

Indian Journal of **Gerontology**

a quarterly journal devoted to research on ageing

Vol. 21, No. 1, 2007

Editor

K.L. Sharma

EDITORIAL BOARD

Biological Sciences

B.K. Patnaik

P.K. Dev

A.L. Bhatia

Clinical Medicine

S.D. Gupta

Kunal Kothari

P.C. Ranka

Social Sciences

Uday Jain

N.K. Chadha

Ishwar Modi

CONSULTING EDITORS

A.V. Everitt (Australia), Harold R. Massie (New York),

P.N. Srivastava (New Delhi), R.S. Sohal (Dallas, Texas),

A. Venkoba Rao (Madurai), Sally Newman (U.S.A.)

Girendra Pal (Jaipur), L.K. Kothari (Jaipur)

Rameshwar Sharma (Jaipur), Vinod Kumar (New Delhi)

V.S. Natarajan (Chennai), B.N. Pahan (Bhubaneswar),

Gireshwar Mishra (New Delhi), H.S. Asthana (Lucknow),

A.P. Mangla (Delhi), R.S. Bhatnagar (Jaipur),

R.R. Singh (Mumbai), Arup K. Benerjee (U.K.),

T.S. Saraswathi (Vadodara), Yogesh Atal (Gurgaon),

V.S. Baldwa (Jaipur), P. Uma Devi (Bhopal)

MANAGING EDITORS

A.K. Gautham & Vivek Sharma

Indian Journal of Gerontology

(A quarterly journal devoted to research on ageing)

ISSN : 0971-4189

SUBSCRIPTION RATES

Annual Subscription

US \$ 50.00 (Postage Extra)

UK ^ 30.00 (Postage Extra)

Rs. 300.00 Libraries in India

Financial Assistance Received from :

ICSSR, New Delhi

Printed in India at :

Aalekh Publishers

M.I. Road, Jaipur

Typeset by :

Sharma Computers, Jaipur

Phone : 2621612

CONTENTS

S.No.	Chapter	Page No.
1.	Age determination in fan-throated lizard, <i>Sitana ponticeriana</i> (Cuvier) Swapnananda Rath and Arttatrana Pal	1–8
2.	Prospective study on body mass index, stature and demispan of elderly population of Pokhara valley in Nepal Rabindranath Das, Don Fitzroy Smith and Narahari Timilsinha	9–19
3.	Study on food preferences and taste sensitivity of local elderly women residing in Baroda city and evaluation of selected food items for geriatric group Pallavi Mehta, Komal B. Chauhan and Chayanika Devi	20–29
4.	Prevalence of hyperglycemia and hyperlipidemia among the middle aged and elderly population in a University setup Vanisha Nambiar and Parul Guin	30– 43
5.	Effect of physiological problems on dietary intake of elderly Namita Jain and Meenal Phadnis	44–51
6.	Self-actualization and locus of control as a function of institutionalization and non-institutionalization in the elderly Philip O. Sijuwade	52–60
7.	Age related facial changes among rural and urban punjabi Brahmin females Maninder Kaur and G.K. Kochar	61–74
8.	Mental health status of the aged migrants B. Nagarathnamma	75–80
9.	The effect of companionship of spouse upon life satisfaction among elderly Ira Das and Archana Satsangi	81–86
10.	Recent advances on anti-aging H.L. Dhar	87–90
11.	Book-Review Uday Jain	91–93
12.	For our Readers	94-95

DECLARATION

1. Title of the Newspaper Indian Journal of Gerontology
2. Registration Number R.N. 17985/69; ISSN 0971-4189
3. Language English
4. Periodicity of its Publication Quarterly
5. Subscription Annual Subscription
US \$ 50.00
UK £30.00
Rs. 300.00 Libraries in India
Rs. 250.00 for Individuals
6. Publisher's Name Indian Gerontological Association
C-207, Manu Marg, Tilak Nagar
Jaipur - 302004
Tel. 0141-2621693
e-mail : klsvik@yahoo.com
7. Printer's name Aalekh Publishers
M.I. Road, Jaipur
8. Editor's name Dr. K.L. Sharma
Nationality : Indian
9. Typeset by Sharma Computers
Opp.Maheshwari School
Vijay Path, Tilak Nagar
Jaipur - 302004
Tel : 0141-2621612

Age determination in Fan-throated Lizard, *Sitana ponticeriana* (Cuvier)

Swapnananda Rath and Arttatrana Pal*

B.J.B. College, Bhubaneswar - 751 014

**School of Life Sciences, JNU, New Delhi - 110 067*

ABSTRACT

*The age of of *Sitana ponticeriana* collected from Balukhand - Konark sanctuary of Orissa was determined by counting 'growth rings' in the cross sections of diaphysis of the humerus and femur. In this species, the compacta pattern of long bone is well-developed in the shafts, forming the outer regions called cortex. Most of the compacta is formed of periosteal bone. The skeletochronological analysis revealed distinct pattern of periosteal 'growth rings'. While there were no growth rings in juveniles, in mature adult and older lizards, the numbers of growth rings were 1-4. On the basis of this observation it is believed that the maximum recorded *Sitana ponticeriana* in the wild is 4 years. This corresponds well with the life span recorded for other species of tropical lizards.*

Keywords : Lizard, Age-determination, Skeletochronology, Growth

A precise knowledge of the age of the individual is necessary in studies concerning growth, age at maturity, age structure in natural population and gerontology. In species capable of breeding in captivity, it is easy to know the age by keeping the birth record. But for animals which breed favorably in nature, some alternative methods have to be followed to assess the age of individual. The method of mark, release and recapture of individuals from natural population has been used successfully for some species. But the process is tedious and time consuming. On the other hand, skeletochronological technique serves as a very handy method for indirect measure of age in hard

tissue of individuals. These vertebrates being poikilothermic, experience slow metabolism in winter and rapid metabolism in summer (Patnaik, 1994). 'Growth rings' (otherwise called "annuli", lines of arrested growth LAG, Peabody, 1961; Castanet, 1982) in hard parts (scales, otoliths, vertebrae and opercular bone in fish, long bones and phalanges in amphibia and reptilia) represent a period of slow growth in winter and rapid growth in summer. Thus, growth rings, have annual occurrence and their numbers indicate the age of the individual in years.

Most of the reptiles do not breed in captivity. So the indirect methods of age determination i.e. skeletochronological techniques involving bone histology, radiography and flourochrome labeling have been utilized with great success in tortoises, turtles lizards, snakes and crocodiles (Castanet, 1994). But most of the studies have been undertaken in temperate species where there is distinct winter and summer seasons. This distinction may not be clear in all areas of tropical/subtropical region. Therefore, to test the applicability of skeletochronological technique in tropical species of reptiles, Patnaik and Behera (1981) used the common garden lizard (*Calotes versicolor*) as experimental animal and successfully determined the age of individuals. Similarly, Mahapatro, *et al.*, (1989) found the technique useful in determining the age of individuals in the lizard, *Psammophilus dorsalis* (Gray). Based on these observations and age estimation in tropical amphibians (Pancharatna, 1994) it is suggested that distinct winter and warmer climates may not be entirely responsible for the development of growth marks. The present study concerns age determination in fan-throated lizard, *Sitana ponticeriana*.

The fan-throated lizard is a small animal (two forms : larger, 70-80 mm and smaller, 40-50 mm body-length depending on area of distribution and easily distinguished by the presence of four toes. The fan like throat appendage in the male is an additional identifying character which becomes brilliantly coloured in breeding season. The species inhabits all biotopes except perhaps the heavy rainfall forests and deserts. This insectivorous lizard is widely distributed in India, ground-dwelling, diurnal and common in sandy scrub areas (Daniel, 1983).

Materials and Methods

Lizards of both the sexes and various sizes (snout-to-vent length, 12 mm to 57 mm) were collected from Balukhand - Konark Wild life sanctuary located in the district of Puri, Orissa. The range of longitudes being 85° 52' to 86° 14' (east) and latitude 19° 48' to 19° 54'. The sanctuary is a 71.71 square kilometer area established on the sandy tract between Puri and Konark. The maximum air temperature during May-June is 40°C and the winter temperature around 10°C. The survey of lizards was conducted during October 2001 to September 2003. The lizards were caught by hand or by using net.

After collection, the lizards were acclimated to laboratory conditions for about a week. During this period various insects (white ants, red ants, black ants, grass hopper, crickets) were provided as food and water was given *ad libitum*.

Skeletochronological studies were conducted in these lizards using long bones (humerus and femur) and third digits of hind limb as reported by Patnaik and Behera, (1981). After killing by a blow on the head, long bones and the digits were preserved overnight in 10% formalin. The bones cleaned in running tap water for 24 hour and were decalcified in 10% EDTA (ethylene diamine tetra acetic acid) solution at room temperature. The decalcification period lasted for 2-40 hours depending on the size of the lizard from which the bones were collected. The bones were then washed under running tap water over night. The decalcified bones were dehydrated through a graded series of alcohol (30%-100%) and processed for paraffin (56-60°C) block preparation. The diaphysis portion of long bones (humerus and femur) and the digit were used for cutting of serial sections (6-10mm) in a rotary microtome. Staining of sections was done using delafield haematoxylin and eosin.

Results

The cross sections of diaphysis of long bones of *Sitana ponticeriana* present lamellar-zonal pattern and avascular condition.

Cellular elements are present in the cortex. The shape and size of osteocytes varied with increase in age of the lizard. In adult and older lizards the osteocytes appeared elliptical with ecentric nuclei. The number of osteocytes, however, was much more numerous in juveniles than in mature adults.

Like in other lizards the LAGs are basophilic. There were no LAGs in juvenile and immature lizards (Table 1). The first ring developed at 35 mm size of male and 38 mm size of female lizard. With the increase in size from 35-38 mm to 56-57 (mature adult and older) the number of LAG increased from 2-4 (Figs 1, 2, 3 and table I). There is almost a close similarity in the number of LAG in the cross sections of humerus and femur of the same individual.

Table-1 : Correlation between size and LAG in *Sitana ponticeriana* of both the sexes

Age group		Snout-to-vent length (mm)	Number of LAG
Juvenile	(Male)	12 - 27	0
	(Female)	13 - 27	0
Immature	(Male)	29 - 34	0
	(Female)	28 - 34	0
Mature and older	(Male)	35 - 57	1 - 4
	(Female)	35 - 56	1 - 4

Discussion

Till now, in lizards skeletochronological technique has been extensively used. This is due to simple structure of bones in the group with no vascularization (except in varanids) having no intracortical remodeling, low endosteal bone resorption and not many supplementary marks. It appears that skeletochronology is an operational and reliable tool for age estimation in most of the living and extinct species of lizards (Castanet, 1994).

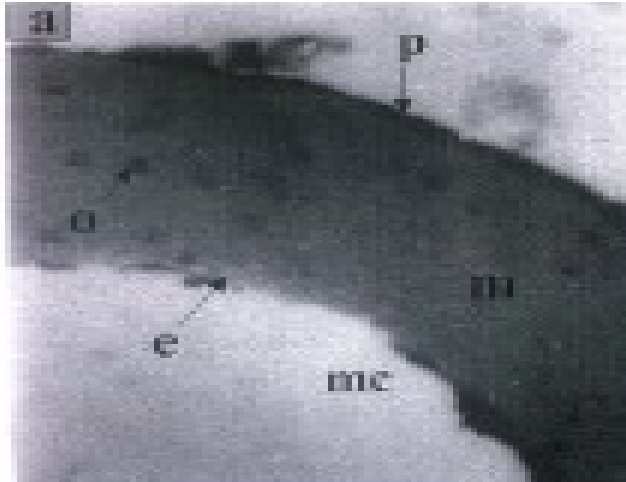


Fig. 1 (a) CS of humerus of juvenile male (SVL, 21 mm) with thicker cortical layer and no LAG.

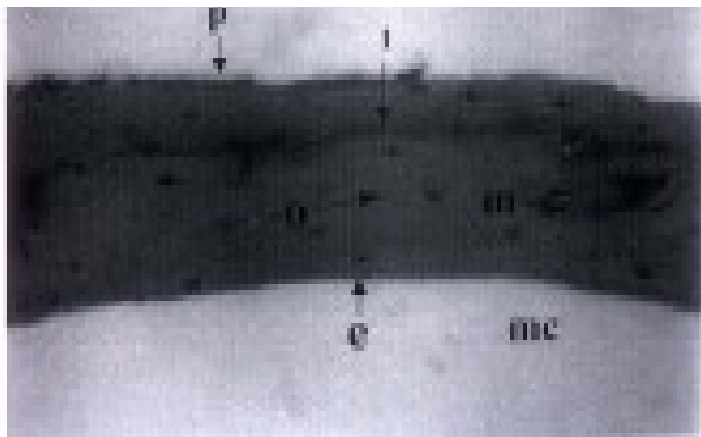


Fig. 1 (b) CS of femur of mature male (SVL, 35 mm) with less number of osteocytes and one LAG.

Cross sections (cs) of long bones showing central marrow cavity (mc), inner endosteal layer (e), outer periosteal layer (p), osteocytes (o) in the matrix (m) and number of arrested growth (LAGs).

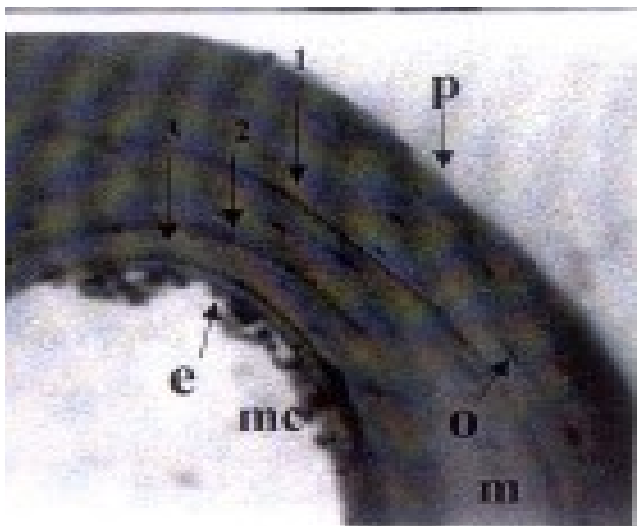


Fig.2 CS of femur of mature female (SVL, 48 mm) with elliptical osteocytes and 3 LAG..

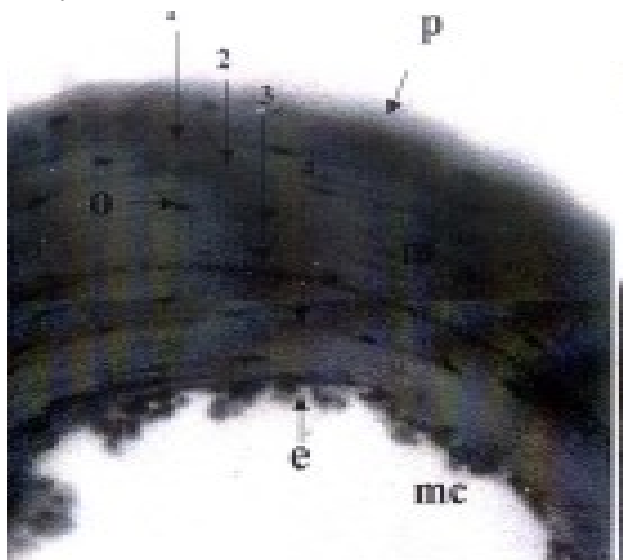


Fig.3 CS of femur of mature male (SVL, 52 mm) with elliptical osteocytes and 4 LAG.

Since most of the work in reptiles (lizards, snakes, crocodiles, and chelonians) is confined to temperate species, it is thought that the sketetochnological technique may not be useful in tropical species. But Griffiths (1961) and Warren (1963) believed that reptiles of equatorial and tropical regions may exhibit similar pattern. The lamellar-zonal pattern and avascular conditions of bone histology in garden lizard (Patnaik and Behera, 1981) and *Psammophilus dorsalis* (Mahapatro, *et al.*, 1989) and the present result in fan-throated lizard, *Sitana ponticeriana* confirm that the basic histological structure is similar in temperate and tropical species.

It appears that in *Sitana ponticeriana* growth ring develops only when the lizard becomes mature after one year. Thereafter even with small increase in size, growth rings continue to develop year-wise. Most of the lizards are short-lived, the life span ranging from 2-10 years (Castanet, 1994).

