrophotometric

method of Beuge and Aust (1978); the results were expressed as nmoles of MDA formed/mg protein using 1,1,3,3-tetraethoxypropane as standard. The protein carbonyl (PCO) content was analyzed using 2,4-dinitrophenylhydrazine (DNPH) as described by Levine *et al.* (1990).

Assay of enzymatic antioxidants

Hepatic superoxide dismutase (SOD) activity was measured by the method of Kakker *et al* (1984) using NADH-PMS-NBT. Catalase (CAT) activity was measured by the method of Beers and Sizer (1952) in which disappearance of peroxide was followed spectrophotometrically at 240 nm; one unit of activity is equal to the μmol of H_2O_2 degraded min⁻¹. Glutathione peroxidase (GPx) was estimated by the method of Rotruck *et al.* (1973), glutathione reductase (GR) activity by the procedure of Stall *et al.* (1969), glucose-6-phosphate dehydrogenase (G6PDH) by Korenberg *et al.* (1955) and glutathione-s-transferase (GST) according to Habig *et al.* (1974). Protein concentrations were assayed by the method of Lowry using bovine serum albumin as standard.

Estimation of non-enzymatic antioxidants

Reduced glutathione (GSH) was measured as described by Ellman (1959) using 5, 5-dithiobis- (2-nitrobenzoic acid) (DTNB) reagent. Ascorbic acid (vitamin C) and α -tocopherol (vitamin E) contents were assayed according to Omaye *et al.* (1979) and Desai (1984) respectively.

Statistical analysis

The results were computed statistically (Graphpad Instat) using one-way analysis of variance. Post hoc testing was performed for intergroup comparisons using the least significance (LSD) test. Comparisons were made for Group II with Group I; Group III with Group I and Group IV with Group III.

Results

The results obtained in liver showed that the levels of MDA and PCO significantly increased to 26.68% and 31.46% respectively in aged rats compared with young rats (Table 1). In *T. chebula* treated rats, levels of MDA and PCO significantly decreased ($P<0.001$) with comparison of age-matched controls.

Table 1. Effect of *T. chebula* treatment on oxidation products in liver of young and aged rats (Values are expressed as mean $\pm$ SD of six rats)

	Group I	Group II	Group III	Group IV
MDA	2.83 $\pm$ 0.21	2.41 $\pm$ 0.24	3.86 $\pm$ 0.22	3.06 $\pm$ 0.25
n moles/mg protein		p < 0.05	p < 0.001	p < 0.001
PCO	2.68 $\pm$ 0.15	2.46 $\pm$ 0.18	3.91 $\pm$ 0.22	2.84 $\pm$ 0.20
μ moles DNPH/ mg protein			p < 0.001	p < 0.001

The activities of the enzymatic antioxidants SOD, CAT, GPx, GR, G6PDH and GST were significantly ($P < 0.001$) decreased in the control aged rat when compared to young control rats (Table 2). *T. chebula* aqueous extract treatment to aged rats showed increase ($P < 0.001$) in the antioxidant enzymes upto 29.67 %, 17.31 %, 29.18 %, 32.99 %, 22.27 % and 23.53 % respectively.

Table 2. Effect of *T. chebula* treatment on enzymatic antioxidants in liver of young and aged rats (Values are expressed as mean $\pm$ SD of six rats)

	Group I	Group II	Group III	Group IV
SOD	8.81 $\pm$ 0.51	9.04 $\pm$ 0.48	6.14 $\pm$ 0.52	8.73 $\pm$ 0.54
(50% reduction/min/mg protein)			p < 0.001	p < 0.001
CAT	50.11 $\pm$ 3.04	54.74 $\pm$ 3.11	41.08 $\pm$ 3.04	49.68 $\pm$ 3.14
(μ moles H ₂ O ₂ cons./min/mg protein)			p < 0.001	p < 0.001
GPx	8.93 $\pm$ 0.48	9.42 $\pm$ 0.52	6.31 $\pm$ 0.49	8.91 $\pm$ 0.45
(μ moles GSH oxidised/min/mg protein)			p < 0.001	p < 0.001
GR	1.06 $\pm$ 0.14	1.14 $\pm$ 0.12	0.65 $\pm$ 0.09	0.97 $\pm$ 0.12
(μ moles NADPH oxidised/min/g protein)			p < 0.001	p < 0.001
G6PDH	2.16 $\pm$ 0.19	2.22 $\pm$ 0.19	1.64 $\pm$ 0.17	2.11 $\pm$ 0.16
(Units/min/mg protein)			p < 0.001	p < 0.001
GST	0.71 $\pm$ 0.07	0.80 $\pm$ 0.08	0.52 $\pm$ 0.05	0.68 $\pm$ 0.06
(n moles GSH-CDNB conjugated/min/mg protein)			p < 0.001	p < 0.001

A significant decrease (27.55%) in GSH level was observed in the liver of aged control rats. *T. chebula* treatment increased the GSH content in aged rats upto 28.18 % (Table 3) and GSH content in young

rats upto 8.81%. The levels of vitamin C and E significantly decreased to 26.89% and 34.66% respectively in aged rats compared with young rats. In *T. chebula* treated rats, the levels of vitamins were significantly increased ($P < 0.001$) in comparison to age-matched controls.

Table 3. Effect of *T. chebula* treatment on non-enzymatic antioxidants in liver of young and aged rats (Values are expressed as mean $\pm$ SD of six rats)

Non-enzymatic Antioxidants (μ g/mg protein)	Group I	Group II	Group III	Group IV
GSH	12.63 $\pm$ 0.74	13.85 $\pm$ 0.71	9.15 $\pm$ 0.75	12.74 $\pm$ 0.73
		(p < 0.05)	(p < 0.001)	(p < 0.001)
Vitamin C	2.38 $\pm$ 0.24	2.69 $\pm$ 0.22	1.74 $\pm$ 0.20	2.33 $\pm$ 0.23
			(p < 0.001)	(p < 0.001)
Vitamin E	1.76 $\pm$ 0.21	1.94 $\pm$ 0.24	1.15 $\pm$ 0.22	1.73 $\pm$ 0.20
			(p < 0.001)	(p < 0.001)

Discussion

According to the 'free radical theory of aging', aging is caused by the accumulation in the cell of macromolecules, such as DNA, proteins and lipids, that have been damaged by free radicals (Harman, 1956). The senescent liver has a number of characteristics consistent with oxidative injury and many studies have examined the effect of aging on the oxidative stress in mammalian tissues. In the liver, aging has been associated with enhanced ROS generation and oxidative stress (Rikans *et al.*, 1997; Allen, 1998). In the present study, the increased levels of hepatic MDA and PCO in aged rats were observed. Similar increases of MDA in the liver have been previously reported (Farooqui *et al.*, 1987; Sanz *et al.*, 1997). After *T. chebula* treatment, a decrease in MDA and PCO levels were observed in the liver of aged rats. This may be due to reducing the amount of hydroxyl radicals generated by Fenton-type reaction (Haenen *et al.*, 1989) and also as a scavenger of peroxide and superoxide radicals by aqueous extract of *T. chebula*.

Imbalance between radial production and catabolism of oxidant during aging would shift the cells towards oxidative stress resulting in

alterations of membrane properties and cell dysfunction. Lower activity of SOD and CAT in aged rats could be a consequence of inhibitory effects due to excess of ROS generation (Cand and Verdeti, 1989; Pigeolot *et al.*, 1990). SOD is inhibited by hydrogen peroxide (Pigeolot *et al.*, 1990) and CAT by an excess of superoxide radical (Blum and Fridovich, 1985). Inhibition of the catalytic activities of proteins that express SOD and CAT activities could also be a consequence of the liver GSH depletion in old animals. The increase in SOD and CAT activities in liver of aged rat after *T. chebula* treatment may be due to the potential quenching of free radicals by its phenoxyl radical, which significantly decrease the superoxide radicals level (Rice-Evans *et al.*, 1996).

Major functions of GP_x and GR might be the disposal of organic peroxides and the maintenance of protein thiols in their reduced states (Mueller *et al.*, 1997). The decrease of GP_x in the present study may be the accumulation of the superoxide anion which inactivates GP_x by reacting with the selenium at the active site of the enzyme (Prabhu, 2002) and excessive production of oxidized glutathione, which fails to match the capacity of GR, to reduce oxidized glutathione. Oxidized glutathione is produced when peroxides are detoxified by GP_x and is recycled back to the reduced form by GR at the expense of NADPH (Mc Intyre and Curthoys, 1980). *T. chebula* administration increased the GP_x and GR activities by the protection of sulphydryl groups in glutathione from oxidative damages.

In this study, G6PDH and GST activities were decreased in aged control rats. G6PDH, which catalyses the initial step of the pentose phosphate pathway and whose most important function is the reduction of nicotinaide adenine dinucleotide phosphate (NADH⁺) to NADPH. GSTs are multifunctional enzyme that catalyzes the transformation of peroxides to less toxic products conjugating them to reduced glutathione, it was considered an antioxidant enzyme as well (Sun Yi, 1990). The decreased activities in aged control rats may be due to the oxidation of the active site of G6PDH, which contains an essential lysine residue (Naylor *et al.*, 1996) and increased lipid peroxidation and depletion of glutathione status (Huang *et al.*, 2003). *T. chebula* supplementation increases the activity of G6PDH in liver of aged rats by producing

more reducing equivalents and by inhibiting lipid peroxidation and increased availability of GSH from GSSG by the enzyme GP_x.

GSH plays a pivotal role in defending against oxidative stress. Conditions that perturb intracellular levels of GSH have been shown to result in significant alterations in cellular metabolism. The present study reveals that the decreased levels of GSH may be the result of an increased oxidation of GSSG, increased degradation or decreased synthesis. *T. chebula* administration increase the levels by providing NADPH for the reduction of oxidized glutathione into reduced glutathione, catalyzed by GR and G6PDH.

The decrease in vitamin C and E in aged rats may be due to the increased oxidative stress with aging. Decrease of ascorbate damages the cell membrane, since they are involved in regeneration of tocopherols, the lipophilic membrane antioxidant from its oxidized form. *T. chebula* reversed the decline of vitamins due to the increased ascorbic acid absorption, reduction of dehydroascorbate to ascorbic acid and preventing the lipid peroxidation processes (Maffei Facino *et al.*, 1996).

All these results suggest that *T. chebula* is highly protective against oxidative damage and aging. It scavenges free radicals, balances the antioxidant enzyme system and stimulates metabolism of oxidative wastes. Thus, *Terminalia chebula* could act as a potent agent for preventing age and age related degenerative diseases.

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Correlation Between Balance and Mobility to Physical Function in Healthy Elderly Population

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ABSTRACT

Decreased physical, social and psychological well being is a characteristic of geriatric population, leading to reduced quality of life. The purpose of this paper was to investigate the role of balance and mobility on declining function in healthy elderly population and the role of gender and age on physical function in same group. A total of 47 (males=24, females=23) were taken from senior citizen homes and were administered to Modified Physical Performance Test (MPPT) for physical function on Timed Movement Battery (TMB) for mobility and Timed Get Up and Go (TGUG) test for balance. The results correlated ($p < 0.05$) on MPPT with TMB (0.000) and highly correlated on MPPT with TGUG (0.000). Gender specific variations were significant. On age adjusted analysis, results were identical. The identification of domains of physical function may be useful to physiotherapists in development of specific interventions, targeted to physical impairments and disabilities, thus reducing the loss of independence which contributes to deficits in performance.

Key words: balance, mobility, physical function, geriatrics.

According to projections by the United States Census Bureau, by the year 2050, up to twenty percent of the total United States population will be aged 65 years and older. Many people experience healthy aging without significant impairments. A number of sensory, cognitive and functional declines occur with age, which threatens independence. With advancing age, there is an increased susceptibility to various chronic

conditions, functional limitation, disability and co morbidity, often resulting in compromised physical, social and psychological wellbeing and reduced quality of life. In cases of extreme sensory or cognitive loss, the capacity to perform Activities of Daily Living (ADLs; e.g., toileting, eating, bathing and very basic aspects of mobility) can be compromised. However, geriatric population can experience less visible but equally damaging losses in the ability to perform Instrumental Activities of Daily Living (IADLs; e.g., balancing a checkbook, grocery shopping, medication management and driving) (Wood *et al.*, 2005).

Chronic conditions such as arthritis, orthopedic impairments, cardiac disorders, and reduced sensitivity of sensory organs are associated with varying degrees of disability. These conditions often reduce the ability of the geriatric population to perform routine activities of daily living such as getting around the house and walking up and down stairs. Although the decline in activity is common, there is disparity related to (1) the age at which a decline in activity occurs, (2) the degree of impairment or disability that results in a decline in function, and (3) the success of some individuals to maintain function in light of chronic conditions. These chronic conditions also predispose the older adult to a most feared and leading cause of disability for the geriatric falling. Not only is it a fear of falling, but also a fear that the individual will be unable to get up once they fall (Burdick *et al.*, 2005; Edward, 2005; Martin, 2005).

The risk of future falls of individuals with a fear of falling is most marked when it is linked to restriction of activity. In both faller and non-faller groups, poor mental and poor physical health have been associated with limited activity. Several clinical indicators of balance and mobility, such as activity level, the presence of neurological symptoms, muscle strength, and joint flexibility, are associated with functional performance (Newton, 1997; Means *et al.*, 2005).

Over three decades, physicians, clinicians and researchers have struggled to determine the most appropriate methods to assess the ability of geriatric population to maintain their independence in activities of daily living. These efforts have led to the development of a wide variety of assessment tools. Although each tool has strength relative to their intended use, they still do not adequately address the current need for efficient assessment tools that are applicable to elderly individuals with

a wide range of abilities. The problems associated with the currently available assessment tools include the time required to complete the tests, the biasing effects of data sources, and the sensitivity of the assessments to varying levels of ability. The Times Movement Battery (TMB) is an assessment tool designed to measure the mobility of geriatric population. The TMB incorporates common, everyday movements that are associated with the performance of basic activities of daily living and instrumental activities of daily living, such as supine to sit-to-stand, and forward walking. The remaining movements in the TMB were chosen because it has been reported that geriatric population with declining independence in ambulation (e.g., turning, stepping over objects, backward walking) have problems performing them (Creel *et al.*, 2001).

Use of physical performance measures provides valuable insight into the ability of geriatric population to perform specific tasks that are important for daily living. Measures of task performance, such as the short physical performance battery and the Modified Physical Performance Test (MPPT) have been used in several epidemiological studies (e.g. epidemiologic studies of established populations in the elderly, Women's Health and Aging Study), establishing evidence for mobility and balance performance as risk factors for institutionalization and mortality. A measure, such as the physical performance test, typically requires very little equipment, and tasks can be administered in most locations. However, these measures may not adequately challenge individuals with higher level functional ability and therefore often are unable to quantify function in people with higher physical ability (Cress, 2005; Kevin, 2005).

The Timed Up and Go Test (TGUG) is a test of balance that is commonly used to examine functional mobility in community dwelling, frail geriatric population. Test requires a subject to stand up, walk three meters (ten feet), turn, walk back and sit down. Time taken to complete the test is strongly correlated to level of functional mobility (Julie, 2005; Wall, 2000).

Evidence suggests that therapeutic exercises are a valuable tool in the prevention of falls, especially when employed as a part of comprehensive strategy targeting multiple risk factors that contribute to falls (Weeks, 2005). There is a lack of clear cut evidence in the

association of functional performance and clinical indicators of balance and mobility, such as activity level, presence of neurological symptoms, muscle strength, joint flexibility. Whether any improvement in balance and mobility will benefit geriatric population by preventing future falls is unclear. This study intends to find out the relation between balance and mobility to physical function in this population.

METHODOLOGY

Forty-seven subjects of 60+ years were taken from senior citizen homes in Delhi. The subjects were able to ambulate a minimum of 15.2 meter independently without using an assistive device. They had minimum score of 24 on Mini Mental Status Exam (MMSE). Subjects having presence of debilitating medical problems or significant loss of hearing and vision or significant deficits in communication were excluded from the study.

Instruments used

The equipments used to complete the assessment for mobility, balance, physical function and cognitive status included:

- Armless chair with a seat height of 44 centimeter
- A straight backed chair with arms and seat height of 44 centimeter
- 5.1 cm and 15.2 height blocks
- A lab coat (full sleeves)
- A coin
- A book
- Inch tape
- Stopwatch.

Procedure

After completing the baseline testing, subjects were asked to complete the performance based tests that is Modified Physical Performance Test (MPPT) for physical performance, Timed Movement Battery (TMB) for mobility and Timed Get Up and Go (TGUG) test for balance. After matching for inclusion and exclusion criteria, informed consent was obtained from the subjects. Initial heart rate and blood pressure were measured to establish a baseline of physiological function prior to testing.