Corresponding to the growth ring, 2-4 year old Sinata species are found in nature.

Determination of age of individual animal is extremely important for studies concerned with demography, life history, growth and aging. This is particularly necessary for animal living in the natural environment. Very few studies have been undertaken using tropical amphibians and reptiles. The present results along with previous studies in other species of lizards and amphibians provide the initiative for extensive studies on diverse species living in different regions of tropics.

Acknowledgement

The authors thank Prof. B.K. Patnaik for the help rendered in preparation of this manuscript. Thanks are also due to Head, Zoology Department, Utkal University, Bhubaneswar for providing necessary facilities for the work.

References

- Castanet, J. (1982) : Recherches sur la, croissance du Tissu Osseux des Reptiles Application : La Methode squellochronologique. Doctoral dissertation, University of Paris, 7 : 199.
- Castanet, J. (1994) : Age estimations and longevity in reptiles. *Gerontology* 40 : 133-146.
- Daniel, J.C. (1983) : Fan-Throated lizard *Sitana Ponticeriana-cuvier* The book of Indian reptiles. *J. Bombay, Nat. Hist. Soc.* PP. 45.
- Griffiths, I. (1961) : Skeletal lamellae as an index of age in heterothermous tetra pods. *Ann. Mag. Nat. Hist* (ser-13) 4 : 449-65.
- Mahapatro, N.N., Begum, K.A. Behera, H.N. and Patnaik, B.K. (1989) : Age determination in the lizard, *Psammophilus dorsalis* (Gray). *J. Anim. Morphol, Physiol* 36 : 73-80.
- Pancharatna, K. (1994) : Age determination in amphibians. *Ind. J. Gerontol.* 16 : 151-154.
- Patnaik, B.K. (1994) : Aging in cold blooded vertebrates. Edited Volume of *Gerontology* 40 : 2-4.
- Patnaik, B.K. and Behera H.N. (1981) : Age determination in the tropical agamid garden lizard, *Calotes versicolor* (Daudin), based on bone histology. *Exp. Gerontol.* 16 : 295-307.
- Peabody, F.E. (1961) : Annual growth zones in living and fossil vertebrates. *J. Morph.* 108 : 11-62.
- Warren, J.W. (1963) : Growth zones in the skeleton of recent and fossil vertebrates, Ph.D. Thesis, Long Angeles, Calif. *Diss. Abstr.* 1963, 24 : 908-909.

Indian Journal of Gerontology
2007, Vol. 21, No. 1, pp 9-19

Prospective study on body mass index, stature and demispan of elderly population of Pokhara valley in Nepal

Rabindranath Das, Don Fitzroy Smith* and Narahari Timilsinha

Manipal Teaching Hospital, Pokhara, Nepal

**Countess of Chester Hospital, United Kingdom.*

ABSTRACT

We assessed the rate of decline of height, body mass, demispan and BMI in 138 Nepali men and 164 women above 50 years of age. Height appeared to fall at a rate of 0.199cm /year in men and 0.138 cm/year in women. Similarly, BMI decreased at a rate of 0.076 kg/ m² per year in men and 0.057 kg/m² per year in women. Mass decreased at the rate of 0.34 kg/year and 0.21 kg/year for men and women respectively. Similarly demispan decreased at the rate of 0.034 cm and 0.044 cm/ year in man and women, respectively. The lines of regression [Fig I, II] for the prediction of height and demispan for men and women show both the nature and strength of a relationship between height and age, demispan and age for both sexes. Demispan provides a means to predict height, comparable to other stature substitutes and may be used in lieu of other conventional stature measurement.

Keywords : Height, Bodymass, Demispan, BMI, Stature.

As age advances beyond the period of menopause and retirement, height becomes shortened due to shrinkage of intervertebral disc, osteoporotic vertebral collapse and anatomical distortion of the

skeleton. Thus it can be a misleading index of stature. It makes the measurement of foot to crown unreliable. The measurement of height in other elderly groups of patients becomes unrealistic owing to their physical handicap, non-ambulation and kyphoscoliosis, lower limb contracture, osteoarthritis of hip and knees (Smith *et al.*, 1992a). In these situations, the height based calculations of the lung volumes, glomerular filtration rate and BMI would be erroneous (Allen, 1989). The mean arm-span measurement (finger tip to finger tip with arms abducted to horizontal) is approximately equal to crown to feet height in Caucasian race. The arm- span measurement is not affected by the height; but as age advances, the difference between the arm-span and height also increases. Since the arm-span measurement in the elderly becomes difficult and erroneous too owing to osteoarthritic changes in the interphalangeal and shoulder joints in these subjects (Kwok and Whitelaw 1991). In 1986, Bassey has described an alternative method of measurement of body mass index. The measurement of “Demispan” is becoming the preferred option to estimate stature in the elderly population supplanting the alternative measurement such as “Span” and “Hemi span”. Demispan, measured from the second finger web to the center of the sternal notch with the arm abducted to the horizontal at 90°, palm forward and the shoulder in neutral position is a favored option, since it is not affected by the loss of intervertebral disc or vertebral collapse. However, like other indices of stature measurement, it may be affected by shoulder and interphalangeal joint arthritis (Mitchell and Lipschitz 1982).

Using these principles, Lehmann, *et al.*, (1991) has described alternative indices of body mass, demiquet (mass. demispan²) for the elderly male and mindex (mass. demispan¹) for the elderly female. Normative data from Nottingham (Lehmann, *et al.*, 1991) and Ontario (Smith 1995) have been published.

The present study was conducted at Manipal Hospital - a tertiary care teaching centre in Pokhara, Nepal; this serves a mixed population of urban and rural Nepalese. The purpose of the study was to :

1. Re-evaluate the relationship of indices of stature, such as height and demispan in Nepalese elderly population who were attending our medical outpatient clinic.
2. Assess the use of Demispan as an index of stature in less mobile elderly patients.
3. Assess the longitudinal changes in Demispan, initially over two years in a sample population with progressive osteoporotic vertebral disease.

Materials and Methods

A randomized cross-sectional sample of 138 elderly men and 164 elderly female between the age of 50 and 80 years (Maximum: 89 years.) was drawn from patients attending the medical outpatient clinic at Manipal teaching hospital from Sept 2002 to Aug 2004 for hypertension, diabetes, chronic obstructive airway disease and liver or gastrointestinal disorders. Patients with severe degree of osteoarthritis of hip or knees, fracture femur or amputated lower limbs excluded from the study.

Every fifth elderly patient of both sexes was selected for the assessment while examining them routinely in the medical out patient clinic. There was a written proforma in which personal identification, dietary habit, previous occupation, smoking, alcohol history, concurrent illness, medication and along with the stature indices such as height, weight, BMI and demispan data were recorded.

Height was measured to the nearest of 0.5 cm using a stadiometer and standard technique. To record, demispan a rigid straight wooden scale was made by affixing a steel meter tape on that wooden dowel. The demispan measurement was taken with the subject standing against a wall with the right arm abducted horizontally at 90° and palm forward, keeping the shoulder at neutral position. The demispan was

measured to the nearest of 0.5 cm from the right middle finger web where the dowel rested, to the centre of the sternal notch. Weight was measured on calibrated lever-balance scales to the nearest of 0.5 kg, with the subject standing barefoot on the scales with their usual light clothing (Gordon, *et al.*, 1988). To avoid observer bias, two different community medical assistants, untrained in anthropometrical measurement, were employed to record the measurements.

Coefficients for the prediction of height from demispan were deduced by linear regression for comparison with data obtained by Bassey (1986) and Cline MG, *et al.*, (1989). BMI was calculated in the conventional manner for men and women. For each subject, weight, height, BMI, demispan and age were correlated using Pearson's correlation coefficient using SPSS-PC software; the level of significance (p) was taken equal to, or less than, 0.05.

Results

Within the constraints of a cross sectional study, height, weight, demispan and BMI displayed a downward trend across the age of both men and women (n=164) subjects in the present study. Height appeared to fall at a rate of 0.199cm/year in men and 0.138cm/year in women. Similarly, BMI decreased at a rate of 0.076 year in men and 0.057 year in women (Table-1).

There was a strong positive correlation between height and demispan; linear regression coefficients to predict height from Demispan are shown in Table IV. The mean height: demispan ratio was 2.16 and 2.17 in men and women, respectively, and this ratio did not change significantly across the age range studied. The mean and group data for height, weight and demispan are shown in Table 2 and 3 for men and women respectively. Mass decreased at the rate of 0.34 kg/year and 0.21 kg/year for men and women, respectively. Similarly demispan decreased at the rate of 0.076 cm per year in men and 0.057 per year in women respectively.

Table-1 : Decline in anthropometric values with age

Subjects	Height (cm/yr.)	Mass (kg/yr.)	Demispan (cm/yr.)	BMI (kg/m ²)	Mindex (kg/m/yr.)	Demiquet (kg/m ² /yr.)
Men N=138	0.199	0.34	0.034	0.076	—	0.54
Women N=164	0.138	0.21	0.044	0.057	0.216	—

Mindex : kg/m/year and *Demiquet*: kg/m²/year.

Table - 2 : Height, Mass, Demispan, BMI by age cohort men

Cohort	Height (cm)	Mass (kg)	Demispan (cm)	BMI (mg/m ²)	Demiquet (kg/m ²)	N
All	162.67	63.74	75.19	24.04	113.36	138
50-55	164.76	66.27	74.37	24.43	120.75	40
56-60	162.86	62.50	77.34	23.53	105.13	25
61-65	162.28	65.00	75.40	24.55	114.85	16
66-70	161.91	63.36	74.52	24.15	114.14	23
71-75	161.65	65.50	75.30	24.97	115.44	13
76-80	162.42	62.11	75.00	23.47	111.13	13
80+	156.68	53.31	74.18	21.76	97.15	8

Table - 3 : Height, Mass, Demispan, BMI by age cohort women

Cohort	Height (cm)	Mass (kg)	Demispa (cm)	BMI (mg/m ²)	Mindex (kg/m ²)	N
All	151.91	51.36	70.29	22.20	72.99	164
50-55	154.05	52.00	71.23	21.94	73.00	44
56-60	153.02	54.17	70.17	23.18	77.18	34
61-65	151.10	48.44	70.20	21.21	68.89	29
66-70	151.47	54.00	71.42	23.78	76.42	20
71-75	149.25	48.39	70.00	21.71	69.07	14
76-80	147.75	44.79	67.08	20.48	66.60	12
80+	150.41	53.09	68.95	22.42	66.50	11

Table- 4 : Subject's height and demispan

Sex	N	Height (cm)	Demispan (kg)	Height: demispan
Men	138	162.67	75.19	2.16
Women	164	151.91	70.29	2.17

Table 5 : Linear regression for height prediction
(Height in cm = Demispan + Constant)

Sex	Demispan	Constant	SE	R
Men	1.356	33.432	0.058	0.352
Women	1.301	24.49	0.029	0.631

Table 6 : Deciles of height, demispan, mass, BMI and Demiquet in Men

Percentile	Height (cm)	Mass (kg)	Demispan (cm)	BMI (kg/m ²)	Demiquet (kg/m ²)
10	156.00	50.00	70.00	19.88	89.95
20	159.00	54.00	71.50	20.91	97.15
30	160.35	59.00	74.00	22.75	102.07
40	162.00	64.00	75.00	23.85	106.06
50	163.00	65.75	76.00	24.44	111.96
60	164.00	66.50	77.00	24.80	118.39
70	164.50	68.30	77.65	25.31	126.29
80	166.00	71.00	78.00	26.61	132.92
90	168.50	75.00	79.00	27.74	136.64

Table-7 : Deciles of height, demispan, mass, BMI and Demiquet in Women

Percentile	Height (cm)	Mass (kg)	Demispan (cm)	BMI (kg/m ²)	Mindex (kg/m ²)
10	145.25	43.00	67.00	19.50	63.26

20	147.00	44.00	68.50	20.00	64.26
30	149.00	46.00	69.00	20.23	65.72
40	151.00	48.00	70.00	20.44	67.61
50	153.00	49.25	70.50	20.88	69.64
60	153.50	50.00	71.00	21.60	71.23
70	154.00	53.00	71.50	22.93	74.74
80	155.00	56.00	72.00	20.90	80.00
90	156.00	64.25	73.00	27.28	91.46

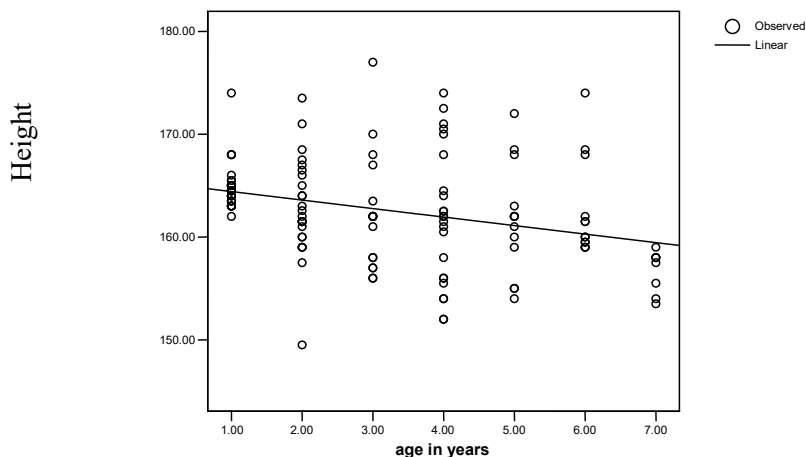


Figure : 1 : Lines for regression of height with age (Men)

N.B: Y axis in cm; X axis in years (Gr.1= 50-55; Gr.2= 56-60; Gr.3= 61-65; Gr.4= 66-70; Gr.5= 71-75; Gr.6= 76-80; Gr.7 = 80+ age Group in all figures).

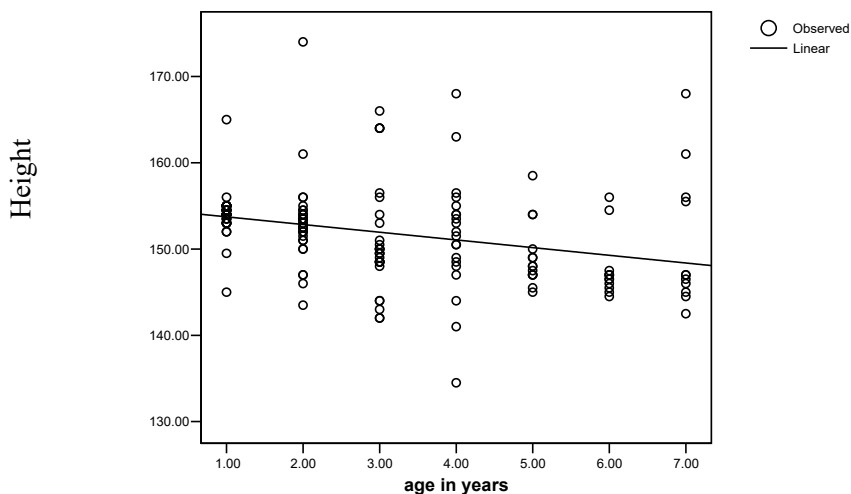


Figure-2 : Lines of regression of height with age (Women)

N.B: Y axis in cm; X axis in years (Gr.1= 50-55; Gr.2= 56-60; Gr.3= 61-65; Gr.4= 66-70; Gr.5= 71-75; Gr.6= 76-80; Gr.7= 80+ age Group in all figures).

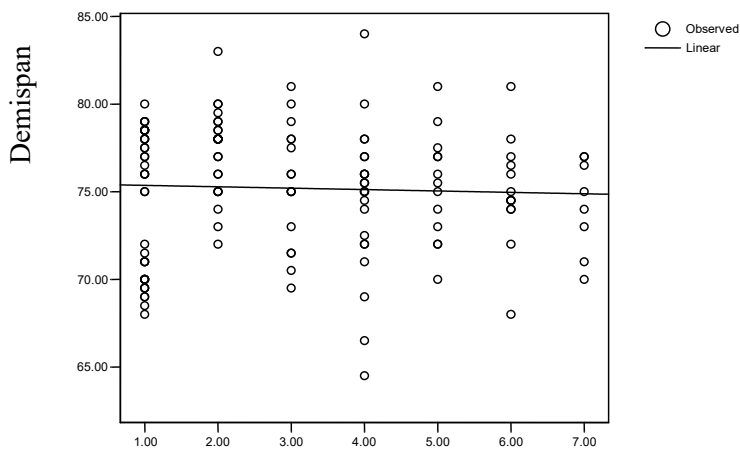


Figure-3 : Lines of regression of demispan with age (Men)

N.B: Y axis in cm; X axis in years (Gr.1= 50-55; Gr.2= 56-60; Gr.3= 61-65; Gr.4= 66-70; Gr.5= 71-75; Gr.6= 76-80; Gr.7 = 80+ age Group in all figures).

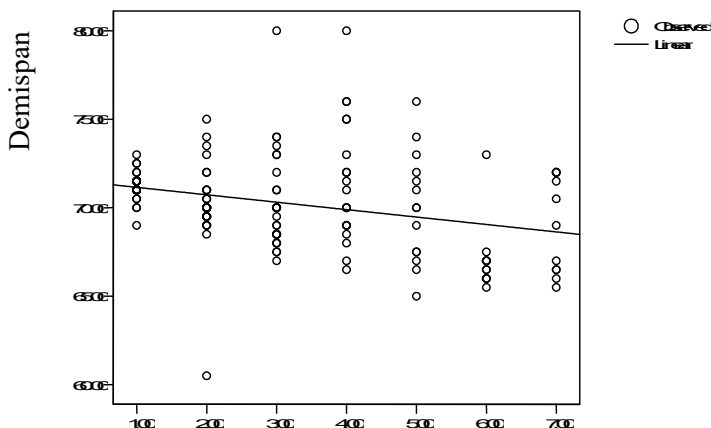


Figure - 4 : Lines of regression of demispan with age (Women)

N.B: Y axis in cm; X axis in years (Gr.1= 50-55; Gr.2= 56-60; Gr.3= 61-65; Gr.4= 66-70; Gr.5= 71-75; Gr.6= 76-80; Gr.7 = 80+ age Group in all figures).

The lines of regression for the prediction of height and demispan for men and women are shown in figures 1 and 2. The figures show both the nature and the strength of a relationship between height and age. The rate of decline of height is 0.199 cm per year and 0.138 cm per year for men and women, respectively. Similarly, the rate of decline of demispan is 0.034 cm per year and 0.044 cm per year for men and women, respectively. From the graph in figure 1 and 2, it is evident that the height of both male and female is decreasing as the age increasing. Likewise, in Figure 2 and 4 is also showing that demispan decreases as the age increases for both sexes.

Discussion

This cross-sectional study shows the decline of height with age as is expected as a result of age related loss. Similar studies have been performed in Canada, Portugal and other parts of Europe (Smith, *et al.*,

1992; Santana 2000 and Dey, *et al.*, 1999). However, in this country, no database are available to compare the anthropometrical values of height, weight, demispan and BMI. Evidently the stature of the Nepalese citizens is smaller than the Caucasians; the decline of height and demispan with age is almost comparable with the similar values of the latter. Besides, the fixed factor like age, many other contributory factors like alcohol and smoking habits at early age, sedentary lifestyle of the elderly women, early puberty and early menopause (Hodgekinson 1992) and other factors yet to be identified in the decline of the anthropometric indices in Nepali population.

The demispan measurement technique is simple, reproducible and has minimal observer bias errors. It is easily taught to any paramedics who do not have any experience in anthropometrical measurement. It requires only one hand as compared to the conventional use of both hands in fingertip-to-fingertip measurement of armspan. Since no adjustment is required to indoor clothing; demispan is easy to measure as an index of height and has been accepted as the stature measurement of preference in the epidemiological studies.

Conclusion

This study shows the decline of anthropometrical values in relation to advancing age in the Nepalese citizens, which is comparable to values shown by western authors. Though the sample size is comparatively small, these data are representative of both frail and robust body stature of mixed elderly Nepalese population aged 50-85 years. Demispan is a reliable measurement which can be used to calculate sex-specific indices of body mass. In addition, the demispan provides a mean to predict height, comparable to other stature substitutes and may be used in lieu of the conventional stature measurement, height and weight, which may not be available, applicable or feasible in all the cases.

Acknowledgements

Dr. R. N. Das is indebted to Prof K.J.Shetty, HOD Department of Medicine who encouraged me to do this novel work on Nepalese population. I am also thankful to Dr.D.P. Saraswat, the Medical Superintendent of Manipal Teaching Hospital for his unflinching support especially in using patient's medical records.

References

- Allen, SC (1989) : The relation between height, armspan and forced expired volume in elderly women. *Age and Aging*; 18:113-116.
- Bassey, EJ. (1986) :Demispan as a measure of skeletal size. *Annals of Biology*; 13 : 499-502.
- Cline MG, Meredith KE, Boyer, JT, and Burrows, B. (1989) : Decline of height with age in adults in a general population sample: estimation of maximum height and distinguishing birth cohort effects from actual loss of stature with aging. *Human Biology*; 61:415-425.
- Dey DK, Rothenberg E, Sundh V, Bosaeus I and Steen B. (1999) : Height and body weight in the elderly: a 25-year longitudinal study of a population aged 70 to 95 years. *Eur J Clin Nutr*1999 Dec; 53(12): 905-14.
- Gordon CC, Chumlea WC, and Roche AF. (1988) : Stature, recumbent length and weight. In *Anthropometric Standardization Reference Manual*; edited by I Lohman, AF Roche, R Martorell (Illinois: Human Kinetics Book), and 1st edn: pp.3-8.
- Hodgekinson HM (1992) : The Nutrition of Elderly People. Report on Health and Social subjects 1992; 43 (London: HMSO).
- Kwok T and Whitelaw M N. (1991) : The use of armspan in nutritional assessment of the elderly .*J Am Geriat Societ*; 39:492-496.

- Lehman AB, Bassey EJ, Morgan K, Dalloso, HM (1991) : Normal values for weight, skeletal size and body mass indices in 890 men and women aged over 65 years. *Cln Nutr*; 10:18-22.
- Mitchell CO, and Lipschitz DA. (1982) : Arm length measurement as an alternative to height in the nutritional assessment of the elderly. *J Parentrl Enterl Nutr*; 6 : 226-229.
- Santana P. (2000) : Ageing in Portugal: regional inequities in health and health care. *Soc Sc Med.*, Apr; 50(7-8): 1025-36.
- Smith WDF, Cunningham A, Paterson DH, Rechnitzer PA and Koval JJ. (1992b) : Forced expiratory volume, height and demispan in Canadian men and women aged 55-86. *J Gerontol*; 47 : M40 - M44.
- Smith WDF, Cunningham D A, Paterson D H, Rechnitzer PA, Porter M M. and Koval JJ (1992a) Demispan to predict height and body mass index. *Age and Ageing*; 21(Suppl.1): 11-12.
- Smith WDF, Cunningham DA, Paterson D H. (1995) : Body mass indices and skeletal size in Canadians aged 55-86. *Annals of Human biology*; 22(4) : 305-314.
- Indian Journal of Gerontology**
2007, Vol. 21, No. 1, pp 20-29

Study on food preferences and taste sensitivity of local elderly women residing in Baroda city and evaluation of selected food items for geriatric group

Pallavi Mehta, Komal B. Chauhan and Chayanika Devi

*Department of Foods & Nutrition,
Faculty of Home Science,
MS University of Baroda,*

Vadodara, (Gujarat)

ABSTRACT

Ageing is a complex process which is associated with disabilities of all modalities of functions of the body. Poor food intake is a major nutritional problem during old age which is even worsened with age related decrease in taste sensitivity and change in food preferences. Elderly women are more vulnerable to poor food intake as a result of various social taboos. Relevant literature in relation to food preferences and taste sensitivity for women is scanty. Keeping the above facts in view, the present study was planned with a central objective to study the food preferences and taste sensitivity of local elderly women residing in Baroda city and formulation and evaluation of selected food items based on their food preferences. 140 elderly subjects belonging to middle income group were selected from free living population by snow ball technique. These subjects were categorized into three groups: 50-70 years (n=60), 71-85 years (n=60) and 86 years and above (n=20). Socio-demographic information like age, marital status, religion, ethnic group, education, occupation and living arrangements was collected using a pretested questionnaire. Nutritional status was assessed in terms of anthropometric measurements. Assessment of nutrient intake was done by 24-hour dietary recall method. Data on food preferences was collected by using the same pretested questionnaire which contained an exhaustive list of food items. Taste sensitivity was studied by threshold sensitivity tests by using the method given by Swaminathan's Standards, 1979. Food items were formulated based on the food preferences of the elderly subjects and then evaluated in the laboratory by trained panel members. These food items were then carried to the elderly subjects to test whether they are acceptable or not. Data analysis revealed that there is a change in preference for certain class of foods and a decline in taste sensitivity with the advancement of age. The food items were preferred by the elderly women more than the younger panel members.

Keywords : Food preference, Taste sensitivity, Elderly women, Nutritional problem, Food habits

Aging is a normal process in which every organ system undergoes structural and functional degeneration. Elderly people are

susceptible to a number of physiological changes. The rate of catabolic change becomes greater than the rate of anabolic cell regeneration. Nutrition has been identified as a critical factor in the causation and control of many health problems among the elderly.

A study conducted by Sabharwal, *et al.*, (1996) of Indian institutionalized elderly above 65 years of age revealed adequate energy, protein, calcium and vitamin C intakes as compared to RDA while iron and vitamin A intakes were lower. A number of studies have been conducted by a team of research workers from the Department of Foods and Nutrition, M.S. University of Baroda, on free living geriatric population from HIG, MIG and the LIG, belonging to the local region. The findings of these studies have been reported by Mehta P (1999), Mehta and Panchal (2000) and Mehta and Chhabra (2001). The dietary pattern data revealed that the consumption of major nutrients like energy, protein, iron, β - carotene and fibre were less than the RDA, whereas the intake of fat, calcium and Vitamin C were greater than the RDA in both the HIG and MIG elderly men and women. The studies conducted on LIG men and women revealed low intake of all nutrients when compared to the RDA.

One of the important determinants of food intake is strong food preferences in the elderly. Decreased food intake is also influenced by food preferences. The present study is focusing on their food preferences. There is a general decline in taste sensitivity in the elderly with the advancement of age. Taste sensitivity refers to the intensity with which one perceives tastes and flavors. Hence, a decrease in taste sensitivity also affects food preferences that in turn decrease food intake.

In view of these facts, the present study was planned with a central objective of studying the Food Preferences and Taste Sensitivity of local elderly women residing in Baroda city. The study also included formulating and evaluating selected food items suitable for geriatric group. The specific objectives were to study the socio-demographic profile, nutritional status, food habits and morbidity profile of these elderly women.

Methods

The present study was aimed at establishing a baseline data related to the food preferences and taste sensitivity of free living local elderly women of Baroda city from the middle-income group belonging to 3 different age groups : 50-70 years, 71-85 years and 86+ years.

In addition to the above information the study also included information regarding socio-economic background, dietary intake, nutritional status and different signs of ageing that appeared at different ages in the elderly women under study.

The study also included the formulation of food items based on the food preferences of the elderly women under study and evaluation of these food items by geriatric group to test acceptability levels.

Selection of Subjects

The selection of subjects was done using snowball technique. A sample of 140 subjects from the middle-income group was selected belonging to the age groups 50-70 years (n=60), 71-85 years (n=60) and 86 years and above (n=20). They were subjected to a series of questions listed in the questionnaire regarding their socio-demographic pattern, dietary intake, nutritional status, food preferences, food habits and their general disease profile. Sensitivity threshold test was then carried out on 80 of them i.e. 50-70 years (n=30), 71-85 years (n=30) and 86 years and above (n=20). Out of these 80 elderly females 30 of them were screened based on their taste sensitivity, each group consisted of 10 subjects. Evaluation of selected formulated food items was done by these 30 elderly females to test the acceptability levels of these recipes by the geriatric group.

Selection of these subjects was based on their age, income group and willingness to cooperate in providing valid information.

The study included :

- Collection of information on the nutritional status, food preferences and morbidity profile of the elderly women under study,
- Assessment of taste sensitivity of the elderly women and
- Development and evaluation of the food items by younger and older subjects.

The socio-economic status was studied by collecting background information. Nutritional status was studied by taking anthropometric measurements such as height, weight, mid-upper arm circumference (MUAC) and body mass index (BMI). Twenty-four hour dietary recall method was used to carry out the dietary survey.

To study the food preferences, an exhaustive list of various food items was made with their amounts and frequency of consumption. Morbidity profile included problems of the oral cavity, the gastro-intestinal tract, the hepatobiliary tract, the pancreas, cardio-vascular system, genito-urinary system, endocrine system and locomotor system.

The threshold taste sensitivity was studied by using the method given by Swaminathan's Standard, 1979. Four types of solutions were prepared using sucrose, sodium chloride, citric acid and caffeine and each of these solutions were prepared at four different molar concentrations. Subjects who could correctly identify lower concentrations of these solutions were selected for the evaluation of the food items.

Based on the food preferences of the elderly women, five different food items were developed. The food items are : Green Paratha, Stuffed Vegetable Idli, Dahlia Khichdi, Soya-besan Puda and Soya been Puranpoli. Standardization of these food items was done in the laboratory. These food items were then taken to the 30 elderly females who were asked to taste these cooked items for acceptability.

The results obtained from the data collected by these methods are subjected to appropriate statistical analysis. Percentage, mean and standard deviation were applied wherever required. Data which required application of statistical tests were subjected to Z-test and t-test. Since there is a sharp difference in the various parameters between younger geriatrics and the oldest geriatrics, comparison is done between these two age groups.

Results

(a) *Nutritional status, food preferences and morbidity profile of the elderly women under study.*

The socio-demographic data revealed that majority of the subjects belonging to 50-70 years and 71-85 years old age groups were married whereas most from the 86+ years old subjects were widows.

Maximum subjects were Hindus (Gujaratis). Most of the subjects were illiterate and were not working. The elderly subjects stayed mostly with their family members.

Anthropometric measurements showed a decreased in weight, MUAC and BMI was seen with the advancement of age. However, percent prevalence of weight distribution showed the most of the 86+ years old subjects were of normal weight.

Data on nutrient intake revealed that energy consumption was very less in the 86+ years old subjects compared to the other two groups. A significant difference was noted in the intake of all the nutrients namely protein, fats, calcium, iron and vitamin C between the 50-70 years and 86+ years old subjects ($p \leq 0.05$). (Table 1)

Food habits revealed that most of the elderly subjects were vegetarian. A significant difference was observed in taste preference for salty and bitter tastes between the 50-70 years and 86+ years age groups ($p \leq 0.05$). An observed significant less use of salt was also noted between these two groups. No difference was observed in the use of sugar.

Table 1 : Mean nutrient intake of the elderly subjects belonging to three different age groups, (Mean, $\pm$ SD)

Nutrients	RDA	50-70 yrs (n=60)	71-85 yrs (n=60)	86+yrs (n=60)	Z-value
Energy (kcal)	1350	1461.71 ± 361.59	1491.12 ± 371.8	1042.6 ± 154.25	*3.497
Protein (gms)	50	29.94 ± 11.81	21.89 ± 9.01	17.05 ± 5.69	*2.80
Fat (gms)	25	22.59 ± 8.86	23.14 ± 7.05	18.65 ± 4.82	*4.34
Calcium (mg)	400	290.03 ± 91.06	195.96 ± 84.22	199.95 ± 46.8	*3.583
Iron (mg)	28	22.87 ± 10.44	15 ± 5.57	14.2 ± 5.12	*4.46
Vitamin C (mg)	40	28.45 ± 10.92	21.35 ± 6.26	16.5 ± 4.34	*4.65

**Significant at $P \leq 0.05$. (Z-values are between 50-70 yrs and 86+ yrs.)*

Source of RDA : Natrajan. 1999, Government Hospital, Chennai.