Movements of TMB and MPPT were performed in random order to control the fatigue. Subjects completed three trials of TGUG. The

mean of these trials were used. For each movement, subjects were instructed to move at their normal or customary pace (that is self selected speed). After completion of each movement, subjects were allowed rest for 1-3 minutes to allow them to recover from possible fatigue. Heart rate and blood pressure monitoring was done at various intervals during the testing and after the final test period to ensure safety of the subjects and their tolerance to activity. Completion of all data collection required approx. 60-80 minutes per subject.

TMB consist of eleven movements—supine-to-sit, sit-to-stand, forward ambulation for 6 meter, backward ambulation for 3 meter, walking and stepping over a 5.1 cm and 15.2 cm obstacle, a figure of eight walk, ascending and descending four steps and moving from a supine-on-the floor position to a standing position.

MPPT consists of nine components—standing (feet together, semi tandem, tandem), chair use, lift a book and put it on a shelf, put on and remove a jacket, pick up a penny from floor, turn 360 degrees, 50-feet walk test, climb one flight of stairs, climb stairs up and down(4steps).

TGUG test requires the subject to stand up from a standard arm chair (seat height=44 cm), walk 3 meters, turn around, walk back to the chair and be seated. The subject is timed from the command go until he or she returns to a seated position in the chair.

Analysis of Data

A computer software package, STATA 9.0 for, windows was used for statistical analysis. Mean and standard deviations were calculated for subject's age, gender, TMB, TGUG, MPPT scores. Comparisons between the scores on the three scales were made using pair wise correlation test. Taking gender specific variations, again pair wise correlation test was used. Partial correlation was used for age adjusted analysis. A value of $p < .05$ was considered significant in all compartments.

RESULTS AND DISCUSSION

Of the 47 subjects taken 24 were males and 23 were females. Mean and standard deviations were calculated for subject's age, gender, TMB, TGUG, and MPPT scores and values are shown in Table 1. Table 2 shows pair wise correlation between TMB and MPPT ($r = -0.7432$, $p = 0.000$) and in between TGUG and MPPT ($r = -0.7440$,

$p = 0.000$). The results correlate significantly ($p < .05$). Scatter plot of MPPT scores against TMB and TGUG scores illustrates the relationship between variables (Figures 1 and 2). Male subjects show pair wise correlation of MPPT with TMB ($r = -0.7050$, $p = 0.0001$) and MPPT with TGUG ($r = -0.8618$, $p = 0.0000$), while female subject shows pair wise correlation of MPPT with TMB ($r = -0.7261$, $p = 0.001$). Gender specific variations were significant, but did not show any correlation. On age adjusted analysis, values were significant. That is, partial correlation of MPPT with TMB ($r = -0.7374$, $p = 0.000$) and MPPT with TGUG ($r = -0.7379$, $p = 0.000$).

Table 1

Variable	Obs	Mean	S.D.
Subject	47	24	13.71131
Age	47	69.17021	7.41127
Sex	47	1.489362	.5052912
MPPT	47	24.76596	5.913186
TMB	47	51.0266	14.1065
TGUG	47	11.3083	4.616355

Table 2

Variable	MPPT r	P	correlation test
TMB	-0.7432	0.0000	pairwise correlations
TGUG	-0.7440	0.0000	pairwise correlations
Male			
TMB	-0.7050	0.0001	pairwise correlations
TGUG	-0.8618	0.0000	pairwise correlations
Female			
TMB	-0.7862	0.0000	pairwise correlations
TGUG	-0.7261	0.0001	pairwise correlations
Age			
TMB	-0.7374	0.000	partial correlations
TGUG	-0.7379	0.000	partial correlations

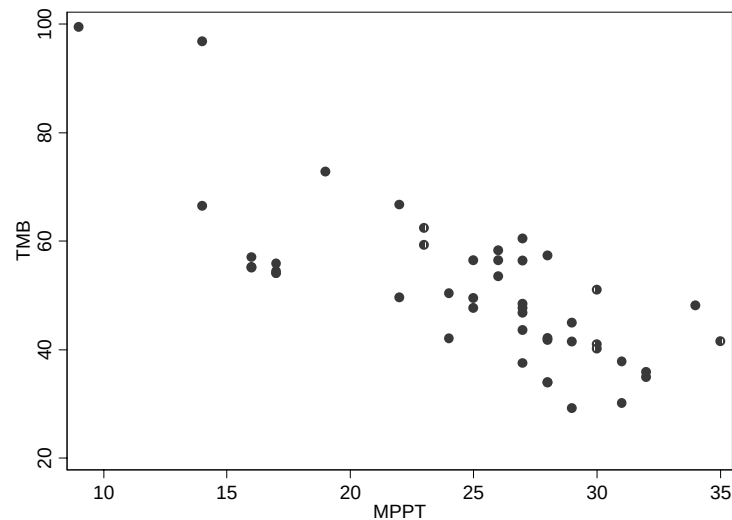


Figure 1 : Scatter plot of MPPT scores against TMB scores.

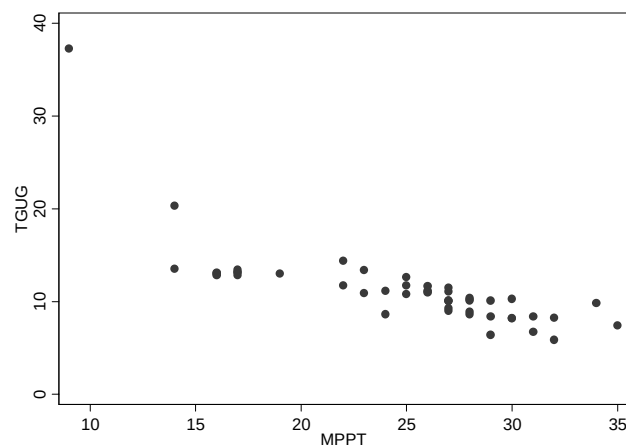


Figure 2: Scatter plot of MPPT scores against TGUG scores.

Identification of balance and mobility association with physical function can provide crucial information for the development of therapeutic strategies for prevention of falls and intervention in improving in balance. The TMB was developed specifically to measure the mobility of geriatric population. TGUG was developed specifically to measure balance and MPPT for physical performance. Both balance and mobility were strong predictors for physical function in this population. Actual performance of mobility skills is an efficient means of identifying limited physical function. The reduction in physical activity appears to be related to central information processing control components, specifically selective attention and choice reaction time (Lin and Woollacott, 2005). Selective attention and choice reaction time are two most significant balance control components predictive of limited physical function. Limitation of physical function is also due to complain about tiredness (Wood et al., 2005). Postural balance was indicated as risk of falling in an ambulatory and independent geriatric population. Control of lateral stability may be an important area for fall prevention intervention (Lin and Woollacott, 2005).

The difference in physical function between males and females subject population in this study was found to be significant ($p=0.000$) but did not correlate with the scores of TMB and TGUG test. This could be due to absence of any physical and cognitive, and relatively unimpaired health. Similarly, on age adjusted scores, the results were again significant ($p=0.000$). This could be the result of the fact that the majority of the subject population was from a relatively narrower age group and we expect that with a wider age variation and enlarge group more meaningful results can be obtained.

The identification of domains of physical function may be useful to physical therapists in the development of specific interventions targeted for physical impairments and disabilities that contribute to deficits in performance of ADL. Targeting interventions for physical impairments and disabilities related to physical therapy reduce the loss of independence among the geriatric population.

CONCLUSIONS

Both balance and mobility are strong predictors for the physical function in the geriatric population. Identification of balance and mobility associated with physical function in geriatrics can provide crucial

information for the development of the therapeutic strategies for prevention and intervention in misbalancing and falling, thus reducing the loss of independence.

LIMITATIONS OF STUDY

- It was not a blinded study.
- It was limited to geographical area.
- Condition specific features of balance and mobility cannot be determined by this study.

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Shoulder Muscles Activation in Physically Active Individuals of Young and Older Age Groups During Dynamic Activities : An Electromyographic Study

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ABSTRACT

The present study aimed to investigate the difference in selected shoulder muscles activation between athletes of young and older age groups during pulling, pushing, elevation and throwing activities. Eight healthy male young adult athletes of 20-29 years and eight older veteran athletes of 50-59 years age group participated. Signals were recorded through surface EMG from middle deltoid (MD), posterior deltoid (PD), supraspinatus (SUP) and infraspinatus (INF) muscles as %MVIC. Unpaired t-test was used for comparison between muscle activity of young and older groups. No significant differences in muscle activity were found during pulling and elevation in the four muscles among the young and old groups. During pushing, similar activity was obtained in MD and SUP and greater activity in PD and INF in athletic old group. Significant increase in muscle activity of MD and SUP were obtained in athletic young group ($p < 0.05$) and PD in athletic older group ($p < 0.05$) during throwing activity. Greater recruitment of muscle fibres usually occurs in older individuals to compensate for decrease in muscle strength with aging. However, results of this study indicate that similar muscle

activation capacity occurs in physically active older individuals when compared to younger counterparts.

Key Words : Electromyography, Physical activity, Ageing, Dynamic contraction.

Electromyography (EMG) as a tool for the study of muscle function has been in use since the pioneering work of Inman *et al.*, 1944. EMG has been used to quantify muscle activity patterns during, normal and pathological muscle functions, shoulder rehabilitation protocols to analyze shoulder muscle activity and coordination during sports activity and all day work (Gowan *et al.*, 1987; Glousman *et al.*, 1993; Kelly *et al.*, 2002).

Although lower extremity muscle activity has been extensively studied in older individuals under static conditions, till date few experiment are available concerning the shoulder muscle activation capacity of older individuals when compared to their younger counterpart during dynamic muscle activity. It is uncertain whether the adult's neuromuscular system responds as similar as that of the older individuals who are physically active during dynamic muscle action at the shoulder.

Loss of muscle strength as a result of normal aging is reported to impair functional ability in various communities (Vandervoort, 1986). The decline in the maximum voluntary contraction (MVC) force that occurs with age is typically greater than expected on the basis of the loss of muscle mass. It was concluded by De Serres *et al.* (1998) that decline in strength with age does not appear to result from an impairment of the neural drive to muscle and might be related to the loss of type-II fibres.

Maintaining increased physical activity and fitness throughout life provides significant health and longevity benefits. Sarcopenia and loss of strength with aging reflect the combined effects of progressive neuromotor deterioration and chronic decrease in regular muscle loading. Lack of physical activity may further enhance this deterioration. Older individuals possess impressive plasticity in physiologic, structural and performance characteristics. Improved muscle strength, bone density, dynamic balance and overall functional status with regular exercise may minimize or reverse the syndrome of physical frailty (McArdle *et al.*, 1996). In a research of Harvard Alumni (Paffenbarger, 1986) men

who expended at least 1500 kcal per week in exercise or sports like swimming, tennis, cycling for one hour, 3-4 times a week for 20 years had a 25 % lower mortality rate than most sedentary men. According to Seghers *et al.* (2004) physical activity of men of 55 years mean age on EMG variables, a shift in the frequency spectrum of the signal towards lower frequencies accompanied by an increase in the EMG amplitude was observed and showed a decreased MVC torque at the end of the fatiguing contraction.

Therefore, physical activity can make a major contribution to the continued health and fitness of older people. Not only it significantly slows down and minimizes the physical decline associated with old age but more importantly, it also preserves functional capacity, quality of life and independence. Few studies are available on quantification of effect of sedentary or active lifestyle on muscular system through surface EMG under dynamic muscle actions. Therefore, this study was aimed to analyze the effect of level of physical activity on aging through surface EMG during dynamic muscle activities.

MATERIAL AND METHODS

Subjects :

16 healthy male subjects participated in this study. All recordings were taken from the dominant side of the upper limb for each subject. Two groups were taken for the purpose of comparison.

Group-1: Athletic younger adults, 8 subjects of 20-29years age group (mean age; 25.37 ± 1.40 yrs, weight; 86.60 ± 13.42 kg, height; 178.75 ± 7.79 cm). Physical activity level – 2: 1-3days/week of sports participation in overhead sports activity (*Cincinnati sports activity scale* – CSAS, Westin *et al.*, 2004). Random samples were drawn from throwers of Punjab academy of police (PAP), Jalandhar, and baseball and basket ball players from Khalsa College, Amritsar.

Group-2: Athletic older individuals, 8 subjects of 50-59years age group (mean age; 57.62 ± 2.18 yrs, weight; 77.62 ± 14.31 kg, height; 174.71 ± 9.09 cm.) Physical activity level – 2: 1-3days/week of sports participation in overhead sports activity (*Cincinnati sports activity scale* – CSAS, Westin *et al.*, 2004). Random samples were drawn from throwers who participated in veteran games, 2006, Amritsar, Punjab.

A complete detail of present and previous history, sports participation information and training characters were taken for each subject. All subjects were screened for musculo-skeletal pain or disorder of the upper extremity and were excluded if they reported any present or previous disorder or symptom related to shoulder within past 6-12months. Each subject provided an informed consent prior to participation in the study approved by University Ethical Committee.

Procedure and instrumentation:

Four pairs of disposable Ag-AgCl surface (skintact) electrodes with 8 mm diameter were used with inter-electrode distance of 2.5cm attached to the skin, over the muscle belly in the direction of muscle fibres. The reference electrode was taped to the 7th cervical spine process. Recording electrodes were placed according to recommendation of Hermes *et al.* (1999), European recommendations for surface EMG, results of SENIAM project; Middle deltoid – at a distance 1/4th from acromian process, on the line joining acromian to lateral epicondyle of elbow; Posterior deltoid – an area about two finger breaths behind the angle of acromian; Supraspinatus – just rostral to the mid-point of the scapular spine and Infraspinatus – just below the mid point of the scapular spine.

The instrument used was NORAXON 4 channel EMG, USA, with Myosystem 1200. The RMS values of EMG signals were calculated for each muscle by using maximum of three peaks EMG signals to represent 100% MVIC. Muscle activity was categorized as minimum (0-40%), moderate (40-75%) and maximum (75-100%).

MVIC of all muscles were recorded in manual muscle testing position in accordance with standard physical therapy guidelines (Daniel & Worthington, 2003). The subject was in sitting position during all the recordings. Three trials of MVICs were taken for selected shoulder muscles for each subject and each muscle.

Four dynamic movements were investigated in the sequence of pull, push, elevation and throw. Subjects were standing during all the activities. Each movement was repeated at least three times one after the other. Each phase of pull, push, and elevation exercise was performed at 40 beats per minute, 0.1sec beep duration, standardized with the aid of a metronome. Exercises of pull, push and elevation involved the use

of elastic green color, 1.8m, medium heavy resistance exercise band while maintaining consistent metronome speed. A tennis ball was used for overhead throw with the target 5m away.

The movements were performed as follows:

PULL (Figure 1)—the starting position of pull was in sagittal plane with the arm at approximately 90° of flexion, elbow fully extended and forearm supinated 90° . From this position all subjects performed pull against the resistance administered by the band. The end point of pull was at 10° of extension at shoulder with 100° of flexion at elbow and 90° of supination at forearm.



Figure1:Pull

PUSH (Figure 2)—the starting position of push was in sagittal plane with the upper arm in neutral position beside the trunk with elbow in 90° of flexion, forearm in 90° of pronation and wrist in 30° of dorsiflexion. The end point of pushing was at 90° of flexion at shoulder with elbow at full extension and forearm and wrist remaining in the same position.



Figure 2: Push



Figure 3: Elevation

ELEVATION (Figure 3)—the plane of elevation was in approximately 20° flexion of frontal plane. The elbow and wrist were extended during the movement. Elevation started from a neutral position of the upper extremity. The end point was at approximately 120° of elevation.



Figure 4: Overhead throw

OVERHEAD THROW (Figure 4)—the throw was performed with maximum speed and subjects were asked to throw as fast as they can, in the position as it was natural for them.

Statistical analysis:

Before statistical analysis, all EMG data was normalized to amplitude obtained during Maximal Voluntary Isometric Contraction (MVIC) and was taken in terms of %MVC. The significance level was calculated at 0.05 level. One way ANOVA test was used for comparison between four muscles during an activity within the same group and mean values were used for interpreting the results. *Unrelated* 't'-test was used for comparison in the four muscles during an activity between the two different groups.

RESULTS

The mean values of %MVIC, grading of activity of each muscle and significant difference between the two groups are summarized in Table-1.

Table 1 : Average MVIC% (SD) of the muscles examined of the athletic young (group 1) and athletic older (group 2) groups.

Muscle/ Activity	Middle deltoid	Posterior deltoid	Supra- spinatus	Infra- spinatus
Pull				
Group1	41.2(17.7)	43.5(14.4)	23.1(10.9)	36.7(19.8)
Group2	32.6(20.1)	45.3(23.3)	25.0(17.7)	36.6(15.8)
Push				
Group1	21.6(8.5)	5.6(3.7)*	15.8(3.2)	22.1(5.9)*
Group2	27.6(7.4)	14.3(11.6)*	17.5(8.8)	31.1(11.7)*
Elevation				
Group1	74.6(17.3)	47.7(17.5)	48.6(5.9)*	36.8(13.0)
Group2	67.4(15.7)	60.9(25.5)	58.2(6.5)*	40.7(10.5)
Throwing				
Group1	92.8(33.6)*	54.7(23.3)*	76.4(17.7)*	81.7(69.5)
Group2	63.1(19.6)*	87.6(40.9)*	55.6(17.9)*	72.8(27.5)

Activity level: minimal; 0-40%, moderate; 40-75%, maximal; 75-100%.