Data on food preferences showed that sweet foods were preferred more by the 50-70 years and 86+ years old subjects than the 71-85 years old group, while all the elderly subjects under study, preferred to eat snacks. A significant difference was observed for the preference of fast foods, miscellaneous foods, soft drinks and juices / shakes between the 50-70 years and 86+ years old subjects ($p \leq 0.05$). Salad, chutney, pickles, ice-creams and beverages are, however, more preferred by the 50-70 years old subjects than the other two age groups. (Table 2)

Food preference at various meal times indicated that the 86+ years old subjects preferred steamed foods for breakfast more than the other two groups. Full lunch (i.e. four square meal) was minimum preferred by the 50-70 years and 71-85 years old subjects while half lunch was preferred more by the 86+ years group. Beverage was maximally preferred by all the elderly subjects. preference for full dinner, half dinner and beverages were significantly different in the 50-70 years and 86+ years old subject.

Table 2 : Number of Elderly subjects belonging to three different age groups showing their food preferences

Food Choice/ Food preferences	50-70 yrs (n=60)	71-85 yrs (n=60)	86+yrs (n=60)	Total	Z-value
(a) 0.14	Sweet Foods	43	29	14	86
	(71.67)	(48.33)	(70.00)	(61.63)	
(b) 0	Snacks	60	60	20	140
	(100.00)	(100.00)	(100.00)	(100.00)	
(c) *5.08	Fast Foods	39	21	0	60
	(65.00)	(35.00)		(42.86)	
(d) *3.23	Miscellaneous Foods	34	17	3	54
	(56.67)	(28.33)	(15.00)	(38.57)	
(e) 0.096	Salad	54	44	12	110

	(90.00)	(73.33)	(60.00)	(78.57)	
(f) Chutney	55	45	14	114	0.07
	(91.67)	(81.67)	(70.00)	(84.29)	
(g)	Pickles	45	38	15	98
0					
	(75.00)	(63.33)	(75.00)	(70.00)	
(h)	Ice Creams	39	14	11	64
0.80					
	(65.00)	(23.33)	(55.00)	(45.71)	
(i) Soft Drinks	33	12	2	47	*3.52
	(55.00)	(20.00)	(10.00)	(33.57)	
(j) Beverages	58	58	18	134	0.03
	(96.67)	(96.67)	(90.00)	(95.71)	
(k)	Juice/Shakes	51	57	10	118
*3.21					
	(85.00)	(95.00)	(50.00)	(84.29)	

Figures in parenthesis denote percentage of subjects

**Significant at $p \leq 0.05$. (Z- values are between 50-70 yrs and 86+ yrs.)*

A notable difference was observed regarding the problems related to oral cavity, gastrointestinal tract and cardiovascular diseases between the 50-70 years and 86+ years old subjects. Problems related to the hepatobiliary tract, pancreas, genito-urinary system, endocrine system and locomotor system were more prevalent in the 71-85 years old subjects.

(b) *Taste sensitivity of the elderly women belonging to three different age groups.*

Data on taste sensitivity revealed that there is a decrease in the taste sensitivity with the advancement of age. A significant difference was noticed in the taste sensitivity for the sweet, salty and sour tastes between the 50-70 years and 86+ years old subjects ($p \leq 0.01$). (Table3)

Table 3 : Percentage of elderly subjects showing their intensity of perceiving the various concentrations of the four solutions

50-70 years (n=30)	86+years (n=20)	T-Value
-----------------------	--------------------	---------

SWEET			
High	46.4 (14)	25 (05)	*1.55
Moderate	3.3 (01)	10 (2)	0.56
Low	50 (15)	65 (13)	0.83
SALTY			
High	26.6 (08)	30 (06)	*1.37
Moderate	23.3 (07)	5 (01)	0.4
Low	50 (15)	65 (13)	0.87
SOUR			
High	20 (06)	35 (07)	*1.87
Moderate	36.6 (11)	25 (05)	1.0
Low	43.3 (13)	40 (08)	0.25
BITTER			
High	36.6 (11)	40 (08)	0.44
Moderate	16.6 (05)	20 (04)	0.68
Low	46.6 (14)	40 (08)	0.40

Figures in parenthesis denote number of subjects

**Significant at $p \leq 0.01$*

T-values are between 50-70 yrs and 86+ yrs.

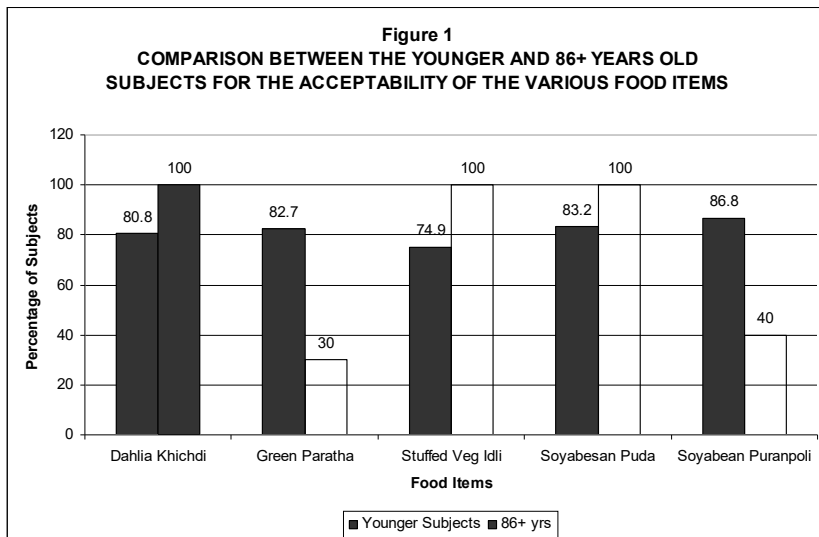
High - strong, medium

Moderate - weak, threshold very weak

Low - different from taste of water, taste of water

(c) *Development and evaluation of food items by younger and older subjects.*

Evaluation of the food items indicated that the elderly subjects preferred Dahlia Khichdi, Stuffed Vegetable Idli and Soyabesan Puda more than the younger subjects as compared to the Green Paratha and Soyabesan Puranpoli. This indicated that the elderly subjects preferred to eat food items that were easy to chew and softer (Figure 1). Nital Patel (2003) in a study on institutionalized elderly showed that fresh soy based food items were found more acceptable by the institutionalized elderly.



Dahlia Khichdi and Green Paratha were mostly preferred for breakfast as age advanced. Stuffed Vegetable Idli, Soyabesan Puda and Soya been Puranpoli were maximum preferred for tea time by all the elderly subjects. Elderly subjects from the 50-70 years and 71-85 years old groups preferred to consume full katori of Dahlia Khichdi. Green Paratha and Soya bean Puranpoli were preferred in lesser amounts by the 86+ years old subjects. However, Soyabesan Puda was preferred in more amounts by the 50-70 years and 71-85 years old age groups.

Conclusion

This study clearly shows that food preferences and taste sensitivity are important determinants of food intake in elderly women. It provides good guidelines for planning diets for very old individuals.

References

Davidson, S. and Passmore, R. (1975) : *Human Nutrition and Dietetics*. 6th Edition, English Language Book Society in Adult Man and the Age. pp 651-661.

- Sabharwal, M. Sharma and Wadhwa, A. (1996) : Age Related Changes in the Nutrition Profile of Institutionalized Men (50-78 years) belonging to the Middle Income Group. CF : Nutritional Status of the Elderly. *Indian Journal of Medical Research* 106 : 340-348.
- Mehta, P. (1999) : Effects of Ageing on Dietary Pattern and Disease Profile of Men aged 60-70 years belonging to HIG and MIG group of Baroda City. In *Ageing* : Kalyanji Bhagachi and Seema Puri
- Mehta, P. and Panchal, P. (2000) : A Study of Nutrition, Diet and Disease Profile of Elderly Patients with Dental Problems. (M.Sc. Dissertation Thesis) Department of Foods and Nutrition, Faculty of Home Science, M S University of Baroda, Vadodara, Gujarat.
- Mehta, P. and Chhabra, S. (2001) : A Study on Nutritional Status, Diet and Disease Profile of Edentulous Elderly Subjects (with and without Denture Treatment). (M.Sc. Dissertation Thesis) Department of Foods and Nutrition, Faculty of Home Science, M S University of Baroda, Vadodara, Gujarat.
- Mehta, P. and Patel, N. (2003) : Effect of Soy Foods on Health & Nutritional Status of Institutionalized Elderly. (Unpublished MSc Dissertation) Department of Foods and Nutrition, Faculty of Home Science, M S University of Baroda, Vadodara, Gujarat.

Indian Journal of Gerontology
2007, Vol. 21, No. 1, pp 30-43

Prevalence of hyperglycemia and hyperlipidemia among the middle aged and elderly population in a University setup

Vanisha Nambiar and Parul Guin*

Department of Foods and Nutrition

**A WHO collaborating Center for Nutrition Research in Anemia
Control and Diet related Chronic Degenerative Disorders
The Maharaja SayajiRao University of Baroda
Vadodara - 390002. Gujarat. India.*

ABSTRACT

Epidemiological studies have reported a positive relationship between increased levels of plasma lipoproteins and coronary heart disease (CHDs). The present study aimed to assess the prevalence of hyperlipidemia among the middle aged and older (37-73 y) population in a University setup. The results revealed that the mean Fasting blood glucose (FBG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density cholesterol (LDL-C) and very-low density cholesterol (VLDL-C) and triglycerides (TG) were 100mg/dl, 200 mg/dl, 42 mg/dl, 125 mg/dl, 33 mg/dl and 166 mg/dl, respectively. The 162 studied, subjects, only 21.6% had normal biochemical parameters, whereas 29% of the subjects were hyperlipidemics the remaining 50.6% had either a high TC or TG value. Females in general had higher lipid values as well as higher atherogenic indices as compared to the male subjects. Since the average age for these post-menopausal female subjects was 51 years, wherein the protective effect of estrogen was limited, they were at risk for chronic degenerative disorders (CDDs) and therapeutic lifestyle changes are advised for these subjects.

Key words : Hyperlipedemia, FBG, LDL, TC, TG, HDL-C, Middle-Aged, Elderly, Post Menopausal Women.

Hyperlipidemia, characterized by elevated serum Total Cholesterol, LDL-C and triacylglycerol concentrations as well as reduced HDL-C concentrations are identified risk factors for coronary artery disease, and is a major concern in both developed as well as developing countries. Absolute risk of coronary heart disease increases with age in both men and women as a result of progressive accumulation of coronary atherosclerosis with aging. Incidence of coronary artery disease is known to be higher in men than in women,

however aging reduces the protective effect of the hormone estrogen, thus post menopausal women are equally at risk for chronic degenerating disorders (CDDs) as their male counterparts.

Numerous epidemiologic studies have shown that lipid and lipoprotein levels are predictive of coronary heart disease (CHD) (Kannel, *et al.*, 1971). The incidence of CHD is positively related to high levels of LDL-C and negatively related to that of HDL-C (Gordon, *et al.*, 1977) and TC/H and L/H ratio is more predictive of CHD than either LDL-C or TC (Lavie, *et al.*, 1987). The aim of the present study was to assess the prevalence of hyperlipidemia among the middle-age and elderly population in a University setup.

Materials and Methods

All the middle-aged and elderly subjects who were registered in the University Health Center for past two years were enrolled for the present study (n=162 subjects; M=104, F=58). Fasting blood glucose estimations were done by the enzymatic kit supplied by Glaxo India Limited by GOD/POD method. The triglycerides in the serum were estimated by the GPO/POD method using the enzymatic kit. Total cholesterol was estimated using diagnostic kit supplied by Glaxo India Ltd., and serum HDL-C was also estimated. VLDL was calculated by dividing triglyceride values by five (TG/5). The LDL was calculated by dividing the difference $LDL-C = TC - (HDL-C + VLDL)$.

Mean age of the subjects under study

The age range of the subjects was 37-73 years. The mean age for the males (n = 104) was 52.9 years, with a range of 37-73 years (Table 1). The mean age of the females (n= 58) was 51.4 years, with a mode of 46 years and a median value of 51 years indicating that these women were mainly in their post menopausal age, wherein, they are at a greater risk for CDDs and do tend to have an abnormal lipid profile. As the population base shifts its mean age move upwards. It becomes increasingly important for health care practitioners, managers and planners to understand the dietary and nutrient intake patterns and requirements of the middle aged and age-related health disorders, both of which are closely linked to the socio-economic condition of the population. Late middle age is a particularly important period for both men and women as it is during this period that age related disorders begin to manifest themselves overtly (Nambiar and Seshadri, 2004).

Table 1 : Quartile values of age of the subjects under the present study

Sex	Minimum	25%	Median	75%	Maximum	Mode
F	39.0	46.0	51.0	56.0	67.0	46.0
M	37.0	48.0	52.0	58.0	73.0	48.0

Statistical analysis

The data so obtained was subjected to appropriate statistical analysis using MS excel or EPI Info 6 software package for statistical analysis. Independent ‘t-test’ was used to find out the significant differences between the means. All the tests were considered significant at $p < 0.05$.

Results

Fasting blood sugar and lipid profile of the subjects

Mean fasting sugar values were 95.8 mg/dl and 108 mg/dl for males and females respectively. The females had significantly higher FBS values than males. The mean TC value was 200 mg/dl (range 146-357 mg/dl) with 199 mg/dl and 203.5 mg/dl for males and females, respectively. Despite similar TC levels, the HDL-C values for females were same as that of males (42.3 and 42.6 mg/dl). The HDL-C levels were 21.2% and 20.9% of TC in males and females, respectively. The subjects had an average LDL –C level of 124.9 mg/dl (range 83-279 mg/dl). The mean VLDL values were 33.26 mg/dl (range 14-74).

**Table 2 : FBS, lipid profile and atherogenic indices
of the subjects (37-73 years)
(Mean $\pm$ S.D., mg/dl) (n=162)**

Variable n	Males 104	Females 58	Total 162	t' value
FBS	95.8 $\pm$ 19.81 (66 - 163)	108.9 $\pm$ 44.89 (60 - 183)	100.5 $\pm$ 31.83	13.36*
TC	199.0 $\pm$ 28.06	203.5 $\pm$ 34.41	200.6 $\pm$ 30.56	0.913
HDL - C	42.3 $\pm$ 3.25 (36 - 49)	42.6 $\pm$ 3.32 (34 - 52)	42.4 $\pm$ 3.28	1.03
LDL - C	123.3 $\pm$ 25.34 (47 - 279)	128.6 $\pm$ 26.62 (45 - 219)	124.9 $\pm$ 25.81	1.08
VLDL - C	33.5 $\pm$ 9.62 (13 - 72)	32.9 $\pm$ 12.33 (17-74)	33.2 $\pm$ 10.68	1.63
TG	167.8 $\pm$ 47.1 (66 - 360)	164.7 $\pm$ 58.24 (65 - 371)	166.7 $\pm$ 51.39	0.35
TC/HDL	4.71 $\pm$ 0.61 (2.65 - 8.11)	4.78 $\pm$ 0.78 (3.30 - 8.43)	4.73 $\pm$ 0.67	0.53
TC/LDL	1.61 $\pm$ 0.23 (1 - 3.61)	1.58 $\pm$ 0.70 (1.34 - 6.93)	1.60 $\pm$ 0.46	0.94
LDL/HDL	2.91 $\pm$ 0.56 (2.24 - 8.1)	3.00 $\pm$ 0.55 (2.11 - 5.4)	2.94 $\pm$ 0.56	0.87

* Significantly different at $p < 0.05$

The mean TG levels were 166.69 mg/dl. Mean TG levels of males were 167.8 mg/dl vs 164.7 mg/dl (Table 2) for the females, which was more than the recommended values of < 150 mg/dl indicating that these subjects (37-73 y) were at-risk for the development of CDDs. Triglycerides are naturally produced and stored in the body as fat. Most fats in foods are in the form of triglycerides. Elevated triglycerides have been shown to be an independent risk factor for CHD. High levels are also associated with obesity, diabetes, and high blood pressure.

A recent study on postmenopausal women (45-58 y) by Nambiar and Seshadri (2004) reported that 29.4 per cent suffered from some chronic degenerative disease. The major confirmed chronic degenerative chronic diseases were hypertension (34%), osteoarthritis (27%), multiple disorders (CVD, diabetes and blood pressure, 7%), and 39.3 per cent complained of symptoms, which were suggestive of

disorders of one or more systems, 31.3 per cent reported healthy having no symptoms of disorders or disease.

Atherogenic indices of the subjects

The atherogenic indices of the subjects are given in Table 2. As can be seen from the table, the TC/H, L/H and TC/L ratios for male subjects were 4.71, 1.64 and 2.91, respectively and for females were 4.78, 1.58 and 3.00, respectively. Higher ratios were found for female subjects than male subjects. The incidence of coronary heart disease (CHD), is related positively to the level of HDL-C and negatively to that of HLD-C, and TC/H and L/H is more predictive of CHD than either LDL-C or TC alone.

Quartile values of the lipid profile of the subjects

When the quartile values of the lipid profile of the subjects was calculated (Table 3), it was seen that the 50th percentile or the median values for TC were 198mg/dl for females and 193 mg/dld for males, while the 75th percentile vales were 206 mg/dl and 208 mg/dl for males and females, respectively, which indicates high levels. The TG values at the 50th percentile were 158 and 167 mg/dl whereas the 75th percentiles were 187 and 189 mg/dl for females and males respectively.

Table 3 : Quartile values of the lipid profile of the male and female subjects (37-75 y)

Variable		Minimum	25%	Median	75%	Maximum	Mode
TC	F	155.0	187.0	198.0	208.0	339.0	180.0
	M	146.0	186.0	193.0	206.0	357.0	187.0
TG	F	65.0	126.0	158.0	187.0	371.0	173.0
	M	88.0	132.0	167.0	189.0	360.0	152.0
LDL-C	F	83.0	109.0	121.5	138.0	258.0	106.0
	M	83.0	111.0	118.0	132.0	279.0	117.0
HDL-C	F	34.0	40.0	42.0	44.0	50.0	44.0
	M	36.0	40.0	42.0	45.0	48.0	40.0
VLDL-C	F	17.0	25.0	32.0	38.0	74.0	37.0
	M	14.0	26.0	33.0	37.0	72.0	37.0

Lipid profile and atherogenic indices of the subjects in relation to the age (35-55y vs 56-75 years)

Table 4 shows that the females had higher values for TC than the males, which increased in the older age group. When the lipid values were analyzed according to age i.e, 35-55 years and 56-75 years, all the lipid parameters monitored increased with age except for TG and VLDL-C in females, which decreased as the age increased. The HDL-C values remained the same in both the sexes in both the age groups.

The TC/H, TC/L and L/H ratios were higher for females than males. It is also noted that as the age increases, the ratios also increases. Late middle age is an important period in life of women during which time changes in physical activities and lifestyle occur

Table 4 : Lipid profile and atherogenic indices of the male and female subjects in relation to age
(Mean $\pm$ S.D, mg/dl) (n=162)

Variable		35-55 Years	56-75 Years	't' Value
N	Males	66	38	
	Females	43	15	
	Total	109	53	
TC	Males	197.3 $\pm$ 25.18	201.9 $\pm$ 32.26	0.78
	Females	201.2 $\pm$ 33.41	210.2 $\pm$ 36.31	0.86
	Total	198.9 $\pm$ 28.77	204.9 $\pm$ 33.67	0.85
TG	Males	162 $\pm$ 45.85	177.8 $\pm$ 47.54	1.65
	Females	172.8 $\pm$ 62.52	141.5 $\pm$ 34.36	1.81
	Total	166.3 $\pm$ 53.32	170.2 $\pm$ 47.22	1.85
HDL-C	Males	42.5 $\pm$ 3.30	41.9 $\pm$ 3.13	0.98
	Females	42.7 $\pm$ 3.54	42.1 $\pm$ 2.56	0.55
	Total	42.6 $\pm$ 3.39	42.0 $\pm$ 3.17	0.54
LDL-C	Males	122.4 $\pm$ 22.37	124.4 $\pm$ 29.98	0.57
	Females	123.9 $\pm$ 24.78	139.8 $\pm$ 31.29	1.89
	Total	123.2 $\pm$ 23.3	128.9 $\pm$ 29.77	1.36
VLDL-C	Males	32.4 $\pm$ 9.29	35.5 $\pm$ 10.06	1.15
	Females	34.5 $\pm$ 13.29	28.3 $\pm$ 6.40	2.04*
	Total	33.2 $\pm$ 11.18	34.0 $\pm$ 9.56	1.56
ATHEROGENIC INDICES				
TC/H	Males	4.65 $\pm$ 0.58	4.81 $\pm$ 0.63	1.3
	Females	4.71 $\pm$ 0.65	5.00 $\pm$ 1.02	2.81
TC/L	Males	1.64 $\pm$ 0.28	1.62 $\pm$ 0.14	0.13
	Females	1.63 $\pm$ 0.13	1.50 $\pm$ 1.34	2.25*
L/H	Males	2.86 $\pm$ 0.53	2.95 $\pm$ 0.61	0.88
	Females	2.90 $\pm$ 0.53	3.32 $\pm$ 0.63	1.27

which may have an impact on the health of the individuals as they progress into the elderly population. There was not much difference in the TC/L ratios between males and females of 35-55 years; whereas a marked difference was there in the TC/L ratio of males and females in 56-75 years age group. The L/H ratio also remained same in both males and females of 35-55 years; whereas the females had a higher L/H ratio than males in the 56-75 years age group. The TC/H ratio of males was higher than females in the 56-75 years age group.

Quartile values of lipid profile of the subjects (more than or less than 45y)

When the quartile values of the subjects who were more than 45 years were calculated, it was clear that (Table 5), the 50th percentile values for TC in the higher age group (> 45y) were lower (193 mg/dl)

**Table 5 : Quartile values of lipid profile of the subjects
(above or below 5y)**

Variable	Minimum	25%	Median	75%	Maximum	Mode
TC I *	157.0	188.0	202.5	230.0	303.0	157.0
TC II**	146.0	186.0	193.0	206.0	357.0	187.0
TG I	104.0	128.5	157.0	184.0	360.0	126.0
TGII	65.0	130.0	168.0	189.0	371.0	186.0
LDL-C I	88.0	105.0	127.0	149.0	183.0	88
LDL-C II	83.0	110.0	118.0	132.0	279.0	112.0
HDL-C I	36.0	42.0	44.0	46.0	48.0	44.0
HDL-C II	34.0	40.0	42.0	44.0	50.0	40.0
VLDL-C I	20.0	25.5	31.0	36.5	72.0	25.0
VLDL-C II	14.0	26.0	33.0	38.0	74.0	37.0

*I = <45 YEARS, ** II = >45 YEARS OF AGE

as compared to the younger age group (202 mg/dl). However, the older age group had a higher median value for TG (168 mg/dl vs 157 mg/dl), and lower values of protective lipoprotein HDL-C (42 vs 44). These results also emphasize the fact that as the population ages dyslipidemia occurs and thus it is important to inculcate therapeutic lifestyle changes early in life in order to have a healthy aging.

Comparison of the lipid profile of the normals with the hyperlipidemics

(TC $\leq$ 200 mg/dl and TG $\leq$ 150 mg/dl respectively).

It can be observed from Table 6 that out of the 162 subjects, only 21.6% were normal (had TC $<$ 200 mg/dl and TG $<$ 150 mg/dl) (13.5% males and 8% females). Twenty nine percent of the subjects were hyperlipidemics, with both the TC $>$ 200 mg/dl and TG $>$ 150 mg/dl (19.1% males and 9.8% females). The females no matter normal or hyperlipidemics had a higher TC, TG, and VLDL as compared to the lipid values of the male subjects. HDL-C value of the normal females was also marginally higher than males. While the remaining 50.6% subjects were having either a high total cholesterol (TC $>$ 200 mg/dl) or a high triglyceride value (TG $>$ 150 mg/dl).

The atherogenic indices of the females of the hyperlipidemic group were higher than males because of the considerably high TC and LDL-C values indicating an overall risk of CDDs in females, which were middle-aged, post-menopausal or elderly. Therefore, it can be concluded that the females had a higher risk of developing atherosclerosis and developing CDD's than males. This maybe due to the fact that the women are middle aged (average age 51.3 years), most of whom were post-menopausal, wherein the protective effect of the hormone estrogen is less pronounced.

Biochemical and Atherogenic indices of the hyperlipidemic subjects according to their age ($>$ / $<$ 45 years)

Table 6 indicates the biochemical and atherogenic indices of the subjects less than or more than 45 years of age. The males of the older category ($>$ 45 y) had a higher FBS, TC, HDL, LDL. No change was observed in the TG and VLDL-C values as compared to the hyperlipidemic males $<$ 45 years. However the TG levels were 209 mg/dl, which were far above the recommended values of $<$ 150 mg/dl. Thus, as per the ATP III Guidelines (2001), these subjects have to

Table 6 Comparison between the lipid profile of the normals with the hyperlipidemics (mean $\pm$ SD ng/dl) (n=162)

variable	%N	TC	TG	HDL-C	LDL-C	VLDL-C	TG/H	TG/L	L/H
Normals									
Males	(135)22	186 $\pm$ 135	119 $\pm$ 155	419 $\pm$ 295	1134 $\pm$ 213	233 $\pm$ 359	423 $\pm$ 04	157 $\pm$ 045	270 $\pm$ 068
Females	(82)13	177 $\pm$ 147	118 $\pm$ 179	426 $\pm$ 215	1113 $\pm$ 172	237 $\pm$ 732	416 $\pm$ 019	159 $\pm$ 03	261 $\pm$ 017
Total	(216)35	182 $\pm$ 139	1175 $\pm$ 162	422 $\pm$ 265	1155 $\pm$ 181	235 $\pm$ 546	423 $\pm$ 04	167 $\pm$ 035	252 $\pm$ 047
Hyperlipidemics									
Males	(19)31	252 $\pm$ 337	195 $\pm$ 510	455 $\pm$ 365	1418 $\pm$ 307	399 $\pm$ 102	513 $\pm$ 07	159 $\pm$ 013	326 $\pm$ 068
Females	(98)16	232 $\pm$ 365	224 $\pm$ 662	443 $\pm$ 435	1460 $\pm$ 295	448 $\pm$ 1417	532 $\pm$ 07	160 $\pm$ 017	329 $\pm$ 071
Total	(201)4	286 $\pm$ 350	208 $\pm$ 578	458 $\pm$ 385	1432 $\pm$ 306	416 $\pm$ 121	523 $\pm$ 07	159 $\pm$ 015	328 $\pm$ 068

control the LDL-C and reduce it to < 100 mg/dl. The Atherogenic indices also reflects that the older age group has a higher TC/H ratios as compared to the younger age group in both males as well as females. If the TG levels are > 150 mg/dl and primary aim of therapy is to reach LDL goal, intensify weight management, □ increase physical activity. If triglycerides are 200 mg/dl after LDL goal is reached, set secondary goal for non-HDL cholesterol (total - HDL) 30 mg/dl higher than LDL goal. (ATP III guidelines, 2001).

Discussion

High blood cholesterol is a risk factor for coronary heart disease (CHD). Results of the Framingham study (1998) showed that the higher the cholesterol level, the greater the CHD risk. On the other end of the spectrum, CHD is uncommon at total cholesterol levels below 150 mg/dl (Kennel, *et al.*, 1971). A direct link between high blood cholesterol and CHD has been confirmed by the Lipid Research Clinics-Coronary Primary Prevention Trial (1984), which showed that lowering total and LDL ('bad') cholesterol levels significantly reduces CHD. A series of more recent trials of cholesterol lowering using statin drugs have demonstrated conclusively that lowering total cholesterol and LDL-cholesterol reduces the chance of having a heart attack, needing bypass surgery or angioplasty.

Low density lipoprotein (LDL-C) is one of the fractions of total cholesterol that is severely atherogenic in nature. Increased accumulation of this fraction leads to subsequent accumulation of the same in the intima of the arterial wall, which causes oxidation of the fraction. When baseline LDL cholesterol is 100–129 mg/dl, several therapeutic options likewise are available. All approaches include TLC as initial therapy. Depending on circumstances, the following options are available:

- Inclusion of therapeutic dietary options (e.g., plant stanol/sterols and increased viscous fiber) can help to achieve the LDL goal.
- If LDL cholesterol levels remain appreciably above 100 mg/dl after 3 months of maximal dietary therapy, consideration can be given to adding an LDL-lowering drug.
- If the patient has an elevated triglyceride or low HDL cholesterol level, another lipid-lowering drug can be considered (e.g., nicotinic acid or fibric acid).

- If the LDL cholesterol level falls to near the goal on dietary therapy alone, the physician can choose to forgo use of a lipid-lowering drug for the present.

Because other risk factors may have contributed importantly to development of CHD in persons with low LDL levels, maximal control of nonlipid risk factors is necessary (ATP III guidelines, 2001).

A comparison of the TC and TG values in the present study revealed that even in the urban Vadodara (Table 7), subjects, registered with the health center had a higher TC and TG as compared to the free living. Also, with the change in the decade higher values are observed indicating the fact that the prevalence of CDDs and mild to moderate risks of CDDs have increased in India, which is rapidly changing to an urbanized sector with a change in lifestyle and dietary habits.

Table 7 : FBS and lipid profile of the hyperlipidemic subjects according to their age (mean $\pm$ SD)

Variable	Males		Females	
	< 45 y	> 45 y	< 45 y	> 45 y
FBS	98.2 $\pm$ 51.68	99.8 $\pm$ 27.62	107.2 $\pm$ 70.88	105 $\pm$ 13.5
TC	225.2 $\pm$ 31.47	235.9 $\pm$ 42.81	233.5 $\pm$ 36.69	247.0 $\pm$ 33.0
TG	209 $\pm$ 62.62	209.1 $\pm$ 43.85	231.6 $\pm$ 67.52	174 $\pm$ 17
HDL-C	43.59 $\pm$ 4.15	44.2 $\pm$ 3.29	44.2 $\pm$ 4.6	45 $\pm$ 1.00
LDL-C	139.7 $\pm$ 24.86	150.1 $\pm$ 42.1	144.2 $\pm$ 28.75	167.5 $\pm$ 30.5
VLDL-C	41.93 $\pm$ 12.52	41.5 $\pm$ 8.60	48.0 $\pm$ 14.31	34.5 $\pm$ 3.5
TC/H	5.10 $\pm$ 0.53	5.33 $\pm$ 0.90	5.30 $\pm$ 0.75	5.5 $\pm$ 0.85
TC/L	1.61 $\pm$ 0.14	1.59 $\pm$ 0.11	1.59 $\pm$ 0.11	1.48 $\pm$ 0.07
L/H	3.18 $\pm$ 0.48	3.40 $\pm$ 0.94	3.40 $\pm$ 0.94	3.73 $\pm$ 0.76

The Framingham heart study in a 26-year follow-up indicated morbidity in coronary artery disease to be twice as high in men as compared to women. Around 60% of the coronary events occurred in men (Lehner and Kannel, 1986). Studies show that women share the same coronary risk factors as men including serum cholesterol levels and other risk factors unique to their gender (Gotto, *et al.*, 1990). Alterations in sex hormones either endogeneous or exogeneous are considered important determinants of coronary artery disease. One mechanism by which female sex hormones can influence risk is

through the estrogen-mediated increase in HDL-C (Leaf,1990). In order to keep the LDL low, it is advisable to start on the Heart Healthy Diet, which is an eating plan that can help keep the blood cholesterol low and decrease the chance of developing heart disease.

It has been observed that 4/5th of fatal myocardial infarction are in patients aged 65 and older. Serum lipoproteins are the best markers of cardiovascular risk. In children and young adults, the plasma total cholesterol concentration decreases between the ages of 10 to 20 years, but after the age of 20 the total cholesterol concentration increases progressively and in men reaches a plateau between 50-60 years, whereas in women reaches a peak around 60 years. The rate at which LDL-C increases in women begins to accelerate between 40-50 years of age. HDL-C concentration increases in males during puberty and early childhood. The triglyceride concentration increases progressively throughout their lifetime. It has also been established that elevated LDL-C and low HDL-C correlates directly to the risk of coronary diseases. It can be concluded that as the age increases the lipid values also increases. Therefore, the elderly are at a greater risk of CVD.