The significant difference ($p < 0.05$) in muscle activity are marked as *.

Pull:

In the athletic older group mainly posterior deltoid (PD) took part in the motion demonstrating moderate activity. Middle deltoid (MD), supraspinatus (SUP) and infraspinatus (INF) were minimally active. In the athletic young group moderate activity was found in MD and PD while minimal activity in SUP and INF. Comparison within the groups revealed greater activity of PD in both groups (group1: $F=4.11$, $p < 0.01$; group2: $F=3.11$, $p < 0.05$). On comparison between the 2 groups, similar activity was found between MD, PD, SUP and INF muscles of athletic young and old groups, as the difference obtained was statistically insignificant.

Push:

During pushing minimal activity was found in all 4 muscles in both athletic young and old groups. Comparison made within the group showed greatest activity in INF in both groups (group1: $F=14.6$, $p < 0.001$; group2: $F=6.69$, $p < 0.01$). On comparing between the two groups, similar activity was found in MD and SUP while greater activity was found athletic older group in PD ($t=2.44$, $p < 0.05$) and INF ($t=1.95$, $p < 0.05$).

Elevation:

In the athletic older group moderate activity was found in MD, PD and SUP while INF was minimally active. In the athletic young group maximal activity occurred in MD, while PD, SUP and INF were moderately active. Comparison within the group revealed greater activity in MD in both older ($F=14.2$, $p < 0.001$) and younger ($F=6.7$, $p < 0.01$) groups. Comparison between the 2 groups showed similar activity in almost all the muscles except SUP ($t=3.05$, $p < 0.01$) which was greater active in older group.

Overhead throw:

In the athletic group PD and INF were maximally active while MD and SUP were moderately active. In younger group MD, SUP and INF were maximally active while PD was moderately active. Comparison within the group showed greater activity in MD in young group and in PD in older group. On comparison between the 2 groups, similar activity was obtained in INF. While PD was greater active in older group ($t=1.97$, $p < 0.03$), and MD ($t=2.15$, $p < 0.02$) and SUP ($t=2.33$, $p < 0.01$) were greater active in younger group.

DISCUSSION

In this study, four shoulder muscles were investigated to examine how muscle activity differs between the physically active or athletic individuals of young and old age groups. Sami (1999) determined the effect of aging on muscle strength and explained that from 4th decade of life significant decrease in the muscle strength occurs. De Serres *et al.* (1998) obtained greater deficits in biceps muscle activation in older individuals and Malgrati *et al.* (1996) recorded lower MVIC in elderly subjects and % MVIC increased as a function of the effort.

However comparisons made in this study to determine the effect of aging on surface EMG parameters revealed that athletic older group had similar activity when compared to athletic younger group during pull, push and elevation thus does not support the above statement. During pulling, pushing and elevation activity posterior deltoid, infraspinatus and middle deltoid respectively showed greater activity in both athletic young and older groups with posterior deltoid greater active during throwing in athletic older group, hence it shows that training or sports related specific adaptations in the muscle activation capacity occurs even at the older age also. This could be attributed to the beneficial effect of training and regular physical activity on aging muscular system in the form of improvement in motor unit recruitment and feed forward adaptations in motor tasks performed (Casale *et al.*, 2003; Karmanidis *et al.*, 2005). Habitual level of physical activity in older individuals had also shown a shift in the frequency spectrum of the signal towards lower frequencies accompanied by an increase in the EMG amplitude.

Hence, the results of the current study indicate that older individuals involved in some kind of regular sports or physical activity related to upper limb can make a major contribution to their continued health and fitness. Not only can it significantly slow down and minimize the physical strength decline associated with old age but more importantly, it also preserves functional capacity, quality of life and independence. Therefore, regular physical activity related to sports or in activities of daily living is essential to maintain healthy physiological functioning of muscular system of the body and can increase the ability of the shoulder muscles to contract during dynamic activities, which may be due to adaptation occurring in the old age like augmenting protein synthesis and improved neuromuscular coordination.

Since, throwing and pitching are complex mechanism that requires high level of neuro-muscular coordination of shoulder muscles (Glousman *et al.*, 1998), there appears to be significant differences in the shoulder muscles activity between the two groups.

Therefore the muscle activity patterns have Clinical implications for both the training and maintenance of healthy muscle function in old age:

- A sports therapist must recognize the difference in activation level of the shoulder muscles during dynamic activities in individuals of young or old age groups, so that key muscles may be trained for relevant movement involved in sports or daily activities specific to age group.
- Regular physical activity with aging is essential to maintain healthy physiological functioning of the body and can lead to improvement in muscle recruitment and adaptation in muscular system.

CONCLUSION

The results suggest that regular physical activity can lead to decline in age related decrease in muscular system functions and can increase the level of activation capacity of the muscles during dynamic activity in older individuals.

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Mental Illness and Disability Among Elders in Developing Countries: A Case Study of Nigeria

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ABSTRACT

This article attempts to document the prevalence of psychiatric disorders among elders in a rural town of Iseyin in the Southwestern part of Nigeria. In addition, the relationship between psychiatric illness and functional disability was investigated in order to assess the impact of disorder on social functioning. A semi-structured interview checklist to diagnose six disorders was used (=182). In Addition, elders older than age 60 were examined to assess the functional impact of mental health conditions by measuring functional disability. Eighteen percent of elders seem to have a diagnosable psychiatric disorder. Furthermore, in general these elders were also less likely to receive assistance with the disabilities they report, compared with those who do not experience a psychiatric disorder. Documenting the extent of psychiatric disorder among elders in developng societies sensitizes health planners to the growing reality of aging in their societies and the need for expanded physical and psychiatric health care services.

Keywords: Developing countries, Psychiatric disorders, Functional disability, Social functioning.

The mental health states of elderly persons in developing countries is a matter of increasing interest and concern to international health experts, sociologists, psychologists and economic development planners. This concern stems from two significant population-related processes:

the aging of the world population and the projected increase in disability (including psychiatric) that will accompany this increase-especially in developing countries (Murray and Lopez, 1996). Between 1980 and 2025, the global population older than age 60 will grow by 198% overall and by 293% in developing countries. Moreover, by 2025, 72% of all those older than age 60 will be in developing countries (Levkoff, Macarthur and Bucknall, 1995). In 1990, mental illness represented 10% of the overall burden of disease from all causes as measured by total disability-adjusted life years. This figure, too is expected to rise dramatically to 15% by 2025 (Ustun, 1999). Moreover, although we are uncertain if elders account for a greater proportion (compared to younger persons) of psychiatric disorders in the world, the growth of this segment of the population will inevitably result in increases in the diagnosis of dementia as well as the prevalence of non-organic psychiatric disorders. These trends may have profound effects on economic and societal development. Persons with disabilities are less economically productive, and elders may also consume greater amounts of social resources because of their illness-related care needs. They also may have greater care needs than non-affected elders.

We know very little about the true prevalence of mental illness in developing countries. We know even less about the mental health of elders living in such countries. To the extent that the mental health of elders has been investigated, studies tend to focus on dementia as the central disorder that is documented (Henderson and Hasegawa, 1992; Levkoff, MaCarthur and Bucknall, 1995). Although dementia is centrally a component of mental disorder among elders, it is also not characteristic of mental disorder in general. Demographic trends and the recognition that mental health is a significant component of the disability disease burden suggest that we need to improve our knowledge in this area. To date, few diagnostically specific, cross-culturally valid measures of psychiatric well-being in developing countries have been used to assess population rates (see these studies for exceptions: Awais, Kebede and Alem, 1999; Mumford, Sweed, Ahmad, Latif and Mubbashar, 1997; Ruiz-Doblado, 1999; Blagwanjee, Parekh, Paruk, Petersen and Subedar, 1998; Rumble, Swartz, Parry and Zwarenstein, 1996; Smith, 1994). It is, however, crucial to assess the community prevalence of psychiatric disorder to organize health services to deal with these disorders. (Andrews, 1997).

Sociologists in the United States need to increase their awareness of these issues, as well as these issues arise in the United States and as we become increasingly aware of our global citizenship, we need to contribute our expertise to address these problems. In addition to these paucity of data, there is an almost complete lack of sociological theorizing and explanation related to mental health issues including those related to aging in developing countries. This may be particularly important for understanding family caregiving in developing societies. Given that family structures are changing because of family planning initiatives, structural adjustment programs initiated by World Bank and International Monetary funds, and internal migration to cities, the informal support systems for elders with any type of disability tend to be understood. Care systems in traditional societies are entirely a matter of responsibility by the extended family and, if the extended family is threatened because of development, then the care system must be replaced or elders will be in considerable danger (Levkoff, Macarthur and Bucknall, 1995).

Mental Health of Elders

It is only relatively recently that investigators have realized that mental health is an issue for elders. Heretofore, evidence of mental illness among elders was attributed to organic deterioration or the "natural" depression that accompanies aging but not recognized as mental illness per se. Our growing understanding of the physical and social dimensions of the aging process has convinced us that neither is true. Rather, mental illness - although it can be related to age-specific loss of roles, income, or physical health - is independent of biological aging. Mental health is now recognized as an issue that is relevant across the life span.

In societies such as the United States, the stereotype of elders as retired, roleless, individuals waiting to die has been replaced with a multifaceted view of elders as individuals with continuing roles and goals who learn, grow and contribute to social well-being. As such, we now realize that disorders such as depression are not natural, inevitable consequences of aging but treatable conditions that can be largely improved or "cured". Elders have increased value in modern societies and as such, are entitled to mental health services. The situation is different in developing societies. This is the first time in history that older populations even exist in such societies. For example, in Nigeria, average life expectancy is still 58 years, and elders (60 years and older)

represent only 3.5% of the population compared to 13% in the United States. Moreover, public health interventions have been aimed at the opposite end of the age distribution. Effort has gone into reducing infant and maternal mortality rather than into elder care. Economic development has been directed into education of the young and the expansion of employment opportunities. As a consequence, there are few if any, services directed to elders and even fewer toward the mental health of elders. National health planners and agencies are either unaware of the need or unable to afford the services to meet those needs. Under these circumstances, it will be helpful to document the prevalence of mental disorder and to examine the potential societal impact of disorder on functional disability.

The purpose of this article, then, is to document the prevalence of psychiatric disorder among elders in a rural town of Iseyin of the southwestern part of Nigeria. In addition, the relationship between mental illness and functional disability is investigated in order to provide a more concrete gauge of the impact of disorder on social functioning. Although our data came from a single town in a single developing country, our intent is to begin documenting the overall scope of this problem. There are current efforts being undertaken that will give us much better worldwide estimates, and the analysis here outlines a way of utilizing the forthcoming data.

Obtaining high quality estimates of psychiatric disorder in developing societies is not an easy task and it is most difficult in rural settings. Although there are substantial debates about the cultural meaning of mental disorders across societies and, therefore, about the ability to compare rates of disorder (Kleinman, 1986, for example), there are also compelling reasons to measure disorder using a common set of criteria (Ustun, 1999). Assessment of psychological disorder across cultures has been facilitated by the development of the Composite International Diagnostic Interview (CIDI) (World Health Organization, 1989). The CIDI reflects current U.S. (Diagnostic and Statistical Manual of Mental Disorders, 3rd ed. rev. {DSM-III-R}, 1987) and International (ICD, International Classification of Disease) diagnostic categories. It has been validated across a number of societies (Wincker, Robbins, Cottler, Sartorius, Burkner and Reiger, 1991). However, the full CIDI requires 1 to 3 hours to administer (longer if

the respondents are not literates), and it requires extensive training of interviewers. These features make the CIDI less than ideal for use in the rural settings such as Iseyin in Southwestern Nigeria.

However, a diagnostically specific symptom checklist instrument that reduces administration time and simplifies the training of interviewers has been developed. The DSM-III-R Criteria Checklist was designed "for clinicians" assessment of the major DSM-III-R adult psychiatric disorders. It is a semi-structured diagnostic instrument (Hetzer and Janca, 1988). This checklist has been compared to the CIDI and been found to produce good concordance of diagnoses (Janca, Robbins, Bucholz, Early, and Shayka, 1992). Tausig, Subedi, Broughton, Subedi and William-Blangero (2003) describes the use of a shortened version of the checklist that can be used to provide diagnostic prevalence estimates in community populations in developing countries. The instrument measures symptoms for six disorders based on DSM-III-R criteria and has been shown to have good psychometric properties.

METHOD

Sample

Iseyin is a medium sized town located in the Southwestern part of Nigeria. It is predominantly a rural community with an economy characterized by low productivity and growth, with a paucity of unknown natural resources, a lack of capital and a labor surplus. The main goal of the survey was to study the psychological health of the adults living in this town. A cluster sample of 100 households with 500 residents was drawn for the study. All individuals 18 years of age and older in these households (N=350) were enumerated and interviews were attempted with all listed individuals. Interviews were actually conducted with 80% of these adults (20% refused) giving us a sample of 280 persons. Of these adults, 100 were 60 years of age or older.

The survey interview obtained demographic, economic and health information; psychiatric symptom data; and for those 60 years old or older, information on needs for assistance with activities of daily living (ADL). Each item in the questionnaire was translated into Yoruba, the indigenous language, and the retranslated into English to ensure accuracy. The translation was done by qualified translators who were well versed

in both languages. Interviews were conducted through door to door visits. Each interview was scheduled for about 1 hour. The actual average interview was 40 minutes. We did not distinguish the time needed to answer the psychiatric symptom questions from the rest of the survey. However, it is clear that the length of the interview is considerably shorter than for the full CIDI. All the data for this study were collected between June 2005 and August 2006. Three interviewers (one woman and two men) with graduate degrees in social sciences, past research experiences, and familiarity with the social, cultural, and behavioral conditions of the population under study were required to do practice interviews to ensure quality and accuracy. A female interviewer was assigned to a female respondent and a male interviewer to a male respondent.

The DSM-111-R Criteria Checklist consists of a list of symptoms that are diagnostically indicative of each psychiatric disorder assessed by the checklist (Helzer and Janca, 1988). Screener questions determined if respondents will be asked about a particular set of disorder symptoms. Scoring is done by counting symptoms and using specified criterion cutoff values to make a diagnosis. Diagnostic criteria are intended to be identical to those used in instruments such as the CIDI and the Diagnostic Interview Survey (DIS) (Robins, Helzer and Ratliff, 1981).

The version of the checklist used in this study assessed symptoms for five Axis I disorders and one Axis II disorder: Somatization disorder (screening criteria), generalized anxiety disorder, depression, schizophrenia and anti-social personality disorder were assessed. These disorders were chosen because they were expected to occur with some frequency. The DSM-III-R Checklist contains symptoms lists for 21 disorders; however, using the entire checklist would have made the survey too lengthy for the target population. The reliability and validity of the instrument used in this study have been examined in considerable detail and have been shown to be acceptable.

The diagnoses of depression and anxiety have the highest reliability as indices, whereas the diagnosis of anti-social personality disorder is subject to considerable uncertainty (no data for antisocial personality disorder will be reported). Overall, the instrument has good psychometric

properties given the fact that the diagnostic sections are not designed to have such characteristics (that is, they are designed to reflect common clinical standards). We also measured age, gender, years of western education, marital status, occupation, and income of respondents. For the most part, our definition of an elder will be a person 60 years of age or older. We also used a modified version of the Cornell Medical Index (CMI) to assess physical health symptom. This measure of physical health records symptoms rather than specific diagnoses. Respondents were asked to indicate any of 40 physical symptoms (45 for women) that they experienced in the past 2 years.

For the purpose of this article, the presence of each symptom was coded 1 and no symptom presence was coded as 0. This measure is used only to compute the somatization diagnosis where we wish to exclude all respondents who reported a history of physical complaints that are related to the diagnosis of identifiable illness before diagnosing somatization as a screening diagnosis simply because the screening diagnosis required the assessment of far fewer symptoms.

We also assessed disability with a series of 23 questions that asked respondents if they need help with common household chores or activities that respondents reported being unable to accomplish without assistance. This index is available only for respondents who were 60 years of age or older because the questions were originally limited to those with physical disabilities (younger than 60 years of age) and those older than the age of 60. Persons younger than 60 with physical disabilities were not included in the calculation reported later. The index has an alpha reliability coefficient of .81.

Finally, we investigated caregiving structures by assessing if the elder lived in an extended or nuclear family (0 = extended; 1 = nuclear), what the total household size was, and whether someone helps the elder with such things as going to the public water tap, housework, bathing, dressing, or mobility (0 = no, 1 = yes).