However, since in women, there seems to be a higher increase in total cholesterol and LDL-C after 60 years, recommendations may concern some lowering of saturated fat. Importantly, weight reduction and maintaining normal blood pressure (with or without salt restriction) will be good. The saturated fat may form 7% of total calories for vegetarians as another 7% may come from MUFA and 7% from PUFA. For a women requiring 2000 Kcal/day, 7% means 140 Kcal from saturated fat i.e., 15gm/day, which means only 3 teaspoons of ghee (a clarified butter, consumed by Indians), rest 6 tsp may come from other fats and oils (Nambiar and Seshadri, 2004).

South Asians are a rapidly growing population in the United States. There has been some special interest in this group because they have been reported to have very high prevalence of coronary disease at younger age in the absence of traditional risk factors. The higher CHD risk in this population may be related in part to a higher prevalence of insulin resistance, the metabolic syndrome, and diabetes. Lipoprotein (a) levels have also been reported to be elevated although its contributions to the observed increased CHD risk are unclear. Special attention should be given to detection of CHD risk factors in South Asians. Also, increased emphasis should be given to life style changes

to mitigate the metabolic syndrome in this population. Cholesterol management guidelines are the same as those for other population groups (ATP III guidelines, 2001).

The present study highlights the fact that CDDs are emerging public health problems of the developing countries and has invaded India at an unbridled momentum. It is time that the medical fraternity realizes this fact and realizes the need and potential of the nutritionist/dietitians of the country in bringing down the prevalence of CDDs. Therapeutic lifestyle changes; especially advice of correct diet is the call of the hour. Appropriate dietary advice will not only help in controlling the biochemical indices of the “moderate” or “at risk population”, but will also bring down the worldwide burden of disease and disability. This would inevitably reduce the government’s expenditure on health and medicine.

Acknowledgements

The authors convey special thanks to Dr Kiran Shinglot for his kind cooperation and to Mrs Sheelaben of the University health center for laboratory assistance.

References

- Framingham study 1985-88 (1998) : Primary prevention of CHD. A statement for health care professional and AHA task force on risk.
- Gordon, T., Castelli, W.P., Hjortland, M.C., Kannel, W.B. and Dawber, T.R. (1977) : High density lipoprotein as a protective factor against coronary heart disease. The Framingham study. *Am. Jr. Med.* 62: 707-714.
- Gotto, A.M., La Rosa, J.C. and Humming, D. (1990) : A summary of the evidence of relative dietary fat, serum cholesterol and coronary artery disease. *Circulation* 81(5) : 1721-29.
- Kannel WB, Castelli WP, Gondo T. 1971 : Serum cholesterol, lipoproteins and the risk of Coronary Heart Disease; The Framingham Study *Am. Jr. Intern. Med.* 74 : 1-12.
- Lavie, C.J., Ray, S.W. and Gau, G.T. (1987) : Prevention of cardiovascular disease Cardiovascular disease. 81(5) : 52-71.

- Leaf, D.A.(1990) : Women and coronary artery disease.Post. *Grad. Med.* 84 : 935-41.
- Lehner, D.J. and Kannel, W.B. (1986) : Patterns of coronary heart disease morbidity and mortality in the sexes; A Framingham Study. *Am. Heart Jr.* 111 : 383.
- Nambiar, V.S. and Seshadri, S. (2004) : Dietary patterns and its relation to relation to disease profile in postmenopausal women (part II). *Indian J Gerontol.* Vol. 18 (8): 73-84.
- NHLBI (1984) : The relationship of reduction in incidence of coronary heart disease to cholesterol lowering *JAMA*, Jan, 20, 251 (3) : 365-74.

Effect of physiological problems on dietary intake of elderly

Namita Jain and Meenal Phadnis

Department of Home Science
Govt. M.L.B. Girls Auto. P.G. College, Bhopal

ABSTRACT

Aging is generally defined as a process of deterioration in functional capacity of a human being resulting from the physiological changes that occur with age. These changes in turn lead to physio-pathological changes. Present paper aims to deal with the effect of these problems on intake of nutrients by elderly. Sample for the study comprises of 300 elderly; 169 male and 131 females. The effect of dental condition and of physiological problems other than dental, on nutrient intake, is studied. The results show that the intake of calorie by both genders having no teeth, no denture was significantly lower than those having natural teeth. Intake of calorie by elderly males having partial teeth, whole denture and no teeth no denture in comparison to elderly male having natural teeth is found to be significantly lower, whereas no significant difference was found between the intake of calorie by elderly females having partial teeth, partial denture and whole denture in comparison to the intake of calorie by elderly females having whole natural teeth. The comparison of mean intake of nutrient by elderly having no physiological problem and those having one or more physiological problem shows significantly lower intake of all the five nutrients, (calorie, protein, carbohydrate, fat and calcium) in case of elderly with physiological problems.

Keywords : Dietary intake, Nutrients, Elderly, Calorie, Physiological problems.

In India there are over 70 million people above sixty years of age (commonly referred to as elderly) i.e. $\approx$ 6 per cent of population which

is likely to touch a hefty 12 per cent by 2025 when they will burgeon to about 150 millions (Census, 2001). But the demographic transition commonly known as greying of nations is no longer taken as just another statistical projection, nor does it arouse pride in having raised our life expectancy to a respectable level. What is now occupying the attention of all concerned is how to respond effectively to the growing needs of millions of elderly persons we are being continuously blessed with.

All persons, who live long enough, experience the effect of aging. The changes in body and mind seen in the later half of life span are popularly referred to as aging. The changes due to aging vary from individual to individual. Some age slowly, some age fast. Even different organs age at different rates. Inter-personal variations are larger than intra-personal variations. These changes are a result of interplay of several factors like heredity, environment, physical, psychological and lifestyle.

Physiological aging corresponds with the biological process that occurs during aging. However, several physio-pathological changes occur during this long biological process, covering several decades, which gradually convert the physiological into pathological aging. Physiological changes in old age are inevitable, irreversible and progressive.

Methodology

A total of 300 elderly persons i.e. 60y and above, living within the municipal limits of Bhopal, comprised of 56.3% (169) males and 43.7% (131) females were selected. Income wise distribution was 42.7% (128) LIG, 32% (96) MIG, and 25.3% (76) HIG.

SPSS (Statistical Package for Social Sciences) has been used for analysis of data. Results have been tested at 95% confidence level using comparison of means one sample t-test, and comparison of means independent sample t-test.

Physiological problems faced by elderly are divided into two groups for the purpose of analysis. First being dental condition, which is further divided into five categories namely, natural (whole) teeth, partial teeth and partial denture, partial teeth, whole denture and no teeth no denture. In the other group, physiological problems other than dental condition includes problems like lack of appetite, chronic fatigue, constipation, diarrhoea, nausea, depression, fever, difficulty in chewing/ masticating (problems related to gums), fever, indigestion, acidity, and vomiting.

Results and Discussion

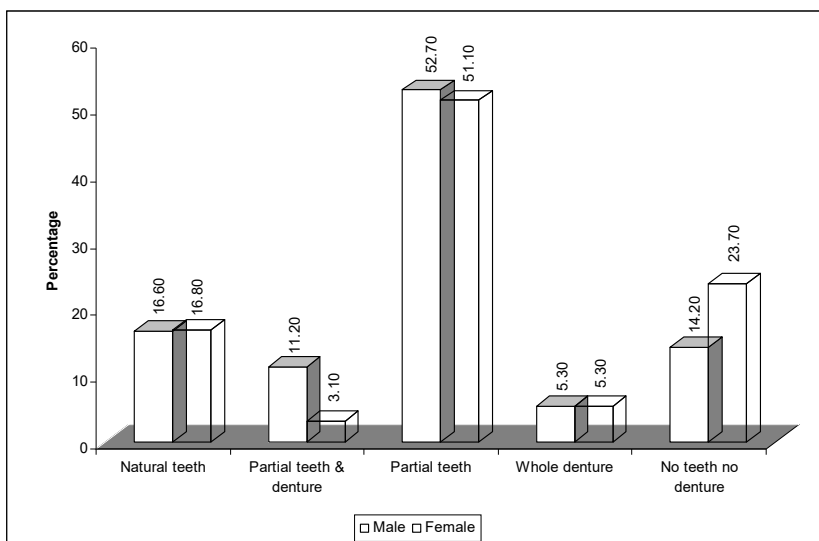


Figure-1 : Dental Status of the sample

Fortunate elderly having whole natural teeth are 16.6% males and 16.8% females. Only 3.1% females and 11.2% males have partial natural teeth and partial denture. Approximately 50% of the sample has partial teeth. Only 5.3% of males and females preferred the use of whole dentures. There are 14.2% males and 23.7% females in the category of no teeth nor denture (Fig. -1).

Nutrient intake according to dental condition

Table-1 : Mean nutrient intake according to dental condition

Nutrient intake	Natural teeth n=50	Partial teeth n=156	Partial teeth partial denture n=23	Whole denture n=16	No teeth no denture n=55
Calorie (Kcal)	1886.04	1804.17	1850.47	1722.33	1648.80
Protein (g)	60.46	56.06	55.59	53.18	50.58
Fat(g)	41.36	44.39	40.13	34.48	34.58
Calcium(mg)	445.53	460.43	466.67	406.67	430.43

As age advances, the dental condition deteriorates. Table-1 describes the mean nutrient intake of the elderly having different dental conditions. The mean intake of energy and protein is highest in elderly having whole natural teeth, and is lowest in elderly having no teeth nor denture but the mean intake of calcium is more in elderly having partial teeth and partial denture. The mean intake of fat and calcium is found to be lowest in elderly using whole denture.

As we are well aware, the condition of teeth affects the chewing of food and therefore intake and digestion of food. Elderly having whole natural teeth are able to chew and bite their food properly in comparison to those having partial teeth or partial denture. As observed, elderly subjects did not feel very comfortable with their partial denture.

Comparison of calorie intake by subjects with different dental conditions.

To find out whether the intake of nutrient was significantly different in the groups, independent sample t-test for equality of means was run for both genders (Table-2). The intake of calorie by both

genders having nor teeth nor denture was significantly lower (at 95% confidence level) than those having natural teeth. Significant difference was found between the intake of calorie by elderly males having partial teeth, whole denture and no teeth nor denture in comparison to elderly male having natural teeth. No significant difference was found between the intake of calorie by elderly females having partial teeth, partial denture and whole denture in comparison to the intake of calorie by elderly females having whole natural teeth. It was observed that females preferred eating 'kichdi', 'dalia' (porridge), mashed blend foods as compared to elderly males who did not relish these food items. Significant difference was found ($p = 0.005$) in the intake of calorie by males having whole dentures compared to their counterparts with whole natural teeth.

Table-2 : Comparison of mean calorie intake by subjects with different dental conditions

Group	Dental condition	N	Mean calorie intake (kcal.) $\pm$ SE*	'p' value
Males		169		
A.	Natural teeth	28	2007.86 $\pm$ 30.97	
B.	Partial teeth	89	1875.67 $\pm$ 33.35	0.035
C.	Partial denture	19	1900.89 $\pm$ 55.37	0.760
D.	Whole denture	09	1781.67 $\pm$ 96.22	0.005
E.	No teeth nor denture	24	1596.04 $\pm$ 38.83	0.000
Females		131		
A.	Natural teeth	22	1748.18 $\pm$ 36.04	
B	Partial teeth	67	1702.31 $\pm$ 28.58	0.399
C.	Partial denture	04	1803.75 $\pm$ 40.99	0.531
D	Whole denture	07	1756.43 $\pm$ 139.77	0.935

E	No teeth nor denture	31	1639.35±24.49	0.012
---	----------------------	----	---------------	-------

*Mean calorie intake by group B, C, D and E is compared to group A.

Due to loss of teeth and periodontal disease chewing and eating becomes very embarrassing for the elderly. Ill-fitted dentures result in avoidance of food, which require thorough chewing and thus tend to limit the diet to softer and easily chewable foods. Bagchi (1999) reported altered food intake with preference for liquid and soft mashy diet by elderly who have lost teeth and find difficult to chew and masticate food.

Seiham and Steele (2001) assessed how dental status of elderly affects the ability to eat and nutrient intake. They reported low intake of raw vegetables, fruits, nuts and steak by dentate (with natural teeth) and also by edentate (without natural teeth but with denture). Intake of most nutrients and that of fruits and vegetables was significantly lower in edentate than dentate.

Table -3 shows the comparison of mean nutrient intake of elderly having no physiological problem and those having physiological problem. The consumption of nutrients was compared using independent sample t-test for equality of means at 95% confidence level. The difference is found significant in all the five nutrients.

Table-3 : Comparison of mean intake of nutrients by elderly with or without physiological problems

Nutrient intake	Without physiological problems n = 106 Mean±SE	With physiological problems n=194 Mean±SE	‘p’ value
Calorie (kcal)	189101±27.26	1732.01±17.85	0.000
Protein (g)	59.53±1.02	53.70±0.68	0.000
Carbohydrate (g)	291.75±4.28	270.50±2.82	0.000
Fat(g)	40.53±0.806	36.34±0.573	0.000

Calcium(mg)	505.66±16.13	411.86±9.07	0.000
-------------	--------------	-------------	-------

The consumption of all the nutrients being lower in case of subjects having physiological problem was mainly due to gastrointestinal disturbances. More of liquid or semi solid diet was preferred during chronic phases of discomfort and flatulence drastically altered the dietary pattern due to the feeling of fullness and sour warping giving a bad taste in the mouth. Milk was found to trigger diarrhoea and nausea in some cases. Similar finding has been published in FDA consumer magazine (FDA, U.S. Government, 2004). It states that some older people may overly restrict food important for good health because of chewing difficulties and gastrointestinal disturbances like constipation, diarrhoea and heartburn. Adverse reaction from medications can cause older people to avoid certain food, which can adversely affect appetite. Other physiological problems like chronic fatigue that may be because of physiological or psychological reason was found to be a major factor in lack of desire to eat.

Parker and Chapman (2004) stated that the control of appetite is complex but it is clear that gastrointestinal signals functions bring about changes in appetite and food intake. Gastrointestinal motor functions bring about changes in appetite and food intake in older people. Morley (1997) reports that the physiologic anorexia of ageing puts elderly at high risk for developing protein energy malnutrition. Depression was found to be a major cause of severe weight loss. Significant changes in gastrointestinal functions decrease in physical activity and many sensory and social factors contribute to under nutrition in older people.

Conclusions

Most of the elderly are faced with poor dentine condition making chewing and masticating of food difficult. Very few elderly are fortunate enough to have whole natural teeth at this stage of life. Dentures pose a problem if not fitted properly, therefore most of the

elderly prefer to continue with partial natural teeth, and some have partial denture permanently fitted.

References

- Bagchi, K., (1999) : 'Nutrition and ageing, an overview' in Bagchi, K. and Puri, S. (ed.) *Diet and Ageing : exploring some facets* : Society for gerontological research and Helpage India, New Delhi, 7-17.
- Morley, J.E. (1997) : 'Anorexia of ageing : physiologic and pathologic', *AmJ Nutr.* 66 : 760-73.
- Parker, B.A. and Chapman, I.A. (2004) 'Food intake and ageing - the role of the gut', *Mechanism of Ageing and Development*, 125 : 859-866.
- Sheiham, A., and Steele, J. (2001) : 'Does the condition of the mouth and teeth affect the ability to eat certain foods; nutrient and dietary intake and nutritional status amongst older people ?' *Public Health Nutr*, 4 : 797-803.

Indian Journal of Gerontology
2007, Vol. 21, No. 1, pp 52-60

Self-actualization and locus of control as a function of institutionalization and non-institutionalization in the elderly

Philip O. Sijuwade

*School of Urban and Public Affairs
University of Texas, Arlington, Texas (U.S.)*

ABSTRACT

Adaptation to the aging process in the American Society would appear to represent a problem for at least a portion of the elderly population. This research represents a limited attempt to bring additional insights to bear on the adaptive portion of the aging process. Both groups of the elderly (institutionalized and non-institutionalized) indicate an extremely oriented view of the social environment in which they exist. These results also provide some evidence in support of Hamilton's (1985) contention that institutionalized elderly individuals are less self-actualized than elderly persons living in the community.

Keywords : Self-actualization, Internal control, External control, Institutionalization, Non-Institutionalization.

Old age is the final stage of the aging process. This process can be traced as far back as the work of Quetelet who in 1835 focused attention on the length and quality of the lives of elderly (Birren, 1964). Hall (1922) contributed to the field with insights referring to aging as the inverse process of development. By the 1930's, Buhler and Brunswick (Birren, 1964) noted differences in the values and goals of the elderly. From the late 1940's into the present time, government agencies and academic researchers have been involved in the physiological, psychological, and sociological aspects of the aging process and the implications

concomitant to adaptation to the final stage of aging. Insights gleaned from these efforts, while helpful for understanding the process and adaptive efforts of an increasing number of Americans who encompass the gerontological segment of the American population, also hold important implications for all facets of society.

Approximately one-third of the United States' population is 65 or older (United States Bureau of Census, 2004). Given these conditions an ever increasing number of the elderly seemingly will be destined to live in an institutional setting. Maddox (1996) reported that nursing homes offer the elderly the "only formal type of treatment available". He also stated that institutions are primarily a place of residence for elderly who have nowhere else to live. This forced choice seems to have a negative implication not only on the elderly, but also on the family and relatives involved.

Stein and Ross (2005) implied that the elderly individuals in a nursing home viewed their lives with extreme pessimism and that "institutionalization is not in the best interest of the elderly". They indicated that the elderly seem to feel abandoned and useless, due to their lack of input into the surrounding environment. Also, Stein and Ross (2005) implied that the relatives of the institutionalized individuals "never have their parents committed without some remorseful feelings". Hamilton (1985) also implied that the elderly deem their situation as a misfortune due to the inability of the individual to live at home. The elderly individual not living in his own home may be inhibited from reaping any benefits he could acquire from his former familiar surroundings. Therefore, Hamilton (1985), suggested that the elderly are faced with a crucial decision; either adapt to the institutional setting or disengage oneself. Numerous studies have been accumulated, and many seem to indicate that institutionalized elderly, when compared to their non-institutionalized counterparts, demonstrated an impaired adaptation and adjustment.

Method

Subjects

The total number of male and female subjects was 48 with an age range between 65 and 90. Two groups of subjects were utilized, the first group consisted of 24 non-randomly selected subjects living in four nursing homes located in Northeastern Texas. The remaining 24 subjects consisted of non-institutionalized individuals. Both groups were interviewed on a volunteer basis. In essence, the sample of elderly individuals represented a non-probabilistic or an "availability" sample of elderly residents of two cities of about 10, 000 and 25, 000 in total population. The institutionalized groups consisted of persons residing for a minimum of two years in a nursing home. The second group, non-institutionalized elderly, had never resided in a nursing home. The subjects, comprised of 96% white and 4% black, were of predominantly rural backgrounds. For both groups, females represented the majority of subjects (83%), while the remaining 17% were males. Educational background levels ranged from having finished middle school (42%), to post high school and college (58%).

Measures

Levenson's (1983) modified internal-external locus of control measure was used. This measure breaks the locus of control concept into three dimensions, internal, powerful others, and chance. On each of these scales one item was omitted due to the inability of the elderly to identify with these items. In conjunction, the Levenson scale was chosen to measure internal-external locus of control because it purports to measure the degree to which individuals feel control over their own social and psychological environment. In addition, the three scales are statistically independent of one another. Levenson's three dimensional scale used the internal locus of control (ILC) as one dimension and the external scale subdivided into the other two scales, powerful others and chance. The rationale for differentiating the two types of externals, stems from the

assumption that those who believe a world is ordered uphold the belief that powerful others are in control of that social order (Levenson, 1983).

The Personality Orientation Invention (POI) scale (Shostrom, 1996), a measure of self-actualization consisting of 150 items gives researchers the opportunity to measure more comprehensively wide ranging value and behavioral systems of self-actualizing persons. The POI consists of two major scales, time and support. The support scale purportedly measures inner-direction and other-direction as related to self-actualization (Shostrom, 1996). Inner-directed are guided by inner motivations and are more self-actualizing than are externally oriented individuals. Other-directed persons are more easily controlled by outward influence and react to external pressures (Shostrom, 1996).

The time scale determines whether an individual perceives that they live in the present, past or future. Self-actualized individuals tend to tie all three in a coherent order. On the other hand, non-self-actualizers tend to be more oriented toward present goals. As such, non-self-actualizers tend to experience more feelings of guilt, resentment, and regret than do self-actualizers.

The Interviews

All interviews were carried out by a female graduate student. A pilot study prior to the actual study was run to gain experience and to determine if the elderly would cooperate in fulfilling the interviewer's expectations. In the present study, one problem was subject fatigue. Each subject was interviewed at the same time of day for both sessions. During the first session, administration of the 21-item Levenson scale was followed by the first half of the self-actualization scale. In the second session, administration for the last half of the self-actualization scale took place. Each session included a brief social exchange to establish rapport with the subject. Both interview sessions lasted between 30 and 45 minutes.

Results

The internal locus of control mean scores and standard deviations for the institutionalized elderly are reported in Table 1 along with the adult standardized norm score recorded by Levenson (1983). The data indicate that both institutionalized and non-institutionalized persons are less internal (or more highly external) in their world view than are the comparison groups. According to Levenson (1983), externally oriented individuals are less self-actualized than internally oriented individuals. Low self-actualization of the elderly may be due to many factors, some of which will be discussed in the following section.

Table 1 : Mean scores and standard deviations for institutionalized and non-institutionalized elderly, and Levenson's adult standardized norm

Source	Mean	Standard Deviation
Institutionalized elderly		
Internals	27.79	3.60
Externals		
Powerful Others	22.33	5.49
Chance	23.04	5.15
Non-Institutionalized Elderly		
Internals	28.54	6.99
Externals		
Powerful Others	22.75	8.39
Chance	20.20	10.17
Adult Standardized Norm		
Internals	35.25	5.90
Externals		
Powerful Others	18.04	7.90
Chance	14.79	8.37

Analysis of variance of Levenson's internal, powerful other, and chance, mean scores between institutionalized and non-institutionalized elderly resulted in a non-significant F value ($F = .23, p .05$) as indicated in Table 2.

Table 2 : Analysis of variance reported for the Levenson, Internal Powerful Others and Chance Scale

Source	Sum of Squares	d. f.	M. S.	F-Value
A (Residency)	11. 11	1	11. 11	0.23
B (Scales)	1204.39	2	602.19	12.35
A X B	94.05	2	47.03	0.96
W Cell	6730.67	138	8.78	
p<.001				

The self-actualization scores based on the time and support scales of the Personality Orientation Inventory are reported in Table 3. The data indicate that both the institutionalized and non-institutionalized groups scored below non-self-actualizers verified in previous Personality Orientation Inventory tests (Shostrom, 1996). These results clearly suggested a lower degree of self-actualization among our total sample of elderly persons. When comparing the experimental and control groups, major differences are noted between these two. The lower mean scores reported for the institutionalized elderly are suggestive of the debilitating effect of nursing homes.

Table 3 : Self-actualization means and standard deviations reported for institutionalized and non-Institutionalized elderly and non-self-actualized adults

Source	Mean	Standard Deviation
Institutionalized Elderly		
Support	62.58	8.27
Time	11.45	2.43
Non-Institutionalized Elderly		
Support	73.46	7.81
Time	14.79	3.82
Non-Self-Actualizers		
Support	75.80	16.20
Time	15.80	3.60

Table 4 : Analysis of Variance Reported For Time And Support Scale

Source	Sum of Squares	d. f.	M. S.	F-Value
A (Residency)	1211.26	1	1211.26	32.30

B (Scales)	72,325.26	1	72,325.26	1928.83
A x B	341.26	1	341.26	9.10
W Cell	2449.71	92	37.49	
p<.001				

Analysis of variance of the time and support scales of self-actualization (POI) was used in providing an F value indicated significant difference ($F=32.30$, $p<.001$) between institutionalized and non-institutionalized groups.

Discussion

The internal, powerful others, and chance mean scores for both groups were below the average scores of the Levenson standardized adult norm. However, both institutionalized and non-institutionalized individuals scored high on the external scales (powerful others and chance), while scoring low on the internal scale. These data indicate an external world view or external locus of control for individuals constituting this sample. In conclusion, self-actualization of the elderly may be due primarily to an inability of elderly persons to adapt to the aging process. In essence, both the control and experimental groups indicated extremely high external orientation, an orientation inversely related to high self-actualization.

The F-value obtained between the mean scores recorded for the time and support scales for the institutionalized subjects are significant at the .001 level. These results provide some evidence in support of Lieberman, Prock, and Tobin's (1988) research conclusions which suggested that the institutionalized elderly have more negative psychological and physical problems than elderly individuals who live in the community. In accordance. Ames, Learned, Metraux, and Walker (1974), indicate a common denominator among nursing home residents which consistently demonstrated a distinct lack of adaptation to the nursing home milieu. The F-value obtained between the mean scores of the external locus of control (powerful others, chance) scales of the institutionalized and non-institutionalized groups indicated no significant differences. These results, however, indicated that both groups scored high on the external (powerful others and chance) scales, and therefore were low on the internal end of the locus of control attitude continuum. In sum, both groups seem to indicate an externally oriented view of the social environment in which they exist. These results also provide some evidence in support of Hamilton's

(1985) contention that institutionalized elderly individuals are less self-actualized than elderly living in the community. A possible explanation for this externally oriented view is that an elderly person may adapt to an institutional environment only because he comes to accept that the control over all the aspects of his life is determined by the institutional staff. Such an adaptation would necessarily tend to cause one to sacrifice or lead one away from fulfilling inner-directed tendencies. Beatty (1992) indicated that the persons with inner-directed orientations were significantly more self-actualized than persons with an external locus orientation. Both groups in this study fit this condition in indicating a high external world view orientation which may, in turn, result in low self-actualization.

Conclusion

Adaptation to the aging process in American Society would appear to present a problem for at least a portion of the elderly population. This research represents a limited attempt to bring additional insights to bear on the adaptive portion of the aging process. It could well be the case that age differences, even within the elderly population, and city size are important factors for adaptation during the aging process.

Old age can be a satisfying period of life if the problem of the aging process is dealt with (Beatty, 1992). Many elderly individuals need assistance in maintaining their health and happiness. Beatty implied that if psychological, sociological, and physiological deterioration were retarded through normal community living, the elderly could uphold their internal locus of control and, as a result, retain their self-actualizing. It may be true that responsibility for the social, psychological, and physical determination of many older persons lies with the society, which promotes a negative stereotype of old age, a stereotype perpetuated by a youth-oriented society.

What we would argue here is that individuals hold on to both strong dependency needs as well as a sense of personal power, and control their own lives. The external elderly then would seem to fit this description no less than would the strongly dependent elderly. The implications for institutionalization would seem apparent when we came to realize the boredom and stigmatization in rest homes for the aged. The sense of powerlessness (externality) is the primary existential state of such persons (Reynolds and Farberow, 1996).

Familial relationships diminish or dissipate totally. Friendships are strained through lack of frequency, whereas such contracts would enhance and maintain a semblance of self-determination and power. In this regard, institutionalized elderly would appear to hold much in common with those relegated to institutions for the mentally ill. Reynolds and Farberow (1996) suggests that mental patients should be accorded a higher degree of control over their lives. And in Lohman's (1997) research for college students, similar sentiments were expressed when application of behavioristic reinforcement principles for the internal-external locus of control concept were applied. Such thinking supports innovations which would humanize the hospital system. Could we suggest any less for the vastly growing number of senior citizens?

References

- Ames, L. B, Learned, J. , Jetraux, R. and Walker, R., (1974) : *Rorshach Response in old age*. New York: Hoeber Harper.
- Beatty, R. (1992) : *The Senior Citizens*. New York:Charle C. Thomas.
- Birren, L. (1994) : *Aging in America*. Toronto, Canada : Beacon Press.
- Hall, H.M. (1922) : *Process of Aging. Social and Psychological Perspectives*. New York : Atherton.
- Hamilton, C. H. (1985) : *Your rewarding Years*. New York:Panthean Press.
- Levenson, H. (1983) : *Reliability and Validity of I. P. and C. Scales-A multi-dimensional view of Locus of Control*, A. D. A. Convention.
- Lieberman, M. , Prock, U. and Tobin, S. (1988) : Psychological Effects of Institutionalization. *Journal of Gerontology*, 23, 343-353.
- Lohman, W., (1997) : Correlation of Life Satisfaction Morale and Adjustment Measure. *Journal of Gerontology*, 32, 73-75.
- Maddox, C. (1996) : *The future of Aging and the aged*. Atlanta:Seminar Books.
- Reynolds, D., and Farberow, N., (1996) : *Suicide Inside and Out*. Berkeley: University of California Press.
- Shostrom, E., (1996) : Personal Orientation Inventory. San Diego:Educational and Industrial Testing Services.
- Stein, E., and Ross, M., (2005) : *You and Your Aging Parents*. New York : Harper and Row.

United States Bureau of Census. *Current Population Reports*. Washington, D. C:U. S Bureau of Census, 78, 61. 2004.

Indian Journal of Gerontology

2007, Vol. 21, No. 1, pp 61-74

Age related facial changes among rural and urban punjabi Brahmin females

Maninder Kaur and G.K. Kochar

Department of Home Science,

Kurukshetra University,

Kurukshetra (Haryana)

ABSTRACT

Present study is an attempt to explore age related changes in the facial frame work of rural and urban punjabi Brahmin females. Cross-sectional data is based on 870 Brahmin females (rural=450, urban=420), ranging in age from 40 to 70 years. Morphological facial height and facial width (bizygomatic breadth and bigonial breadth) of rural as well as urban females show a decline in their mean values with advancing age, but these changes are relatively of small magnitude. Morphological facial height of urban Brahmin females show higher mean values than their rural counterparts at all ages. Bizygomatic breadth and bigonial breadth of urban Brahmin females at most of the ages. Facial measurements (morphological facial height, bizygomatic and bigonial breadth) of the females of present study show lower mean values than Jat Sikh and Bania females at almost all ages.

Key Words : facial changes, rural-urban Punjabi females.

Facial aging is a dynamic process which continues throughout adult life. Individuals are affected to a variable degree depending on facial motor habits, exposure and susceptibility to damaging ultraviolet radiation, smoking and the microscopic tissue changes inherent to the aging process (Ellis and Ward, 1986).

The effect of age induced changes on face recognition are investigated as a means of exploring the role of age in the encoding of new facial memories. The major forces responsible for facial aging include gravity, soft tissue maturation, skeletal remodeling, muscular facial activity and solar changes (Zimbler, et. al., 2001).

Most of the existing studies have dealt with bodily and physiological age changes in different populations (Sidhu, et. al., 1975; Singal 1979; Sidhu, 1982; Banerjee and Sen, 1984; Majumdar, et. al., 1990; Hussain, 1997; Bagga, 1997; Tyagi and Kapoor, 1999; Tungdim and Kappor, 2003), but there is no report on this aspect for Punjabi Brahmin females. So the present study is an attempt to have fundamental knowledge of the age related changes in the facial frame work among rural and urban Punjabi Brahmin females.

Material and Method

The present study is based on cross-sectional sample of 870 punjabi Brahmin females (rural=450, urban=420), ranging in age from 40 to 70 years. The data was collected in two phases from the year 1999 to 2001 from the rural and urban areas of Roopnagar District (Punjab). In the first phase, field work was conducted in rural area and in second phase from the urban area. Care was taken to include only normal healthy individuals, who were not suffering from any chronic disease or physical deformity. The subjects were selected at random.

The data was arranged in six age groups, each of five years duration except for the first age group, which is of 6 years duration for both rural and urban punjabi Brahmin females. Age in years had been obtained from the date of birth, which most of the urban females could recall. Whereas in rural females age had to be ascertained in majority of cases by association with some important events like age at marriage, age of the first child, any important festival etc. With this cross-questioning, it was possible to ascertain nearly the correct age of the subject.

Three Anthropometric measurement morphological facial height, bizygomatic breadth and bigonial breadth were taken on each subject following the standard techniques as recommended by Weiner and Lourie (1981). For recording various measurement and to collect the other information, each subject was contacted individually at her residence and was interviewed regarding her educational status, place

of birth, occupation, age at menarche and age at menopause etc. Student's t-test was used to find out magnitude of rural-urban differences at all ages.

Results

Table 1-3 shows mean and standard deviation of morphological facial height, bizygomatic breadth and bigonial breadth of rural and urban punjabi Brahmin females.