RESULTS AND DISCUSSION

Demographic Characteristics Of Elders

The demographic characteristics of elders and those younger than the age of 60 are presented in Table 1

Table 1: Demographic Characteristics of Elders

Demographic	Frequency 60 and over	Valid Percentage over 60	Frequency	Valid Percentage
1. Gender				
Female	284	60.4	99	54.4
Male	186	39.6	83	45.6
2. Marital Status				
Married	383	81.5	116	63.7
Not Married	82	17.4	14	7.7
Widowed	5	1.1	52	28.6
3. Years of Western Education.				
0 years	267	56.8	179	98.4
1-5 years	41	8.7	2	1.1
6-8 years	39	7.2	—	—
9-10 years	80	17.0	1	0.5
11-12 years	39	8.3	—	—
13-14 years	7	1.5	—	—
15+ years	2	0.4	—	—
4. Income (U.S\$1=126 Naira)				
0-999 Naira	9	1.9	12	6.6
1000-1999 Naira	52	11.1	28	15.5
2000-2999 Naira	152	32.2	59	32.6
3000-3999 Naira	173	36.8	59	32.6
4000-4999 Naira	62	13.2	19	10.5
5000+ Naira	22	4.7	4	2.2
5. Occupation				
Farming	286	60.9	142	78.0
Business	43	9.1	7	3.8
Service	43	9.1	10	5.5
Teacher	26	5.5	—	—
Other	31	7.1	5	2.7
Housework (not employed)	6	1.3	17	9.3
Student (not employed)	35	7.4	—	—

Elders are slightly more likely to be male when compared to the gender distribution among those younger than 60 years of age. This differs from the typical gender profile in developed countries where women greatly outnumber men in older segment of the population. In less developed countries, however, high maternal mortality associated with childbirth probably explains the observed gender percentages for elders. Women are less likely to survive to old age as suggested by the high percentage of elders who report being widowed. Western educational experience is very low. Only 10.6 percent of Iseyin elders reported any years of western education. This appears to be a cohort effect as almost one half of younger adults report some exposure to western education. Incomes are very low. The average income is approximately \$400 per year although older residents of the town reported lower incomes than younger ones. Finally, older residents were more likely than younger residents to report farming as their occupation. Notwithstanding "retirement", older residents are more likely to work in this traditional occupation.

The overall demographic profile is that of a traditional, rural society. The town population is largely engaged in agricultural pursuits, has little western education, and has low incomes. Elders are more thoroughly traditional than younger adults in that they have less western education and are more likely to be engaged in farming. Moreover, elders are more likely to have lost a spouse.

Prevalence of Mental Disorder

Estimates of mental disorder prevalence are presented in Table 2.

Approximately, 18% of elders (not different from the rates among younger residents of the town) reported at least one diagnosable disorder. Somatization (screening criteria) was detected in 5.5 percent of the older group. This rate is statistically different (lower) than among younger adults. In our computation of somatization, we excluded from diagnosis any respondent who also reported any recent physical illness symptoms on the CMI as required by diagnostic criteria specified in the DSM-III-R Checklist. Thus, our estimate of this disorder is not biased by the high rates of physical illness found in the general population and especially among older adults. This rate of somatization for elders is at the upper end of rates found in other surveys (Ustun and Sartorius,

Table 2
Percentage of Prevalence of DSM III-R Checklist Disorders
Among Elders (60+) at Iseyin

	Somati- zation (Life time)	Genera- lized (Life time)	Depre- ssion (recent)	Mania (recent)	Schizo- phrenia (recent)	Any Disorder
Total Elders (n=182)	5.5 (14.3)**	5.5 (2.8)	4.4 (2.6)	1.1 (0.4)	2.7 (0.9)	17.6 (18.7)
Gender						
Female	3.0	7.1	5.1	0.0	1.0	16.2
Male	8.4	3.7	3.6	2.4	4.8	19.3
Marital Status						
Unmarried	3.0	9.2	3.0	0.0	3.0	16.7
Married	6.9	3.4	5.2	1.7	2.6	18.1
Income (Nigerian currency)						
0-999	0.0	8.3	16.7	0.0	0.0*	25.0
1000-1999	7.1	14.3	0.0	3.6	3.6	25.0
2000-2999	3.4	3.4	5.1	0.0	1.7	11.9
3000-3999	6.8	3.4	3.4	0.0	0.0	13.6
4000-4999	5.3	5.3	5.3	5.3	15.8	31.6
5000+	25.0	0.0	0.0	0.0	0.0	25.0

*One-way ANOVA significant at $p < .05$. **One-way ANOVA significant at $p < .01$.

1995; U.S. Department of Health and Human Services {U.S. DHHS}, 1999) and is equivalent to that reported in the Epidemiologic Catchment Area Study (ECA) findings for somatization syndrome (Swartz, Landerman, George, Blazer and Escobar, 1999).

The lifetime rate among older adults for generalized anxiety disorder is 5.5% and 4.4% for depression. Both of these rates are at the low end of prevalence estimates found in other cross-national studies (Ustun and Sartorius, 1995; Weissman *et al.*, 1996). They do not differ

from the rates found for younger adults. Estimates for mania (1.1%) and schizophrenia (2.7%) are consistent with those reported for the ECA surveys in the United States (Keith, Regier and Rue, 1991). Based on the relatively small size of the elder sample however, these latter rates are not considered reliable estimates of prevalence.

We also examined prevalence of several sociodemographic characteristics within the elderly population. Table 2 shows the computed rates of disorder by gender, marital status and income. One-way ANOVAs indicate that rates did not vary as a function of demographic status. However, these comparisons may not be reliable because of the small number of respondents in some categories and the low rates of disorder for some diagnoses. The sole significant contrast relating schizophrenia to income is not readily interpretable.

Disability and Care Receipt

Finally, we want to examine the association between psychiatric disorder, the ability to perform normal economic activities or ADL without assistance - our disability index and the structure and use of caregiving resources. These associations can only be examined for the elders who are 60 years of age or older because of the way the data were collected. Table 3 shows the mean disability index scores for each type of mental disorder and the Pearson product-moment correlations between each psychiatric disorder and the index of disability, the type of household, the number of persons in the household and whether someone assists the elder with care needs. Elevated disability scores are associated with the diagnosis of depression, only. This is reflected in the correlation coefficients and in the mean disability scores that is two times as high for those with depression compared to the average elder.

Those elders with an anxiety disorder or somatization disorder were more likely to live in an extended family context, although they were more likely than other elders with disability to receive help with disability. The size of the household is positively related to somatization disorder but otherwise unrelated to diagnosis that suggests that those with disorders are not excluded from family households. Those diagnosed as schizophrenic are less likely to receive assistance with the disabilities they report, though in all cases, those with psychiatric

diagnoses report fewer helpers compared to elders with disabilities who do not experience a psychiatric disorder. In a regression analysis controlling for whether the elder requires assistance, a diagnosis is the only diagnosis associated with increased social, economic or ADL disability.

Table 3

The Relationship Between Psychiatric Diagnosis and Degree of Disability For ders 60 and Older

Psychiatric Diagnosis Score	Mean Disability	Disability Type	Husehold Score	Household
Somatization	3.20	.11	-.24**	22*
Anxiety	3.00	-.07	-.27	.10
Depression	7.33	.39***	.06	-.01
Mania (no cases over 60)	-	-	-	-
Schizophrenia	4.67	.05	-.08	-.09
Subsample Mean = 3.61				

Note : Household Type: 0=Extended; 1=Nuclear.

*p<.05, **p<.01, ***p<.001.

Discussion

The aging of the world population and the consequential expected increase in the occurrence of disability as part of the societal disease burden poses a substantial challenge to all societies in the coming years. The impact in developing societies is likely to be greater than in the developed world because health resources in general are less adequate and less well distributed. In this context, it is important that we obtain good estimates of the prevalence of disability (mental illness, in particular) to assess the contribution that disability makes to the disease burden and to plan services. Much of the existing data focuses on dementia as the principal form of psychological disability among elders and results in an underappreciation of the extent to which psychiatric disorders affect elders. Under such circumstance, it would be unlikely

that adequate services would be created.

In this article, we estimated community prevalence of psychiatric disorder using a short version of the DSM-III-R Criteria Checklist. Of elders in the town of Iseyin, 18% have a diagnosable mental disorder using this instrument. This rate is not different than that found for younger adults and suggests that mental health care be conceptualized as a health need for the entire population. Only the rate of somatization disorder differs between younger and older Nigerians. Older Nigerians have lower rates of the disorder, probably because they have higher rates of actual physical disorder. This fact makes it difficult to distinguish somatization of psychological problems from genuine physical symptomatology. There were no socio-demographic correlates with disorder; however, in many instances, the categories for sociodemographic variables have too few cases to put much meaning into this finding. Elders who suffer depression are more likely to report disability in economic and daily living skills than elders diagnosed with other disorders or no disorders. This is consistent with findings from the global burden of disease study (Murray and Lopez, 1996). Depression is one the leading causes of disability-lost years within the global burden of disease. It is relatively frequent in occurrence and seems to interface with normal daily functioning to a greater degree than other types of disorder. Elders with depression are not more likely to receive help for their disability, however, elders with anxiety disorder are more likely to live in extended family households, the traditional site for care. Those diagnosed with schizophrenia are least likely to receive assistance—a fact consistent with a strong cultural stigma attached to people with this disorder. These patterns of family care likely to be disrupted by migration to cities that implies more nuclear families and by lower fertility that means there will be fewer household members who can be caregivers—exactly the pattern found in the West. Care systems must be monitored to ensure that the traditional caregiving that occurs in families is not jeopardized by demographic change. From one perspective, distinguishing the mental health problems of elders from younger adults is not consistent with more general need to define the disease burden for all persons. On the other hand, documenting the extent of disorder among elders also sensitizes health planners to the new and growing reality of the aging of their societies and the consequent need for an expanded notion of health care services.

Epidemiological surveys are only a first step in the health-planning process. Data from such surveys define the extent and distribution of the problem but do not specify the types of services that need to be offered nor how they should be offered. More research on the impact and treatment of disorders need to follow. One study is illustrative, rather than definitive, in these regards. Our principal objective was to begin the documentation of the psychological health of elders and their care needs in developing countries where we expect diametric increase in the prevalence of disorder among older adults. We need to conduct additional studies to ensure the generalizability of observed rates in various contexts (for example, urban versus rural), and we need to better access the functional impact of disorders on daily living and on societal resources. Finally, we need to recognize the need to replace or reinforce systems of care for those elders who experience mental illness.

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Attitudes Towards Old Age : A Study of the Self-Image of Aged

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ABSTRACT

Ageing occurs in a societal context, ranging from the micro scale of the family to the macro scale of the society. This context includes the attitudes, stereotypes and age norms, which determine age appropriate behavior for the aged (Social-Image). Further, the aged have, an image of themselves (Self-Image) and an image of how they feel, the 'others', in the society perceive them (Image of Social Image). The societal attitudes shape the social behavior towards the aged. The interactions of the aged in the social environment, result in the self-image of the aged being reinforced by the social-image. The present paper is an attempt to study the "self-image" of the aged, their "image of the social image" and the influence of "social image" on their "self-image".

Keywords: Self-Image, Social-Image, Image of Social-Image, Social Attitudes.

Images of ageing exist at two levels, personal (our own) and societal (opinion of many people in the society), these are mutually reinforcing. To understand ageing holistically, it is imperative, to understand the self-image of the aged and how this self-image is influenced by the process of ageing (including the social image).

An important component of this self-image is the 'image of age', which includes knowledge of chronological age as well as subjective age (how old they feel and with which broad age group they relate to).

Ageing is judged by different criterion in different societies. The transition to old age is identified with several factors- chronological age, ill health, retirement, physical/mental deterioration, death of spouse, etc. Studies reveal that changes in social role (widow hood, grandparent hood, retirement) and physical health dominate the definition of age identity. At the same time studies also reveal that, like other age groups, some aged separate illness or disability from ageing. While they feel, their health has deteriorated because of ageing; their personality continues to remain the same. Thus, self-image remains unaltered, as the subjective image of age is not changed.

Chronological age is widely used, in spite of being an inadequate indicator of ageing. While society may consider people to be aged at 60/65 years. People of this age group may not feel they are aged but others of this age group are! This shows a discrepancy between the 'self- image' of the aged and the 'social- image'.

Along with the image of their own attributes (self-image), the aged have an image of the way the rest of society perceives them (image of the social-image). This perception is based on the societal attitudes towards the aged, which are in turn influenced by stereotypes. The social attitudes are favorable or unfavorable depending on stereotypes of aged. These stereotypes and attitudes are reflected in the way the social group treats the aged. Owing to these stereotypes the aged develop favorable or unfavorable self-concepts. Self-image is thus reinforced by interaction with others in the social environment.

The inappropriate negative stereotypes lead to discrimination and prejudice (ageism) against the aged. 'Ageism' coined by Butler (1969), was described as a process of systematic discrimination and stereotyping of the aged. Today, it has come to include any prejudice or discrimination, in favor of the aged as well. However, more often ageism is negative than positive.

The negative image typically includes a set of behavioural expectations or prescriptions which define what a person is to do or not to do. The aged are expected to be forgetful, intellectually rigid, unproductive, asexual etc. The aged respond variedly to these expectations. Palmore (1990) has identified four common responses of elders to these prescriptions and expectations: acceptance, denial,

avoidance or reform. The aged who *accept* the negative image "act old" even if it is contrary to their personality. *denial* includes lying about one's age, cosmetic surgery, hair transplants and dyes, use of anti-ageing products etc. while these may not appear significant they erode the morale. *Avoidance* may take the form of self-imposed isolation. *Reform* involves an effort by the aged to eliminate the ageist attitude individually or by joining some advocacy group. All these behaviors have a harmful effect on the aged.

Ageism can be intentional or inadvertent. The society we live is permeated with ageism in varying degrees. Cultural stereotypes, pop cultures, media reinforce in a youth oriented society, "Young is beautiful". Further, the constant emphasis on youth, beauty, vitality and strength, indirectly strengthens the negative aspects of ageing. Literature reveals that younger people have negative image of ageing while the aged have a relatively positive image but at the same time the aged themselves had negative attitudes and perceptions of the other aged!! It appears the aged themselves are impervious to negative stereotypes of ageing being influenced by the social image. This bears proof to a maxim of social psychology which says, what we think of a person influences how we will perceive him, how we perceive him influences how we behave towards him and how we behave towards him ultimately shapes who he is.

Early research on ageing reinforced the negative stereotypes of ageing. There is an urgent need to study the self-image of the aged, the social image and how the social-image influences the self-image of the aged. The present paper is an endeavor in that direction. It is descriptive and exploratory and attempts to understand the 'self-image' of the aged and their 'image of the social image'.

A sample of 25 aged (age ranging from 60 to 75 years) was selected randomly and a schedule was administered to elicit information on transition to old age, response to ageing (change in personality, change in life style, religiosity in old age, gender differential response to ageing), Best and worst aspects of ageing, ageing well and poorly, changes in family and society, ageist attitudes, aged abuse, social image of the elderly-myths and misconceptions regarding the elderly, the need to change public perception and ways to do it, appropriate age norms for the aged, suggestions for successful ageing, special entitlements, opinions

on Old Age Homes etc. Further, an ageing quiz (Miller and Dodder, 1980) was conducted to test their knowledge of ageing and check for influence of negative stereotypes on their perceptions of aged and ageing.

The factors cited to describe **transition** to old age include ill health, mental deterioration, dependence, restricted social mobility, loss of spouse, retirement, less social contacts, general functional disability, lack of general interest in anything and frequent desire to rest/sleep, grand parenthood, mental problems viz., settlement of children, children and wife describing as “bekaar”(worthless). Chronologically 50, 55, 60 years were described as the years that mark the beginning of the ageing process. However, deterioration of physical and mental health dominates the description of transition to old age.

Findings

The **response** to ageing included acceptance, denial, avoidance and reform. However, these responses varied with different aspects and also with age, gender, personality amongst other things. Most respondents accepted they were old. A 95 year old respondent stated that 'at his age one can be nothing else but old.' A 85 year old responded that there was no question of consideration of old age, it was a graceful acceptance. One described himself as physically aged but not mentally (a very good example of separation of illness and image of age). Another opined in a similar vein that consideration of being old is “all in the mind”, further, as he was not dependent he was not aged! However, his wife, though younger, being dependent due to her ill health was old! It appears the young old (60-70) may or may not consider themselves and others of their age as old depending on subjective factors. While acceptance of ageing was greater after 70 years of age.

In response to change in personality most of the elderly emphasized their physical **personality** (aspects such as being physically less active, dependent and diagnosed with mental diseases that come with old age). At the psychological level most believed, they were compelled to change their personality. Being confined to home and having fewer visitors, results in progressive social isolation. Further, it was difficult to communicate as they could not hear properly and also they could not speak clearly because of ageing. Change in personality was inevitable

due to the other changes that happened with ageing. As a result of change in role and status, one learns not to interfere and to submit to domination by children and daughter in laws and at times even to grand children. If they desire to live with their sons they have to adjust and be more compromising. Fewer still believed that personality does not change with old age if one has economic independence, good health, family support and god's grace. Very few believed that personality changes at every age of life and so also at old age.

The response to changes in **life style** appears to be predominantly negative. Ageing seems to have disrupted “normalcy” for most of the aged. The changes that it brings are more detrimental than progressive. Changes have to be made in every aspect right from what one eats. Social disengagement is either forced or voluntary-One is forced to stay home and there are fewer visitors. Personality had to be changed to accept present trends and behaviors. One heart-rending response was “every minute haunts you from the first cup of tea”. The time at their disposal increased when they had nothing to do!! This was leisure for the young but for them it was being idle. Some respondents believed that when one is loved it is not difficult to make adjustments and compromises.

Do old people tend to become more **religious** with age? For some who were religious, old age provides greater time for worship. For others, the sufferings of ageing made them religious and that helped them in dealing with ageing better. For some the temple was a place of regular visit, not for worship but as a meeting place for socializing and entertainment.

The **best part of ageing** was leisure, more time for oneself and family, having fun with grand children. The **worst part of ageing** was dependence, helplessness and the physical deterioration. Having no cultural integrity, no financial security and having bad social relationships. Forced leisure and circumscribed life. Not getting the food that one desires to eat. It was difficult to bear the hitting of grandchildren if they were close to the grand parents. They were asked not to interfere in children's up bringing. One respondent said - it was hell to loose a progeny. Loosing friends and relatives was also very painful and curbed their desire to live. While some readily accepted the fear of death,

some said they believed death was better for it would relieve them of this misery.

The three often cited factors for **ageing well** includes, Economic independence, some one to love and to be loved and good memories. Economic independence and planning for old age were considered pivotal for freedom and dignity in old age. Having some one who cares and someone to love gives a sense of belonging and was reported as very important for the mental well being of the aged. Further, taking responsibility for some one added a sense of worth to their living. Evidently one's past and memories were significant in determining well-being of the aged. Further, The realization and acceptance that ageing is natural and inevitable helped in adjusting well.

Ill health was considered the major factor that led to **ageing poorly**. Loss of memory worsened things. Economic dependence was considered restricting, in all aspects of living, directly or indirectly, including how children treated the aged. Not having anyone who cared and knowing nobody will be there in need, makes him or her feel insecure and unwanted. Estrangement with children only added to the woes. It made them feel that they had wasted all their life in bringing up ungrateful children.

Society forgets you and one is made to feel like a second-class citizen. Society becomes distant. The aged become more dependent on family and the more they depend on it the more helpless they feel. They are made to feel worthless, unwanted and alienated. **Family** starts treating them as a burden, they feel betrayed by their children for whom they had toiled all their life and sacrificed so much including their youth. Grand children whose responsibility they had taken and played an important role in their upbringing after growing up treat them like dirt. Their well-intentioned advices are treated as interference. They do not have the freedom to do anything. Even watching television depends on the mercy of the grand children. They are often told what to do and what not to do. They have to tag along and are voice less. They have to make compromises on everything : food, living space, movement, entertainment. Children feel that having the elderly in the house is an unwanted disturbance in their private life. They are compelled to stay at home in spite of all this because of the insecurity that comes with being easy targets of victimization, exploitations, intimidation and crime.

A difficult adjustment that had to be made was learning to live with the death of spouse with whom one had spent a long time. Family separates and social importance reduces. One respondent was happy that his wards took greater care of him because he was old. Another was unhappy that he had to move from one home to another every 6 months, being ill-treated by daughter in laws and having to bear his wife being abused by them. Further, he was made to do household chores and baby sit children, it was like bonded labor.

Most of the aged were hesitant to talk on **ageist attitudes and abuse**, while; they always had an incident of abuse to narrate. Most believed that financial position and culture in which one lived significantly influenced the attitudes. Some felt lucky they did not have to face it. Some took solace thinking that some other aged had more miserable lives with abuse. The abuse at home upset them more than the one from strangers. At home it was so subtle it could not be stated as abuse but it was. Abuse often took the form of over working them, denying them their basic needs and hurting their dignity. One 85-year-old respondent said he was made to make his own coffee, wash his clothes. While he lived with his son and daughter in law he did not dine with them and had to eat what was left, alone. This abuse he felt was worse than verbal abuse. Some felt that their helplessness was exploited. They were forced to exist without a voice and freedom, and their dignity was denied. They were deprived of any autonomy.

In some cases there was no abuse, but there was silence and distance, which the elderly said, was very difficult to deal with. And in some cases it was regular abuse at home. They felt that when the aged were financially independent they got better treatment. Some believed that in general people gave respect to the aged but that was on the decline.

According to most of the respondents **people's perception** of the aged was predominantly negative. The younger generation believed that the aged are always nagging and they become obstinate. The younger generation starts to stereotype the aged and believe that what ever the aged person is doing or thinking is because of old age. There is no differentiation between age and person : being aged it appears determines the personality and there is no room for differences. To

bring about changes in these perceptions the aged felt that it was essential that sensitivity to the aged should be inculcated in upbringing. Treatment of the elderly being a cultural factor, upbringing and the family background of the person determine his response to the aged. People should be made aware that the aged become helpless with age. A little love and caring will bring about a lot of change in their lives. One respondent believed that it was more of a family affair and if family values were restored ageing will become a natural development.

Moderation, understanding and tolerance have been cited as the **appropriate age norms for the aged**. Keep oneself busy, share things with grandchildren who are closer and are more compromising and try to get along with everyone.

Planning for financial security, insurance and bringing up wards in a way that they are sensitive to the aged will help in successful ageing. It is all the more important now in these rapidly changing times, that children be taught to respect their parents and be trained to care for their parents in the future. Further some respondents believed that, for a peaceful aged life one has to be in content with what one has and believe in divinity.

With regard to the **special entitlements** the aged believed that they should have free medical treatment and those who did not have financial security should be given a monthly allowance. Health care should be geared to the specific needs of the aged and they should be given more concessions. They believed that Old Age Homes are some solace for the invalid aged, however only if they are managed well. Plus living with same age group people having same problems will help them relate to someone. However, it can get boring so they should plan visits of youngsters and have activities planned for the aged so that they do not become bored.

The ageing quiz indicated a significant influence of the social image on self-image of the aged. The societal perceptions and expectations seem to determine the way the aged person responds to ageing. Further, the age norms perceived by the aged are supportive of the societal perceptions, while, being inimical to their own welfare!!

CONCLUSION

Evidently there is a need to counteract ageism to enhance the quality of living of the aged, to understand ageism it becomes pertinent that we begin by understanding the stereotypes and put in our best efforts to abandon the negative stereotypes. A step in that direction would be to make social content elder friendly and sensitive. Systems perpetuating ageism have to be identified and appropriate measures to eradicate such attitudes should be undertaken. The fundamental approach is to minimize individual ageist attitudes. Thus identification of such attitudes becomes essential. Social action and reform will go a long way in negating ageism.

Cultural stereotypes should be encountered with awareness. The major source of creation and perpetuation of such attitudes and stereotypes is lack of information; the role of media cannot be overstated here. Intergenerational programs such as "granny tales", where the aged share their stories with children will not only be educative and fun for children but also keep the aged busy, happy and satisfied. Further, it will help in bridging the gap between the aged and children and in making them learn to love and respect the aged. There is an imminent need for sensitization to aged and ageing. As a part of formal instruction, children should be inculcated with respect for and understanding of aged. Youth should be made to realize that they would be old one day. They should be encouraged to plan for ageing with dignity and independence. Elderly groups should be encouraged to form and function. They should volunteer for elderly welfare and form Watchdog committees for monitoring policy and lobbying for their interests. Ageing successfully relates to defying stereotypes and living long and happy lives. Multi generational groups should also be formed to monitor attitudes; media images of aged, to ensure that aged are not exploited in the name of welfare. "Ageing fairs", ageing "stars", older women groups and such similar innovative means, will help in keeping the aged busy and at the same time create awareness to negate stereotypes about the aged.

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Stereotypes of Ageing among School Students

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ABSTRACT

Ageism is discrimination and prejudice towards elderly people. In this study 100 students of tenth standard belonging to middle class families were administered a Hindi translation of Helpage questionnaire to find out their prejudices towards elderly people. It was found out that majority of students have medium level of prejudices towards elderly people. Difference in the prejudices towards elderly between male and female students of present sample was found. On the whole the findings are suggestive to the prevalence of negative as well as positive stereotypes at moderate level amongst the young school students. The study suggests that at school level intervention is needed to impart correct information about the aged and the need of their care within the family system.

Key words : Ageism, School going students, Old people, Intervention

Human cognition is characterized by its capacity of categorization. Whatever is perceived is labeled in certain category pre-existed in the form of a cognitive schema which, is formed as a product of earlier learning. This categorization often leads to develop a number of stereotypes which guide our thinking, perceptions and actions towards the objects and human beings. Stereotypes are based on false generalizations of group characteristics to the individual level, which we share as members of social group. Once we label an individual belonging to certain category (e.g. caste, class, race, age) we are prone to attribute all those group characteristics to the individual member

which may or may not be existing with the person. In this paper we are concerned with the stereotypes about the aged persons which are, in general false, but considered by perceivers as 'true'.

In recent years gerontologists have coined a term "ageism" to refer the discrimination based on chronological age (Butler & Lewis, 1969). Ageism is a process of systematic stereotyping against the old people held not only by the younger and middle aged persons but also internalized by the older persons themselves. As stereotypes are formed on the basis of social interaction to simplify our perceptions and opinions about others, it becomes difficult to change them. However change is needed to present the correct images of the person(s) belonging to other category. For example, stereotypes about the aged present highly negative images of the aged persons as senile, suffer from memory loss, impotent, mentally declined, look ugly, sick and disabled, rigid and authoritarians etc. Such stereotypes lead to prejudices and discrimination (Palmore, 1990). Stereotypes about aged are not only held by younger and middle aged persons but the aged subjected to prejudice and discrimination tends to adopt the negative images and behaviours very much similar to the stereotypes about them. Thus a vicious circle is created. Many of these stereotypes about old age are misconceptions. For example, believing that impairment is an inevitable part of ageing, older people cannot contribute to the household, workplace or community and so on and so forth. On the contrary in the present era better medical care has made persons above 60 years of age the fastest growing section of the society. The National policy recognizes that 60+ age group as a huge untapped resource. Their abilities should be boosted to enable them to have a healthy and cheerful life.

Several studies on ageism (e.g., Allen *et al.*, 1980; Boone, 1985, Butler, 1969; Butler and Lewis, 1982; Sharma, 2002) have documented the prevalence of stereotypes about aged in developing and developed countries. Several social processes, such as communication, negotiation, advertisement, movies, are involved in constructing and maintaining ageist attitudes. For example, commercial advertisements on anti-ageing drugs, availability of housing complex for aged and life insurances etc. depict older people in stereotypical ways. Indian religions and philosophical schools have characterized old age as the time for disengagement from the family and society to pursue spiritual goals which indirectly support the ageism by suggesting a secluded life style

different from the active members of the society. These socio-cultural processes create a set of expectations concerning the desirable behaviours of the aged.

Ageism has several consequences for elderly persons, particularly, for their behaviours in the society and family. In a study (Palmore, 1990) four common behaviours were noted in the aged in response to the stereotypes held by the society. These include acceptance, denial, avoidance and reform. Such responses may result in depression and its attendant's physiological consequences. Government policy for the retirement of employees on reaching at certain age may contribute to prevailing ageism in the sense that one is declared as not fit for the job any more. For many aged persons retirement brings depression due to reduced income and engagement. For many of them retirement brings idleness and boredom as they start believing that in old age every thing turnout badly and failure is to be expected. In fact retirement should be linked with the physical fitness rather than age. Retirement may be considered marginalization and stigmatization of elderly people due to society's misconceptions, intolerance and lack of awareness.

A number of controversies exist in the literature on ageism. For example, some thinks that ageism is not a cross-cultural phenomenon as in primitive societies it does not exist. Others think that it is universal and the differences are due to different methodology used in the studies (Sharma, 2002). India has had a long tradition of reverence to the older people and the younger generation feel obligation to have the blessings and guidance of the older persons. However, due to increasing trend of free market economy and its attendant consequences on the life styles of younger generation ageism is likely to be enhanced in India. Another important contributor to ageism seems to be increasing population of the older people (as per the 2001 census 7.7% of the total Indian population is of the people 60 plus years) and high rise pricing trend. In the present circumstances the older persons are vulnerable to abuse, neglect and exploitation (Datta, 2006).

The present study intends to explore the prevailing stereotypes among the high school students towards aged persons, for it is relatively easier to correct the negative stereotypes at this developing age before the stereotypes become deeply rooted. In the context of co-education it is expected that both the male and female students will have somewhat similar stereotypes.

METHOD

The Help Age Questionnaire taken from Gastron *et al.* (2001) was translated in Hindi and back translated in English to assure the accuracy of the Hindi translation. The questionnaire has 15 items comprising nine items as erroneous (*ageist*) and six items as correct. The respondents must mark the items, according to their own criteria, which they consider to be true and which false. The scoring of the items involved two criteria: Quantity and Quality. Quantity can be judged by the number of errors committed in marking the items which, indicates the level of lack of knowledge and prejudice about ageing. The Quality can be assessed by combining different correct and incorrect responses.

Sample - One hundred students equally drawn from the 10th standard of a school located in a neighbourhood of lower middle class families at Bhopal (Madhya Pradesh, India) whose age ranged from 14-16 years served as participants in this study.

The questionnaire was administered in the class rooms instructing the students about the aim of the study to know their opinions described in the items. They were told to mark each item as true or false as per their opinions.

Procedure - Following Gastron *et al.* (2001) the coding of each item as correct /incorrect was established. A table of the sum of lack of knowledge or prejudice was constructed. Subsequently, incorrect responses were grouped together to determine the level of prejudices: High, Medium, Low and no prejudice (criteria 1).

Responses were also categorized in the following dimensions to evaluate the prejudices as per criteria 2.

Dimension 1 : Sexless - adding the responses on items 9 & 10

Dimension 2 : Uselessness - adding the responses on items 1 & 15

Dimension 3 : Homogenisation by age - adding the responses on items 12 & 13

Dimension 4 : Normal decline neglect - adding the responses on items 2, 7 & 11

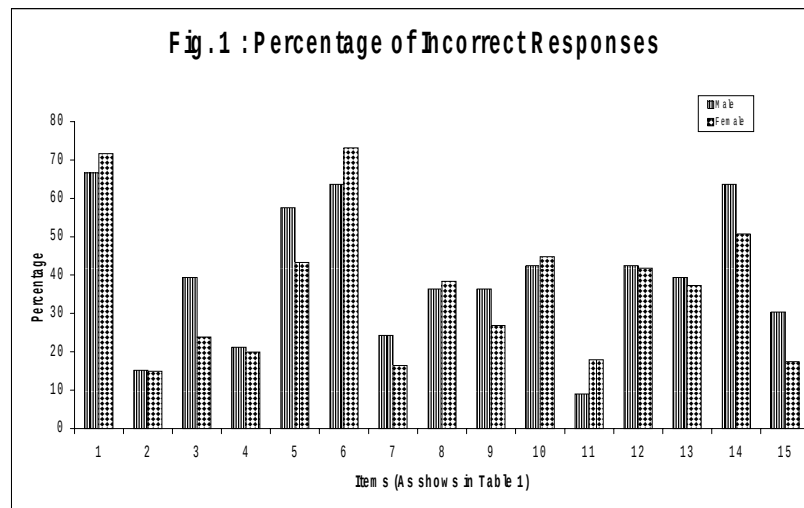
Dimension 5 : Ineffectiveness and lack of performance - adding the responses on items 6 & 8

RESULTS

The incorrect responses were counted for each item and the percentages of the participants were calculated for each incorrect response. The data are shown in Table 1.

Table 1 : Percentage of Incorrect Responses

Item (F= false T= True)	Male	Female
1. (F) The majority of the elders are senile	66.66	71.64
2. (T) All five senses tend to decline with age	15.16	14.93
3. (F) The height of a person tend to decrease with age	39.39	23.88
4. (T) Older adults have more chronic illnesses that limit their activities than younger persons.	21.21	19.95
5. (F) Older people have more damages in the home than younger persons	57.57	43.28
6. (F) The majority of older workers cannot work as effectively as younger workers	63.63	73.13
7. (T) Usually it may take somewhat longer to learn something in old age	24.25	16.42
8. (T) The majority of the elders are healthy enough to carry out their normal activities	36.36	38.41
9. (F) The life expectancy of women is about the same as of men	36.36	26.86
10. (F) Older widows are likely about the same as older widowers.	42.42	44.77
11. (T) Reaction time in the majority of the elders tends to slowdown in comparison of the reaction time in the majority of younger persons.	09.00	17.92
12. (F) Usually the majority of the aged resemble each other.	42.42	41.79
13. (F) Healthy elderly naturally withdraw from participation in community life.	39.39	37.31
14. (F) The majority of the elders are more rich than younger persons.	63.63	50.74
15. (T) The majority of the elders have any job or want to work.	30.31	17.42



It is clear from the Table 1 that percentages of incorrect responses on item 1, 4, 6, 7 and 14 are in high proportion showing that majority of the older persons are incorrectly perceived as senile, lesser effective workers, and rich than younger persons. These stereotypes are shared by both male and female students. The percentage of female students is greater than male students for these stereotypes. On the other extreme on items 2, 11 and 15 female respondents endorsed more correct responses than incorrect. Similarly male students also showed correct responses on the items 2, 4, 7, 11 and 15 however, in comparison to female students more erroneous responses were obtained on the item 15 for male students. Thus aged are correctly perceived for having all the five senses tend to decline with age, older adults have more chronic illness that limits their activities than younger persons, they take longer time to learn, majority of the aged have slow reaction time, and that majority of the aged want to work or have jobs. On other items majority of the responses reflect prejudicial.

The distribution of prejudices in high, medium and low categories is shown in the Table 2. It is clear that 27.27 percent male respondents and 40.29 percent of the female respondents fall in the low level of prejudice category similarly, 45.45% of male students and 37.31%

female students show medium level of prejudices against older persons. It is interesting to note that only 27.27% of male and 22.38 percent of female students possess high level of prejudices. Overall female students expressed less prejudices than male students.

Table 2 Level of Total Prejudice

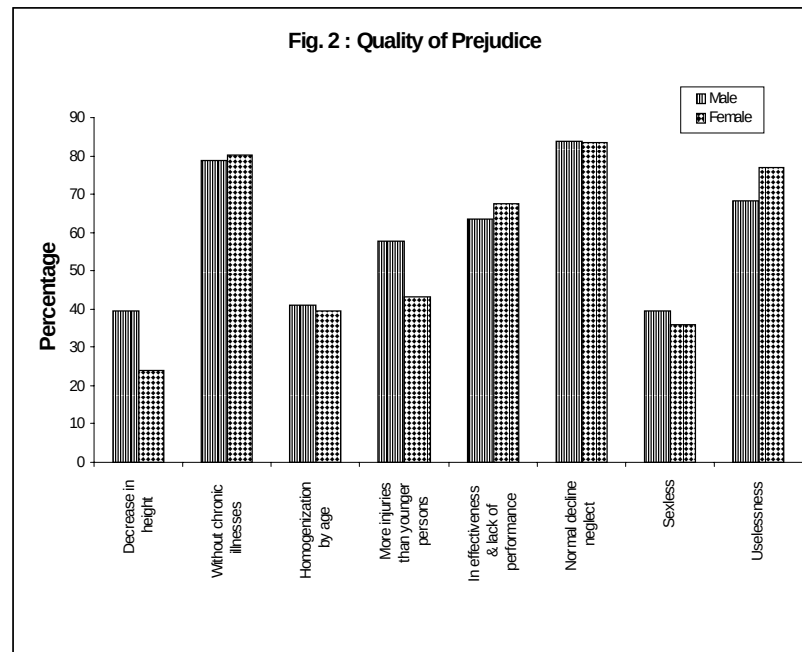
Level of Prejudice	Male%	Female %
High	27.27	40.29
Medium	45.45	37.31
Low	27.28	22.30

To assess the quality of the prejudice further analysis was conducted considering the incorrect and correct items. The results are shown in the Table 3.

Table 3 Quality of Total Prejudice

Type of Prejudice	Male %	Female%
Decrease in height	39.39	23.88
Without chronic illnesses	78.78	80.05
Homogenization by age	40.90	39.55
More injuries than younger persons	57.57	43.28
In effectiveness & lack of performance	63.63	67.36
Normal decline neglect	83.83	83.57
Sexless	39.39	35.81
Uselessness	68.17	76.86

1. Item 3 marks reference to a person's height. More than one third of the respondents endorse the prejudice that the height of a person tend to decrease with age. In fact decrease in height is not a question of age in itself but a result of certain pathology like osteoporosis.
2. Item 4 deals with chronic illnesses in older persons which, is a fact, however, near about 80% of the respondents denied this showing a positive prejudice.
3. This type of prejudice is derived from the combination of items 12 and 13 indicating that older people are very much alike and are healthy but do not participate in community life. Roughly 40% of the respondents hold this prejudice.



4. Item 5 deals with a prejudice that older people have more damages in the home than younger persons. It is a fact that older people are careful in moving than younger persons and hence have lesser possibilities of meeting accidents than younger persons.
5. This type of prejudice is obtained by combining item 6 and 8. The former refers to the unproductivity of elders and later to difficulty in doing normal activities due to health problems. The prejudice is because of labor market, high unemployment, and policy of retirement among other factors.
6. This type of prejudice represents the combination of items 2, 7, and 11 indicating decline in the senses, slowness in learning and slowness of reactions in order. All these items were keyed as true but as many as 84% of male and female students responded incorrectly on these items, perhaps in order to present a positive picture of elderly and thus showed prejudice in the positive direction.
7. Items 9 and 10 make reference to the average life span for men and women and proportion of widowhood in men and women. A

sizable responses 36-40 percent were incorrect showing lack of differentiation in men and women older persons.

8. This type of prejudice is reflected on the combined responses to the items 1, and 15 showing problem of senility and participation in labor market. As many as 70-76 percent responses were in correct showing that male and female students wrongly believe that majority of the older people are senile and they do not want to work.

DISCUSSION

Ageism is discrimination and prejudices towards elderly people. Mostly negative stereotypes towards aged are noted without much differences in the male and female students selected in the present study. A recent study including the three age groups also noted not much differences in ageistic attitudes between male and female samples. The significant finding of the present study is that only a lower percentage of the students hold high level of prejudices. Majority of the students have medium level of prejudices and therefore one can expect that these prejudices can be alleviated by providing correct information regarding the characteristics of the aged population. It is also observed that majority of these students have regards for their elderly family members and therefore if stereotypes are corrected at this stage during schooling, the goal of utilizing the wisdom of the aged as a rich human resource for the enrichment of the society and the betterment of the aged population can be achieved. In a recent study (Jamuna and Ramamurti, 2007) it is noted that the degree of prejudices towards aged are more in the younger adults as compared to the middle aged and old, thus it is reiterated that at the school level intervention is needed to impart correct information about the aged and the need of their care within the family system. The results of the present study must be taken with caution because of the small size of sample drawn from a particular school mostly serving the educational needs of lower middle class students. Nonetheless, the findings are suggestive to the prevalence of negative as well as positive stereotypes at moderate level amongst the young school students.

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Spiritual Intelligence, Living Status and General Health of Senior Citizens

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ABSTRACT

Humans are not merely biological, social or psychological beings, but beings who are able to transcend these dimensions to a level of "human spirituality" by virtue of being free to create the meaning for their own lives. The current research is an attempt to understand the impact of spiritual intelligence on general health. Subject selected for the research were senior citizens of different living status i.e. living with family (n=100) and living in old age homes (n=100). Findings of the research indicate that the effect of spiritual intelligence is insignificant but living status significantly influence the general health of senior citizens.

Key words: Ageing, Spiritual intelligence (SQ), General health, Living status.

Ageing is a universal phenomenon. The improved standard of living and advanced medical care have lengthened the average human life span across the world. Even in developing countries like India, the average life span has increased from 32 years in 1951 to 62 years in 1988 and expected to cross 76 years by 2031. It is expected that by 2025 nearly 71% of the world's elderly population will live in developing countries (Gupta, 1997). India is no exception to this worldwide process of population ageing.

Modernisation, urbanization, dual career families, consumerist outlook and a growing shift towards market economy are shaking the

foundations of centuries old traditional culture that gave protection and security for the elderly in their families. (Chakravarthy, 1997, Kumar, 1996; Ramamurti, 1996). As a result, family care of the elderly is becoming more and more difficult. Also, the interactional dynamics in the family are making life for the elderly at home a hot bed. The ties of kinship have become slender and many elderly seem to seek institutionalization as a recourse to the ills of family conflict (Jamuna, 1990, 1991; Ramamurthy, 1992, 1997). Never before has there been such a demand for homes for the elderly, the demand for outweighing the supply (Ara, 1995; Banbawale, 1996). All these have made the old age homes seen more relevant in the Indian context than ever before.

According to Sastras, old age means time before death. But nobody knows when we are going to die. This is the reason, we always ask how old are you not how young are you. Every moment we are becoming old. If someone says that spiritual life has to be taken at old age. We are already old.

A truly intelligent person is not one who can simply spout words and number; it is someone who can react “intelligently” to all the opportunities, simulation and problems provided by the environment.

There are three types of intelligence that determine our inner and outer success in life i.e. IQ, EQ and SQ.

IQ usually equated with having high logical, strategic, mathematical and linguistic talents where EQ relate well with others, have high self esteem and respond appropriately to situations. SQ allows us to utilize our IQ and EQ in a unified way to express our gifts in the world in a way that betters not only our own life but also that of all beings. SQ is truly a global intelligence (Helliwell, 2001). According to Zohar and Marshall (2000) spiritual intelligence is the most essential to our well-being - SQ puts our individual life into a larger context. It provides meaning and purpose to life and allows us to create new possibilities.

Spiritual Intelligence can be defined as Pure consciousness or awareness of one's inner self (Wild, 2004). The manifestation of our spiritual intelligence is revealed in how we interact with other human beings, all living things, the universe and divine energy and God.

Features of spiritual Intelligence are - high self-awareness, a capacity to face and use suffering; a capacity to face and transcend

pain, the quality of being inspired by vision and value, a reluctance to cause unnecessary harm, a tendency to see connection between diverse things.

Successful ageing is contingent upon three elements; avoiding disease and disability, sustaining high cognitive and physical function, and engaging with life (Rowe and Kahn, 1997). As person gets older and older there are more stressors that appear and can cause extreme side effects both physically and emotionally (King, 1997). People differ not only in the life events they experience, but also in their vulnerability to them. A person's vulnerability to stress is influenced by his or her temperament, coping skills and the available social support. Spiritual intelligence can generally be associated with Psychological health, although some forms of spirituality may be dysfunctional or pathogenic (Vaughan, 1998). When spiritual beliefs foster denial and projection and contribute to fear and conflict, they can be destructive and seriously problematic.

In India religious coping is one of the most preferred coping strategies by older people. Medical research is showing that many older people are religious and depends on religion as a major way of coping with physical health problems (Koenig, 2000).

Many people think that spirituality and religion are same. Religion and spirituality exists together but as Twycross, (1988) Wrote “Everyone has a spiritual component, but not everyone is religious”. Religion includes specific beliefs and practices, where spirituality is far broader (Ebersole and Hess, 1995). It is a sense of inner balance, a deep form of spontaneity which helps us to maintain a balance with our selves, our personal and our work life.

Daaleman (2004) reported that spirituality is an important explanatory factor of subjective health status in older adults. In recent years, numerous empirical studies have supported the idea that certain spiritual beliefs and practices are positively associated with physical and mental health (Vaughan, 2002 & Mc Collough, 2001). Religious engagement are related to positive outcome in people's lives, such as good physical and mental health, happiness and marital satisfaction.

Religion and spirituality provide effective coping mechanism for patients as well as family caregivers (Weaver and Flannelly, 2004).

Spiritual coping strategies, involving relationship with self, others ultimate other/God or nature are found to help individuals to cope with their illness. Spirituality provides patients facing life threatening illness the strength, comfort, many blessings despite the suffering of the illness, and trust in a higher power to see them through the journey (Albaugh, 2003).

The objective, thus found to be substantial with regard to the present study was to know the effect of spiritual intelligence of senior citizens living with family and living in old age homes on general health.

METHOD

Sample : The subjects for the current research constitutes of 200 senior citizens (i.e. living with family and living in old age homes). Out of 200 subjects 100 senior citizens i.e. living in old age homes were taken from the various old age homes (Shree Ram Vradh Aashram, Chaksu, Jaipur, Anubhav Old Age Home, Jaipur, Shardha Vradh Aashram, Kota, Vradh Aashram, Jodhpur) who were residing there for more than one year. All old age homes selected for the study were 'free type' which care for the aged who have no one else to care. They are given shelter, food, clothing and medical care. Senior citizens living with family (n=100) were selected from the general population considering all the relevant variables. The inclusive criteria was as follows:

Age Range	:	60 years and above
Socio-Economic Status	:	Low
Education	:	Literate
Domicile	:	Urban

Physical and mental status: Senior citizens only those were included who have no protected illness and they are able to do their work themselves.

Rationale of the Sample

Spiritual growth in later life is to provide most people a sense of direction and adequate resources for coping with changes that occur with old age such as : retirement, fear of death of spouse, dependency and isolation. This traumatic situation occurs among almost all the elderly. Amongst them some older people are forced to move to old age homes

due to reasons such as migration of young couples for better employment, PICA syndrome (Parents in India and Children in Abroad), to incapability to look after themselves and resentful attitude of the youngsters. Various researches indicate that old people who are institutionalized also face various emotional and physical problems. As, spiritual intelligence is the ability to act with wisdom and compassion while maintaining inner and outer equanimity, regardless of the circumstances, therefore it was presumed that senior citizens having high spiritual intelligence would have positive attitude toward life, better adjustment and good health irrespective of their being institutionalized or non-institutionalized i.e. regardless the living status.

Tools: following tools were used:

1. Salahakar spiritual quotient test (Sqi-t)TM, developed by Daftaur (2003) for measuring spiritual intelligence. There are 15 dimensions of spiritual intelligence named: God and religiosity, Soul, Self-awareness, Spiritual practices. Life style values, Gender and caste equality, Fate and Karma, Interpersonal relations, Divinity in love, spirituality in leadership, helping behaviour, flexibility, Ability to use and overcome suffering, Ability to transcend pain and Being spiritually intelligent about death.

The test was tried twice on two different type of samples on a 4 point Likert type scale. The reliability values on the sample of adults normal population range from 0.63 to 0.91. In the second tryout on a sample of industrial managers, the reliability values range from 0.35 to 0.91. The reliability values for the total scale was found 0.91 in both attempts. Content validity was established through the inter-judges evaluation of the items of the scale.

2. Indian Adaptation of Goldberg's General Health Questionnaire by Shiv Gautam, Nijhawan and Kamal, (1987). The original 60 items questionnaires is in English. It was translated in Hindi. It is a 4 point rating scale. Reliability of the questionnaire by the split-half method was tested using the scores of the first 30 items and last 30 items by Pearson product moment correlation. The correlation was found ranged from 0.73 to 0.78 indicating that the instrument is highly reliable.

Design : 2x2 factorial design (Living status: living with family and living in old age homes and Spiritual intelligence; high and low based on median scores of spiritual quotient test) was employed and accordingly four groups formed. Results were analyzed through multiple ANOVA.

Procedure : As the subjects under study consisted of the people of 60 years of age and above, it was not possible to contact them in formal setting, so, the subjects were contacted in various setups like-homes, places of satsangs, old age homes, kitty parties etc. The subjects were contacted individually and after the data collection scoring was done by the help of instructions given in the related manuals.

The data thus derived was put to analysis by using ANOVA.

RESULTS AND DISCUSSION

Main effects: Spiritual intelligence, living status and general health.

Table 1 reveals that the independent effect of spiritual intelligence did not exert any significant influence on the general health of senior citizens. Only the living status turn out to be significant on general health. The mean scores of senior citizens living with family and senior citizens living in old age homes are ($x=6.65$ and $x = 4.10$) respectively. This mean difference is significant at 0.01 level (F ratio = 7.362) indicating the senior citizens living in old age homes exhibit poor general health than the counter parts. Furthermore the interaction of spiritual intelligence and living status was not found significant.

Table 1 : Analysis of variance for general health

Source	SS	df	MS	F	Significance of F
SQ	42.284	1	42.284	1.041	NS
Living status	298.964	1	298.964	7.362	0.01**
Interaction	40.456	1	40.456	0.996	NS
Residual	7959.010	196	40.607		
Total	8366.875	199	42.045		

** Significant at level 0.01. NS: Not Significant

Table 2 : Summary of ANOVA

	Factor combination	Level 1	Level 2
A	High SQ and low SQ	4.79	5.96
B	Living Status (living with family and living in old age homes)	6.65	4.10
AB			
	B ₁	5.64	7.47
	B ₂	4.09	4.11

Social support has important implication for the well being and welfare of the aged. In this regard the aged in India had been fortunate in the sense that aged person hold a prestigious position in the family and society. But with the technological advancement and urbanisation they are feeling isolated, neglected and are left uncared at the mercy of servants. They feel their life and money is not safe. Studies (Newsom and Schulz, 1996) have shown that social support significantly effect life satisfaction, Self esteem and well being, quality of life and health of aged.

On the basis of present research it seems that spiritual intelligence is not a determining factor for general health of senior citizens but living status is remarkably affects the general health of senior citizens. It suggests that seniors citizens living with family as compared to seniors citizens living in old age homes tends to have better health because best care for an older person is possible only with in his or her own family.

Reker (1997) Reported that the institutionalized elderly were found to be significantly more depressed, had a lower sense of personal meaning, perceived less choice/ responsibilities, were less optimistic had fewer meaningful social contacts and were in poorer physical health.

Studies have reported that long term residence in an institution lead to poor physical health, feeling of fatigue and depression, lower level of adjustment and dissatisfaction with the life in elderly. Chappel (1991) strong support emerged for 'dependent elders' those characterized as living with in a married child household by both

economic and health advantage. We know, old age homes are not the solution to the problems of aged because only family can give them a sense of security, but unfortunately that is not the reality of the present day scenario, so we must try to making old age homes as an unusual family of older people.

Although studies are not unequivocal e.g. Haight (1998), Mc Dougall (1998) reported that institutionalized aged are more depressed where as in a recent study (Yadav, Sharma and Sharma, 2000) have reported that non institutionalized aged are more depressed. More depression in the family living senior citizens might have been due to the transition in roles i.e. earlier they were the head of the family but now they are not being consulted in the major/ minor decision of the family.

Implications :

- (1) The findings of the present study imply that instead of relocating the subjects in the old age homes efforts should be made to design family or community based settings where they can live right with in their own community and with their known people.
- (2) Efforts should be made to involve elderly in the management and running of the homes to ensure their full participation which will give them a sense of fulfillment and will keep them active and healthy.

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Coping with Economic Problems in Old Age and Civil Society's Response

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ABSTRACT

Ageing is a part of our life cycle. Demographically, population is a global phenomenon and India is also not left untouched by this demographic reality. The contemporary society is differential towards the elderly due to gradual erosion of traditional values and rapid socio-economic changes. They not only suffer from health and social problems but also face the economic stringency. The findings of the present work highlights that most of them experience financial difficulty and income is most important item of deprivation in their life after withdrawing from work life. They have no significant savings or property with them. Two-thirds of them are dependent on their children for the fulfillment of their needs. This situation emotionally upset them but belief in religion help in maintaining social integrity. Seeking support from family members is most preferred strategy to cope with income inadequacy. The state has not yet developed the mechanisms to respond to the emerging ageing challenge.

Key Words: Coping, Elderly, Economic Problems, Societal response

Although the process of ageing is a universal phenomenon it has become an issue of concern, in recent years. It was there, it is there and it will remain. The demographic scenario concerning older persons has caught attention owing to the gradual and sustained increase in life expectancy. As such the number of elderly persons, both relative and

absolute are increasing all over the world and India is not an exception to this demographic reality. The advancement in medical sciences has been responsible for increase in life expectancy and decrease in mortality rates. The average life span of an individual has risen from 32 years to 65 years since 1940.

According to international demographic standards, a population is considered to be young when up to 4 per cent of people are over 65 years, mature when the proportion is in between 4 percent to 7 percent and ageing when it is higher than that (U.N. Population Prospects, 1999). If it is followed then, India has reached the third stage i.e. population is heading towards ageing. The increasing presence of older persons in the world is making people of all ages more aware that we live in a diverse and multi-generational society. It is no longer possible to ignore ageing regardless of whether one views it positively or negatively as it is appearing as a major issue in present day society.

It is to note that longevity of population does not ensure health, well-being and prosperity. One of the critical issues which influence the well-being of elderly persons is their economic status and ability to control resources. The old age is generally accompanied by a decline in economic status. A growing and difficult problem in old age is financial problem or difficulty in regard to raising material resources for day-to-day existence. Absence of regular and steady income, debts and absence of primary necessities of life are some of the frequent problems experienced by older persons. Elderly persons both in urban and rural areas feel this problem. It is quite acute in urban areas because it becomes very difficult for a retired person to find satisfying and vital substitute activities for their discontinued occupational role. As such, in the modern industrial society economic insecurity has greatly increased particularly for the retired person. In rural communities there is no set pattern of retirement and the old people continue to work as long as their physique allows them. Yet, in rural areas too, when they leave work role face the same type of problems as their urban counterparts (Randhawa, 1991).

The absence of savings and social security net compels most of the elderly to continue their work status as long as they can. The situation is truism for those whose main occupation is either agricultural oriented

(in rural areas) or are employed in unorganized sector (in urban areas). Hence, the work participation of these elderly persons continue till their physiological condition permits because of absence of any social insurance available to them. The elderly who have no savings or pensionary benefits have to depend on their sons, daughters or near relations for their livelihood. The situation is worse for women whose primary role is within the household and the family.

The problems and worries of old age are multidimensional and require concerted attention for protection from undeserved want. It means that for minimizing the problems of aged, State initiative is required but more important is the initiative of the person concerned. The needs and problems of older people are different from problems of the other age groups but they are also equipped with inherent competencies to manage them. It may be noted that elderly person is not exactly a liability to the family and community. Instead they are capable to cope with problems that affect them. The process of managing this state of affairs is known as coping.

Coping is an inbuilt, automatic response to overcome difficult situation and coping strategies are things that people do in response to specific stressor occurring in the specific concept (Soneja, 1997). The aged evolve strategies of personal adjustment, which enable them to avoid emotionally disturbing situations. Thus, coping is significant strategy or way that enables the older persons to appraise their situation, assess needed skills and face critical radically distinct life tasks. Coping is required for maintaining the homeostasis of the body and mind. Events and circumstances of emotional nature may lead to the breakdown of the individual and can have shattering effect if they are not handled. It is more important for the aged whose material, physical and psychological reserves are on declining trends. So, coping is helpful for maintaining balance, integrity thereby preventing the functional ineffectiveness i.e. enables adjustment to new situations.

Carson (2003) conceptualized three interaction levels of coping helpful in overcoming problematic phases of life:

- (1) On a biological level, there are immunological defenses and damage repair mechanisms.
- (2) On a psychological and interpersonal level, there are learned coping patterns, self-defenses and support from the family and friends.
- (3) On a socio-cultural level, there are group resources such as religion.

Besides this, social support has been viewed as an important coping resource (Sarason and Sarason, 2002). Social support network includes people on whom we can rely, people who let us know that they care about, value and love us. Friends, peers, neighbours, family members, spouses constitute a social network and people of all age groups irrespective of sex or class to which they belong establish and maintain their social support networks. The social support network is extremely important for old people because their social support play an important role in coping. It acts as a buffer against the upsets of living in a complex world.

The present study analyzed the economic situation of the elderly in the context of changing socio-economic scenario and the response of society towards minimizing the problems due to financial stringency. The broad **objectives** are:

1. To examine the economic condition of the elderly;
2. To explore the coping strategies adopted by the elderly to manage financial problems and
3. To understand the societal responses for addressing issues of financial problems in old age

METHOD

The study is exploratory in nature so, the exploratory research design has been used to collect information.

Sample : The sample comprised of 300 elderly of the age 60 years and above from the NCT of Delhi from low socio-economic strata. The sample was selected using simple random sampling technique.

Tool : The structured interview schedule was used to elicit information covering different dimensions on family background, economic condition and coping strategies adopted to manage the situation of financial crises.

FINDINGS

Personal Profile

The beginning of ageing process marks a new phase in the life of an individual. It is usually related with numerous physical, economic, familial, sociological and psychological changes. The effect of age varies

from person to person depending on their state of health, hereditary characteristics, socio-economic and educational background and attitude towards life.

Age distribution

The chronological age is generally considered as an important indicator, because on its basis societies make assumptions about the roles, responsibilities and opportunities that are assigned or denied to its members. The chronological age influences not only the status and position but also has an important bearing on the physical strength and efficiency of an individual. While looking into the age distribution of the elderly covered for the present study, the age of the respondents ranges between 60 years to 90 years. Mean age of the respondents was 68 years and the mode was 65 years. This brings forth that the highest concentration of the elderly is in the 'young-old' age category (60-70 years).

Marital Status

Marriage is essential for emotional and social health of men and women. It plays a crucial role in the life of any person and the need for spouse is more spelt in old age. Marital status of respondents indicated that majority of the elderly were married (48.3 percent), 34.7 percent elderly females as widows while the widowers were less than a half of the widows (14.7 percent). Only 1.7 percent of the elderly were those who had never married and male respondents belonged to this category while female elderly (0.7 percent) had marital status of divorcee. The findings corroborates the results of earlier studies and Census findings that the proportion of widows of higher than those of widowers.

Educational Status

Education in the present day context is perhaps the single most important means for individuals to improve personal endowments, build capacity level, overcome constraints and in the process, enlarge their available set of opportunities and choices for a sustained well being. The educational status of the studied sample is very low.

Table 1
Educational status of respondents

Educational Status	Sex		Total
	Male	Female	
Illiterate	68	118	186
Literate	60	23	83
Primary	11	6	17
Middle	8	1	9
High School	-	2	2
Graduate	3	-	3
Total	150	150	300

It is discouraging to know that most of the elderly (62 percent) were illiterate, 27.7 percent has no formalised education or were simply literates, 5.7 percent has education upto primary level, 3 percent upto middle school and 0.7 percent upto higher secondary level. Only 1.0 percent had done graduation. Poor educational standard indicate dark shades of development and darker is for women who lag behind in overall educational standard and take lead in illiteracy.

Family structure

Family is the basic and universal social structure of human society. It fulfils needs and performs functions of procreation and recreation. The type of family in which the elderly resides determines the kind of care and support they can get. Two types of family set ups were identified viz joint family and nuclear family. In joint family system, respondents were living with their married sons or daughters and 41.7 percent respondents were living in this type of family structure. On the contrary, nuclear family structure comprised of the elderly couple along with their unmarried children staying with them. In nuclear family set up more than a half of the elderly (58.3 percent) were found living. So, gradually the trend is towards nuclearization of family group.

Economic Condition

It is often asserted that elderly persons with adequate financial resources are able to maintain their status in the family and the society

as well (Kumar, 1991). The life is quite tough for those, who do not have proper means of income, which in turn affects their social status and health as well. The economic status is influenced by the occupation, income and savings of an individual that are as follows:

Occupational Status

Occupation of an individual has a definite influence on his personality and life-style. The participation of the elderly in any economically gainful work reduces the chances of dependency. More than two-thirds of them (68 percent) were not involved in any kind of economic activity. Among the non-workers, were mainly women (N=118, 78.3 percent). A look at occupational pattern of the respondent's highlight that the predominance was of self-employed persons (14.3 percent) followed by daily wagedworkers (11.3 percent) mostly in unorganised sector. Only 4.3 percent were engaged in service sector and another 2.0 percent elderly were doing some small-scale business. Overall only, 32 percent of total elderly both men (N=64, 42.2 percent) and women (N=32, 21.3 percent) are found to be economically active.

Table 2
Occupation of respondents

Occupation	Sex		Total	%
	Male	Female		
Self employment	35	8	43	14.3
Salary	9	4	13	4.3
Wage	14	20	34	11.3
Business	6	-	6	2.0
NA/DK	86	118	204	68.0
Total	150	150	300	100.0

Thus, most of the elderly have to rely on other sources for meeting their primary and secondary needs.

Income and Saving

Income or stable sources of income are important for everybody. In this regard senior citizens are no exception. Income is required to meet basic and other needs and on it depend the quality of life. In the

present study, out of 300 elderly only 145 elderly persons had some source of income while 155 were living as dependents. Those who were earning their income varied from Rs.300 to Rs.8000 and the average income of respondents was found to be Rs.888 that is very low in comparison to the current inflationary trends.

It is observed that 51.7 percent elderly were without any source of income i.e. more than half the respondents were living as dependents. Others who had source of income were very less. 17 percent elderly were earning upto Rs 1000. 21.3 percent earned upto Rs 2000, 5 percent had income of Rs.3000, 1.7 percent had income of Rs.4000 and 3.3 percent earned Rs. more than 4000 but less than Rs.8000 per month.

Table 3
Income of respondents

	Income per month (In Rs)	No of the Elderly	Percentage
1.	Nil	155	51.7
2.	Upto 1000	51	17.0
3.	1001-2000	64	21.3
4.	2001-3000	15	5.0
5.	3001-4000	5	1.7
6.	Above 4000	10	3.3
	Total	300	100.0

Moving ahead, attention may be diverted to savings made by elderly persons. Saving or thrift may mean that at the time of need, the elderly can rely on it. The savings could have been made from their income, when they were economically active or productive. The information on this aspect is provided by even less than a half of the respondents. Among those who have been able to maintain some savings from their earnings figured to be 9.7 percent while 36.3 percent told that they have not been able to do any saving from their meagre income. While only 2.7 percent could possibly make out some savings but occasionally. Only one elderly out of ten has been able to save for a rainy day.

Of this small proportion of the elderly who have some savings in their name are mostly males only. Low level of savings could be attributed to the fact that most of the respondents have been engaged

in self-employment or daily wages outside the realm of organized sector. Again, women have not been gainfully employed at any period of their life. This may forced them to live hand to mouth leaving them with no money to save for future life.

Economic Dependency

The occupational status of major proportion of the studied sample comprised of non-workers and those who were not involved in earning process have to rely on alternative source of income. These substitute ways of supplementing monetary needs are varied in nature. Pension as an alternative source of income was available to 5 percent of respondents, 2.7 percent of the elderly managed their expenses from the rent they were receiving from their rented property. 6.3 percent of elderly persons were getting Old Age Pension, neighbours and friends supported 1.3 percent. For some of them it is not possible to meet their needs wholly by relying on single source only so, they have to depend on more than one source like borrowings or help by relatives, neighbours and friends. In this regard 2.3 percent of the elderly belong to this category of multiple sources. However, major proportion of the sample population i.e. 50.3 percent has to depend on their children for the fulfilment of their needs and wants. The age has direct relation with the economic dependency as the advance in age increases the chances of being dependent on others specially the children, This surfaces that despite, nuclearisation of families and changing social scenario the institution of family is still at the centre stage of providing informal care to its elder members. The immediate family often looks after physical, financial and emotional needs. Society has not yet been able to evolve organised societal mechanisms for responding to the old age blues.

Coping Strategies

Since majority of the elderly were not working and were found depending on alternate sources for survival. This may unleashes problems of nutrition, health, medicare and monetary pressure on the family. As such efforts were made to find how aged copes with financial stringency.

Individual Coping with Financial Problems

After superannuation an older person is left with no choice except to adjust within the limits of whatever income he has after his retirement. The way the older people have been regulating their needs to suit their financial resources is therefore an important aspect of their total adjustment in old age. Considering this viewpoint and the economic

situation of aged, researcher looked into the ways and means adopted by the elderly for managing their expenses.

It was reported by eighty-seven percent of elderly persons that they experienced financial problems but tried to manage the situation in different ways, in order to move on the life. The different strategies put forth by them varied from interpersonal help to borrowing. About 32.3 percent respondents told that they try to keep their expenditure within their income only. To do so they curtail their needs and wants so that the situation is managed within their means only. Nearly 40 percent of the elderly mentioned that they seek the help of their children if they come across monetary difficulties and 4 percent of respondents told that they seek assistance from friends and relatives at needful time to pull on their life. Only 0.7 percent of respondents did utilization of savings of past personal earnings. It was told by 7.3 percent of elderly persons that in absence of any support from children they meet their requirements by borrowing and return back the money when they had it. It may be mentioned that among the various modes of managing income inadequacy, the most preferred is interpersonal help or seeking help of one's own children. This shows that the family is still mainstay in providing care and for need fulfilments.

Table 4**Management of Economic Problem by respondents**

Management of economic problem	Sex		Percentage
	Male	Female	
Reducing expenditures	44	53	32.3
Seeking help from Children	68	58	42.7
Seeking help from friends & relatives	7	5	4.0
Relying on savings	1	1	0.7
Borrowing	8	14	7.3
NA/DK	22	17	13.0
Total	150	150	100.0

Feelings on reducing expenditure

Older people have capacity to manage the expenses in event of income inadequacy but it definitely upsets the concerned individual as well. The transition from economic self-reliance to economic dependency is not an easy task. An individual undergoes tremendous pressure on account of reducing expenditure or seeking help from children to whom they were once the provider whereas some may adapt to the new situation with ease. 22.6 percent elderly reported that they feel helpless or unable to do anything at such circumstances. They are unable to satisfy even the most basic needs of life for which have to depend on their children. For 20.7 percent respondent's satisfaction or peace of mind was attainable by accepting the idea that it is the fate that cannot be changed. They have received goods in life as per their destiny. 37.7 percent of elderly told that involvement in religious activities and belief in God gives them solace and comfort on account of economic crisis. Thus, the religion is considered as an important instrument for the individual to console with emotionally distressful life situations. It helps to overcome or to transcend suffering, reduce anxiety and pain distress. 6.0 percent respondents had optimistic belief that their situation may improve someday. 13 percent respondents did not reported on the matter.

Table 5**Emotional responses to income inadequacy by respondents**

Emotional responses to income inadequacy	Sex		Percentage
	Male	Female	
Destiny	22	40	20.7
Belief in god	60	53	37.7
Things may improve	12	6	6.0
Helplessness	34	34	22.6
NA/DK	22	17	13.0
Total	150	150	100

The analysis of economic adjustment of the aged brings out that economic hardships are natural due to their low incomes and poor economic status during working life. The elderly employs different

strategies both positive (destiny, religion and hope) and negative (helplessness) in shade but religion seems to play prominent role in maintaining social integrity and keeping oneself engaged in socially acceptable activities.

Conclusion

Ageing of population is a global phenomenon and India is also not left untouched by this demographic reality. Longevity accompanies old age miseries. The condition of older people is grim as far as their economic status is concerned. The state is also not responding to the emerging challenge. At their personal level, they resort to various coping strategies to manage the situation and the social support is still the major coping resource available to the aged as reflected by the findings whereas the responses from the government are lukewarm.

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The Position of the Indian Elderly: A Socio-Historical Perspective

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ABSTRACT

In this paper an attempt has been made to track the changes in the status of the Indian elderly in a historical perspective. It is found that the high status of the Indian elderly has been quite continuous in different periods of history on the basis of information available on the role and status of the Indian elderly. Moreover, it is argued that the position of the Indian elderly during the contemporary period is similar to the position of the British and American elderly of the nineteenth and early parts of the twentieth century where they underwent similar transformations due to the onset of industrialisation, urbanisation and changes in the family pattern.

Key Words: Status, Elderly, History, India

It has been argued by many scholars (D'Souza 1982, Gangrade 1999, Khan 1999, Singh 1999) that the position of the elderly was very high in the pre-industrial social order. These scholars have also pointed towards a deteriorating status of the elderly in contemporary India. They are of the opinion that the status of the elderly in contemporary India has transformed drastically. But there has not been a systematic description of the role and status of the elderly in each period of Indian history.

This paper discusses the position of the Indian elderly in a historical perspective. It is found that Indian elderly enjoyed considerable power

during the ancient period and colonial period due to their control over their property and greater authority in family decision-making. Though, they did not exercise absolute control in family decision-making and there were a few instances of poor condition of the elderly during medieval period, still one can safely reaffirm that the elderly enjoyed a, somewhat, uniform status in the broader historical panorama of Indian society. But it is argued that they are going through a transitional phase in terms of their position in the post-independence India similar to that of the British and American elderly of late nineteenth century and early twentieth century.

Method

The present paper is based on secondary data. Secondary data consists of sources of data and other information collected by others and archived in some form. In order to discuss the position of the elderly in a historical context, Indian history has been divided into five broad historical epochs, namely, the ancient period, the medieval period, the Colonial period and the post-independence period. The role and status of the Indian elderly in each of these periods has been analysed on the basis of their ownership of property, control over their children and the teachings of the religious texts of that time. In the process, changes have been documented in the position of the elderly in America and England during the nineteenth century and the early part of the twentieth century in order to compare and contrast with those that of the Indian elderly. There is a big gap between the end of the Vedic and the beginning of the medieval periods in my documentation of status of the elderly. This is due to the paucity of available literature.

History of the Elderly in India

The Ancient Period

In order to examine the role and status of the elderly in the ancient period, I have sub-divided this period into the Vedic period and post-Vedic period. While the Vedic period spanned from 1200 B.C. to 600 B.C., the post-Vedic period is the period between 600 B.C. and 500 A.D. The Vedic literature primarily dealt with the religious aspects of life. Still there were a few references to social relationships, legal rights, duties and economic privileges. The status and role of the elderly have

been derived from these social, economic and legal aspects of Vedic life. In the case of post-Vedic period, the position of the elderly is mainly drawn from the *sutras* and the *smritis*. The *sutras* and *smritis* discussed the religious and legal conduct of Hindus in daily life.

The position of the elderly parents, particularly fathers in the Vedic period, does not show a clear-cut trend. Many Indologists refer to the power and authority of the elderly exercised in the family. One indicator of the eldest male's power is his control over family property. One can establish from the references that the eldest male, who was also head of the family, controlled property. They had the privilege to distribute it among the children or to sell it or dispose it of for religious purposes. There are scholars, who argue that property was never family property, rather it was solely in hands of the eldest male. He could even ignore the claim of the eldest son and other offsprings altogether. At the same time, there were instances of limited authority of the eldest male over property, which points to the fact that one cannot establish the fact that eldest male had absolute control over the property (Kapadia, 1966).

The social organisation of the Aryans during the Vedic period showed that the family was patriarchal in nature where the head of the family was the father, his position being superior to that of his wife. As to the relationship between parents and their grown-up children, some of the hymns of the *Rigveda* reveal that the parents had control over the children with regard to their marriage. The married sons stayed with their parents. The father still controlled the family decision-making. He also owned the family property and transferred it to his children only when he himself turned physically incapable. One can derive from these data that the elderly parents enjoyed considerable influence over their adult and married children in family matters and property ownership. Their control diminished only after their physical decline. Though there is not substantial evidence to suggest that the elderly possessed unlimited power in Vedic times, one can still argue on the basis of whatever little information is available that they exerted considerable influence in family matters.

The post-Vedic literature is replete with instances of paternal domination in the family, particularly in property matters. The *Sutra* and *Smriti* writers constantly noted the importance of the eldest male

in dealing with family property. Gautama, a *Sutra* writer, ruled that the father could divide his property during his lifetime or if his wife was past the childbearing stage. Gautama also strongly advocated that if a son forced his father to distribute the property against his wishes, he should not be invited to the *shraddha* dinner, a ritual observed after the death of any family member. This indicates that the adult children invited social sanction if they compelled their elderly parents to distribute the family property. It also suggests that in matters of property, the father had considerable control during the period of *Sutras* and *Smritis*. It was laid down by Narada, a *Smriti* writer, that sons who opposed their father could not claim his inheritance. This again corroborates the control of the eldest male in property and consequently in family affairs.

Further, *Smriti* writers such as Devala, Sankha and Likhita mentioned that a son could not claim the share during his father's lifetime unless the father wished it. They did not have any right over the property while the father was alive. The sons were dependent upon the father till he was "alive and faultless." Kautilya also supported this. The last *Smriti* writer Katyayana wrote, "If a father, during his life, divides the property he shall neither prefer any one of his sons nor exclude any one of them from a share without a sufficient cause."

In the *Dharma Sutra*, while discussing civil and criminal law, it was mentioned that in proving property ownership, if any conflict arose, then the statements made by the old men and by the guilds were to be taken into account. It can be speculated that the elderly could exert such influence because they held position of importance in the society of that period.

Though *Smriti* writers like Manu felt that absolute discretion of the eldest males in property distribution should be curbed, other writers like Yagnavalkya and Narada argued vociferously in favour of the eldest male's unquestioned authority to divide his property whichever way he liked.

Overall, during the period of the *Sutras* and *Smritis*, one gets a picture of complete control of the elderly parents in domestic and religious matters. Though not much information is available on the position of the elderly females, a few references indicate that the eldest females probably enjoyed equal if not greater status than their male

counterparts. For instance, in the *Smritis*, at some places, the mother was mentioned as more venerable than the father. Prabhu quotes one from the *Smritis*, "she is said to be thousand times more venerable than the father" (Prabhu, 1988).

The Medieval Period

In the medieval period of India, i.e., the period spanning from the eleventh century to the seventeenth century, much of the tradition of the ancient period was followed. The father continued to be the head of the family and he had control over the family property. The children remained subservient to their father and respected him. Al Beruni, a Muslim historian who belonged to the eleventh century, said that the *Brahmins* of his time emulated the four stages of life as laid down in the scriptures. According to the Hindu scriptures, old age started at the age of 50 when the adult children got married and took up the family responsibilities. Thereafter the *Brahmins* set off for the forest with or without their wives to devote themselves to spiritual pursuits. However, Al Beruni did not mention anything about the later ages of the other three divisions of Hindu society, namely, the *Khyatriyas*, the *Vaishyas* and the *Shudras*. As to the position of the widows in the medieval society, Al Beruni mentioned that their condition was precarious. He noted, "as a widow she is ill-treated as long as she lives" (Nizami, 1974). Since widow remarriage was completely stopped among the Hindus of that period, the widows had to either depend upon their kith and kin or lead a wretched life.

At the same time, there were instances of Mughal emperors and Rajput kings showering prestige and status on their mothers. "Whatever might have been the position of a woman as a girl, bride, or widow, she certainly occupied a most respectable position in society as a mother" (Chopra, 1984). This implies that the position of the elderly, particularly females, was quite high among the ruling class. The situation of the elderly among the ruled class is not known.

Another interesting point worth noting regarding the medieval period is that, though the public opinion was in favour of suicide by the old and the diseased, the *Brahmins* and *Khyatriyas* did not resort to it. At the same time, there was a particular banyan tree at the meeting point of Ganga and Jamuna rivers from where the old and the diseased

used to commit suicide by throwing themselves into the river (Nizami, 1974). This is noteworthy and two inferences from this limited information can be made. First, there was no proper care system for the old and the diseased, which might have compelled them to end their lives. Second, the aged, by jumping into the sacred river, attempted to attain salvation in line with Hindu scriptural views of salvation and rebirth. Since the information is not conclusive, I infer that the position of the old might have been precarious in the medieval period, which forced them to take such drastic steps.

The Colonial period

As far as the position of the Indian elderly during the colonial period, i.e., between 1800 and 1947 is concerned, many of the practices of the medieval period continued. The joint family system with patriarchal authority was one such tradition, which persisted, during the British period. The joint family was operating much like that of the earlier period. It was based on the supremacy of the eldest male, who was known as *karta*. He managed the joint property and the family affairs. The head of the family wielded absolute control over matters relating to health, education, training and the comfort of other members of the family.

This shows that the elderly males of the family commanded respect and power in the early part of the British period. The *grihini*, the wife of the *karta* or the mother or the grandmother, held the next important position in the family. "What the *karta* was to the whole family, the *grihini* was to the female members" (Dua, 1985). She was the final decision-maker in matters relating to female members of the family. The elderly also exerted influence on the *panchayats*, which were the main ruling bodies and arbitrators of justice in the villages. The *panchayats* settled the disputes of the different castes in the villages. The *panchayats* were constituted of elderly members of the villages. Their decision was final in every case placed before them.

The above description of society during the British period presses the point that, the status of the elderly males and females was quite high and their roles were manifold. The family pattern of the Muslims, Parsis and Christians of that period shows similarities with their Hindu counterparts. Among the Muslims, the same patriarchal system of family

existed with the master and mistress calling the shots (Dua, 1985). The elderly were held in awe and reverence. A similar high status was held by the Parsi and Christian elderly in their respective families. In eighteenth century Indian society, the patriarchal structure of the family prevailed, which in turn proves the dominating position of the elderly during the British period (Raghuvanshi, 1969).

At this juncture, I would like to discuss the position of the English and American elderly during the nineteenth century and the early parts of the twentieth century. In England during this period, the new economy started altering the life of the elderly in a considerable way. The employment opportunities for the elderly declined. The married children set up separate homes and slowly the aged parents with dwindling income were forced to join the households of their children. More number of better off families accommodated their dependent parents whereas the aged parents of the poor classes were left to their own due to economic hardship faced by their poor children (Thane, 2000).

The situation transformed drastically in the early part of the twentieth century. The New Survey of England conducted between 1929 and 1931 on the working class population found that two thirds of the elderly over the age of 65 stayed alone. A majority of them were women. This was mainly because of the marriage of their last child or the death of the spouse. Very few widows and widowers lived with their children, as there was a strong desire to become independent among the elderly. The employment rate was better than it was in the late nineteenth century and the pension paid by the state enabled the elderly to take care of themselves. The elderly attained further autonomy during the Second World War when the state granted more pension to the parents of the young people in military service. It did not mean that the family support and care lessened but it only relieved many young people from the financial constraint of taking care of the elderly parents.

Similarly, in America, during the nineteenth century and the early part of the twentieth century, the role and status of the elderly underwent tremendous transformation with the onset of industrialisation and urbanisation. The changing structure of the family diminished the status of the elderly parents at home. As the average period of child birth came down to nine years from seventeen years and the average number

of children per marriage declined from 7.04 in 1800 to 3.56 in 1900, an increasing number of couples saw their children getting married and setting up new homes by the time they grew older (Haber, 1983). The empty nest syndrome became a common occurrence during this period. This also meant that the elderly felt increasingly insecure about the care and support of their children. The line separating middle age and old age became distinct in this period.

Since children started to live separately in the nineteenth century, the aged couples lost one means of retaining respect and authority in the family. They had to depend upon their material assets to maintain control over the family. Urbanisation also curtailed the land holding capacity of the elderly.

The unemployment rate also affected their status adversely at the family level. Loss of income meant that they had to depend upon their children. Hence they no longer remained the heads of the family. Though the aged population was adversely affected by the socio-economic transformation, this was not the case with every old person. It was the overwhelming presence of the aged paupers in public almshouse that led to such a grim picture of the issue of the elderly.

Another factor, which changed the perception about the elderly, particularly poor elderly, was the treatment given by the charity workers and social scientists to the problem of the elderly in society. Their stand on the issue of the elderly varied markedly from the civil leaders and almshouse managers who clubbed the elderly along with the sick, handicapped, lunatics and orphans in the same category as the destitute (Haber, 1983). The alarming growth in the number of the elderly also contributed to their drawing attention from both policy makers and academicians. This aided in a fresh evaluation of the socio-economic position of the elderly.

Hence in the nineteenth century and the early parts of the twentieth century, both England and America witnessed a gradual decline in the position and power of the elderly owing to factors of industrialisation and urbanisation. In England, the lack of employment made the parents and children depend on each other, which changed during the early parts of the twentieth century, as elderly parents became more independent due to employment opportunities and pension facilities. In

America, a different perception of the charity organisations reinforced a negative image of the elderly as useless and dependent. But in the process they became a distinct group with problems peculiar to them. This helped in reconstructing old age in the twentieth century.

The Post-Independence Period

The status of the elderly in post-independence India has altered. The factors such as industrialisation, urbanisation, modernisation, secularisation, migration, change in the status of women and the increase in the elderly population has certainly changed the absolute dominance of the elderly but it has not also made the position of the elderly radically different from earlier historical phases. The elderly of the current period have definitely become more vulnerable due to the above-mentioned factors. Particularly, factors such as a tremendous growth of the elderly population and an increase in life expectancy have meant that there are more retired elderly than ever before and this particularly spells doom for those elderly who are in the informal sector. The government does not have adequate provisions for the social security of the elderly in the informal sector.

The family network of the elderly has also undergone changes owing to the processes of change but there is no substantial evidence that the elderly, in general, have adjustment problems with the family or that the elderly are not respected by their children and that their position is very low during the post-independence period.

The government of India did not recognize the social security needs of the disadvantaged elderly till recently. Though many state governments in different period of time started providing a meagre amount for the destitute elderly, there was no comprehensive policy by the central government for a long time. But the rise in the number of destitute elderly and an increase in old age homes across India in a very short period of time made the policy makers evolve social security measures for the betterment of the elderly.

One can argue that the contemporary Indian elderly are in a transitional phase similar to the important phase that the English and the American elderly went through during the nineteenth century and the early parts of the twentieth century. Apart from changes in their role and status due to the factors of rapid urbanisation, modernisation

and industrialisation, the elderly as a separate category have become distinct due to their unique problems hitherto unrecognised. This has made the policy makers pay attention to them and to formulate policies for the amelioration of the elderly.

Conclusion

Overall, the position of the Indian elderly till the colonial period reveals a somewhat continuous pattern. In the ancient period, the religious scriptures of the time invest high status in elderly parents. The elderly wielded considerable authority in this period. In the medieval period, there is a proof of the continuity of the earlier status quo, but at the same time, there are hints about the poor condition of the elderly widows and even a compulsion to commit suicide among the elderly. The early colonial period with its patriarchal family pattern gives a clear edge to elderly persons in society.

While control over the family property ensured their dominance in the family, the joint family system, based on patriarchal authority where the eldest male member was the head of the family, ensured a higher social position for the elderly. In community, village and religious affairs, the senior-most member of the family represented the family.

Again, in all these periods, the very age factor was of decisive importance in imputing honour and prestige to the elderly. Hence people enjoyed a high status because of being old. The religious scriptures supported this notion of age as a marker of respect. Religious preaching placed maximum premium on the glories of old age associated with wisdom, experience and virtues.

In the post-independence India the elderly are in a transitional phase similar to the tumultuous phase the English and the American elderly went through during the nineteenth century and early parts of the twentieth century. Apart from changes in their role and status due to the factors of rapid urbanisation, modernisation and industrialisation discussed above, the aged as a separate category have become distinct due to their unique problems hitherto unrecognised. This has made the policy makers sit up and devise strategies to address the problems of the elderly.

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