Morphological facial height experiences a total decrease of 0.23 from an initial mean value of 10.23 cm at age group 40-45 to 10.00 cm at age group 66-70 in rural punjabi Brahmin females. Whereas urban Brahmin females show a total decline of 0.43 cm during the entire age range under study (table1). Average values of this dimension is higher in urban females at all ages, but t-values exhibit statistically significant difference at 40-45 years, 51-55 years and 61-65 years only.

Table-1 : Descriptive statistics for morphological facial height (cm) according to age in Brahmin females

Age group (in year)	Rural Brahmin Females			t-value	Urban Brahmin Females		
	N	Mean $\pm$ SD	SE		N	Mean $\pm$ SD	SE
40 - 45	75	10.23 $\pm$ 0.54	0.06	-2.82***	70	10.48 $\pm$ 0.52	0.06
46 - 50	75	10.13 $\pm$ 0.59	0.06	-1.80	70	10.28 $\pm$ 0.38	0.04
51 - 55	75	10.28 $\pm$ 0.63	0.07	-4.68***	70	10.77 $\pm$ 0.63	0.07
56 - 60	75	10.12 $\pm$ 0.65	0.07	-1.40	70	10.25 $\pm$ 0.39	0.04
61 - 65	75	9.85 $\pm$ 0.63	0.07	-3.32***	70	10.18 $\pm$ 0.56	0.06
66 - 70	75	10.00 $\pm$ 0.59	0.06	-0.46	70	10.05 $\pm$ 0.68	0.08

$p < 0.05^*$, $p < 0.02^{**}$, $p < 0.01$, $.001^{***}$

Mean values of bizygomatic breadth of rural Brahmin females show an increase upto age group 51-55, after that, it follows a downward course. But in urban Brahmin females it falls at age groups 46-50, thereafter follows upward course, till age group 56-60 and then shows a decline (table-2). The highest value of bizygomatic breadth is observed at age groups 51-55 (11.12 cm) and 56-60 (11.09 cm) and

minimum value is registered at age group 66-70 (10.66 cm) and (10.65 cm) in rural and urban Punjabi Brahmin females, respectively.

Table 2 : Descriptive statistics for bizygomatic breadth (cm) according to age in rural and urban Brahmin females

Age group (in year)	Rural Brahmin Females			t-value	Urban Brahmin Females		
	N	Mean $\pm$ SD	SE		N	Mean $\pm$ SD	SE
40 - 45	75	10.93 $\pm$ 0.58	0.06	0.68	70	10.86 $\pm$ 0.75	0.08
46 - 50	75	10.92 $\pm$ 1.27	0.14	0.61	70	10.81 $\pm$ 0.82	0.09
51 - 55	75	11.12 $\pm$ 0.61	0.07	1.11	70	11.02 $\pm$ 0.46	0.05
56 - 60	75	10.99 $\pm$ 0.53	0.06	-3.30***	70	11.09 $\pm$ 0.56	0.06
61 - 65	75	10.70 $\pm$ 0.66	0.07	-1.39	70	10.83 $\pm$ 0.41	0.04
66 - 70	75	10.66 $\pm$ 0.56	0.06	-0.12	70	10.65 $\pm$ 0.41	0.04

$p < 0.05^*$; $p < 0.02^{**}$; $p < 0.01^{***}$

Statistically non-significant rural and urban differences have been obtained at all ages except for age group 56-60, where urban females show considerably higher mean values.

Starting with a mean value of 8.69 cm, bigonial breadth in rural Brahmin females decrease to 8.34 cm at age group 66-70, thereby showing a total decrease of 0.35 cm in this dimension during the age range under study (table-3). Urban females register the minimum mean value of 8.60 cm at 40-45 years which increases to 8.78 cm at 46-50 years registering a gain of 0.18 cm during this period.

Table 3 : Descriptive statistics for bigonial breadth (cm) according to age in rural and urban Brahmin females

Age group (in year)	Rural Brahmin Females			t-value	Urban Brahmin Females		
	N	Mean $\pm$ SD	SE		N	Mean $\pm$ SD	SE
40 - 45	75	8.69 $\pm$ 0.60	0.06	1.01	70	8.60 $\pm$ 0.44	0.05
46 - 50	75	8.66 $\pm$ 0.74	0.08	-1.06	70	8.78 $\pm$ 0.65	0.07
51 - 55	75	8.63 $\pm$ 0.61	0.07	-0.65	70	8.69 $\pm$ 0.45	0.05
56 - 60	75	8.64 $\pm$ 0.59	0.06	-0.21	70	8.66 $\pm$ 0.51	0.06
61 - 65	75	8.56 $\pm$ 0.62	0.07	0.00	70	8.56 $\pm$ 0.40	0.04

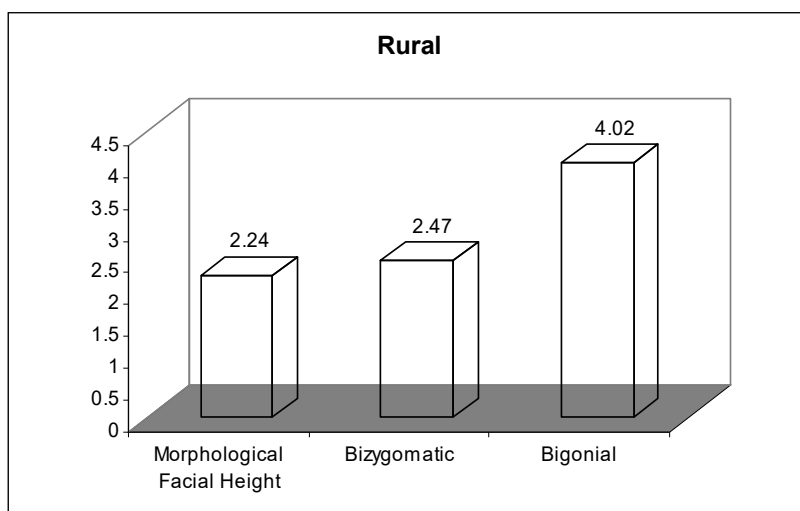
66 - 70	75	8.34±0.72	0.08	-1.33	70	8.47±0.35	0.04
---------	----	-----------	------	-------	----	-----------	------

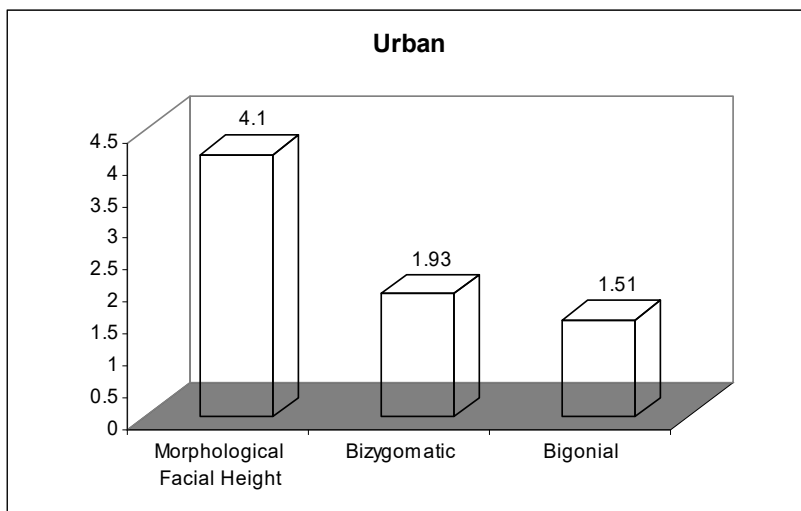
p<0.05*; p<0.02**; p<0.01, .001***

Whereafter the mean values show a regular decline in this parameter with the advancing age, t values reveal non-significant differences between rural and urban Punjabi Brahmin females for bigonial breadth at all ages.

It is clear from the above discussion that although mean values of all the facial measurements show a decline but the onset and magnitude of this decrement differ in rural as well as urban Punjabi Brahmin females. The percentage magnitude of decline for entire age range under consideration for morphological facial height is greater among urban females (4.1%) than their rural counterparts (2.24%) (fig.-1). Bizygomatic breadth of rural Brahmin females (2.47%) show greater percentage magnitude of decline than the urban Brahmin females (1.93%). Similarly for bigonial breadth, percentage magnitude of decline is greater for rural females (4.02%) than urban females (1.51%).

Fig.1 : Magnitude of percentage decline in facial measurements among rural and urban Brahmin females from 40 to 70 years





Discussion

Facial aging is a biological phenomenon. It reflects external marks of time. The changes in this region concerns the body support as well as musculo-cutaneous surface. Bartlett, et. al., (1992) carried out a detailed anthropometric analysis on 160 skulls from a caucasian population. He observed (1) an appreciable reduction of facial height, most marked in the maxilla and mandible, and strongly correlated with loss of teeth, (2) modest increase in facial width, (3) modest increase in facial depth, except in those regions associated with tooth loss, and (4) general coarsening of bony prominences.

In normative aging study (NAS) Damon, et, al., (1972) found that length and breadth of the face showed no significant differences over the decades, whereas Hooton and Dupertuis (1951) observed total face height increase through 30-34 years and decline thereafter. Jat Sikh and Bania females (Singal, 1979) show a decline in the mean values of morphological facial height after 46-50 years. Rural and urban punjabi Brahmin of the present study exhibit maximum mean value of morphological facial height at age group 51-55, after which a decrease with age is noticed.

Bizygomatic breadth of Jat Sikh and Bania females exhibit maximum mean value at 40-45 years and 56-60 years respectively, after which the values decline (Singal, 1979). Both rural and rural Kunbi (Hussain, 1997) females reveal maximum mean value for this dimension at 41-50 years, followed by a decline. Rural and urban punjabi Brahmin females of present study show a decline in the mean values of bizygomatic breadth after 51-55 years and 56-60 years, respectively.

Bigonial breadth of Jat Sikh females show a decline in the mean value up to 55 years, followed by an increase till 65 years after which a sudden decline is seen. Bania females exhibit a pattern of decline with minor fluctuations and finally achieve 0.04 cm less than the initial mean value (Singal, 1979). Rural Kunbi females show a gradual decrease in the bigonial breadth with age. Whereas urban kunbi females show an increase till 60 years, after which a decline sets in (Hussain, 1997). Bigonial breadth of both rural and urban punjabi Brahmin females show a decline in the mean values after 40-45 years and 46-50 years, respectively. Hence comparison of our findings with those from earlier studies suggest that all the facial measurements show continued growth at certain age levels followed by a decline. Onset and magnitude of decline in these dimensions are different populations.

Rural and urban punjabi Brahmin females of the present study have been compared with Jat Sikh and Bania females (Singal, 1979). Punjabi Brahmin females of present study exhibit lower mean values of morphological facial height than Jat Sikh and Bania (Singal, 1979) except at 51-55 years, where urban females show slightly greater mean values than the Jat Sikh and Bania (table-4, Fig.-2). t-values reveal highly significant differences between punjabi Brahmin females and Jat Sikh and Bania except at 51-55 years where both Jat Sikh and Bania and at 40-45 years, where Bania females alone show non-significant results with urban Brahmin females (table-5).

Table-4 : Age group wise comparison of morphological facial height of rural and urban Brahmin females of the present study with Jat Sikh and Bania females

Age Group (in years)	Rural Brahmin Females	Urban Brahmin Females	Jat Sikh Brahmin Females	Bania Brahmin Females
40 - 45	10.23±0.54	10.48±0.52	10.64±0.59	10.68±0.60
46 - 50	10.13±0.59	10.28±0.38	10.88±0.68	10.69±0.66
51 - 55	10.28±0.63	10.77±0.63	10.75±0.60	10.67±0.62
56 - 60	10.12±0.65	10.25±0.39	10.73±0.64	10.67±0.61
61 - 65	9.85±0.63	10.18±0.56	10.72±0.60	10.56±0.67
66 - 70	10.00±0.59	10.05±0.68	10.37±0.69	10.51±0.67

Table-5 : t-values showing are group wise differences in the morphological facial height of rural and urban Brahmin females of the present study with Jat Sikh and Bania females

Age Group (in years)	Rural Brahmin Females	Urban Brahmin Females	Jat Sikh Brahmin Females	Bania Brahmin Females
40 - 45	-4.15***	-1.62	-4.75***	-2.10*
46 - 50	-6.61***	-6.19***	-5.17***	-4.40***
51 - 55	-4.02***	0.16	-3.58***	0.90
56 - 60	-4.60***	-4.76***	-4.07***	-4.19***
61 - 65	-6.14***	-4.11***	-5.34***	-3.04***
66 - 70	-2.60***	-2.01*	-3.61***	-2.91***

p<0.05*; p<0.02**; p<0.01, .001***

Figure 2 : Comparison of morphological facial height of rural and rural and urban Brahmin females with Jat Sikh and Bania females

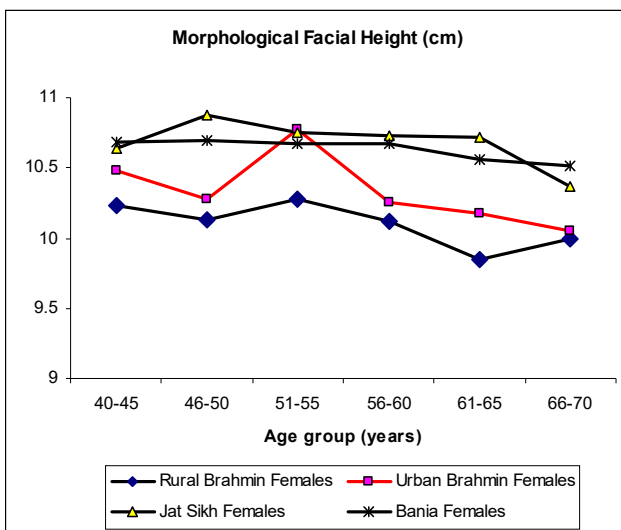


Table-6 and figure-3 clearly reflects that bizygomatic breadth of rural and urban punjabi Brahmin females have lower mean values than Jat Sikh and Bania females (Singal, 1979). It is also evident from statistically highly significant differences obtained at all ages (table-7).

Table-6 : Age group wise comparison of bizygomatic breadth of rural and urban Brahmin females of the present study with Jat Sikh and Bania females

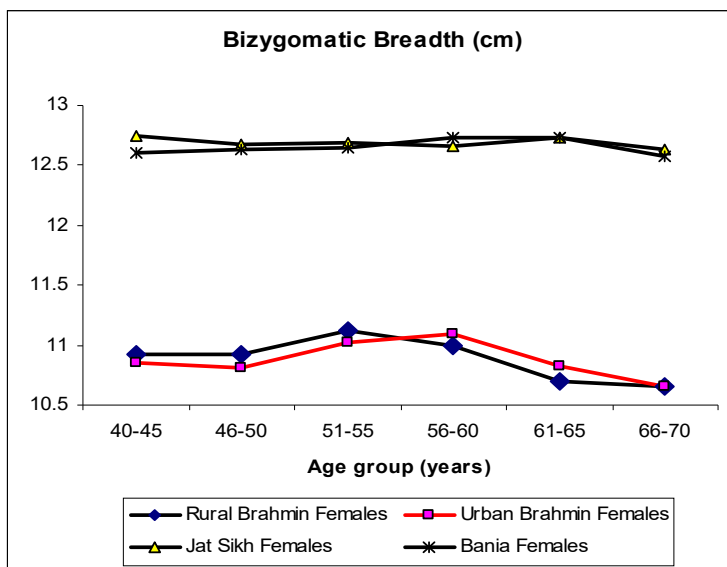
Age Group (in years)	Rural Brahmin Females	Urban Brahmin Females	Jat Sikh Brahmin Females	Bania Brahmin Females
40 - 45	10.93±0.58	10.86±0.75	12.74±0.50	12.61±0.48
46 - 50	10.92±1.27	10.81±0.82	12.67±0.47	12.639±0.48
51 - 55	11.12±0.61	11.02±0.46	12.69±0.41	12.64±0.57
56 - 60	10.99±0.53	11.09±0.56	12.66±0.63	12.73±0.45
61 - 65	10.70±0.66	10.83±0.41	12.73±0.39	12.73±0.41
66 - 70	10.66±0.56	10.65±0.41	12.63±0.54	12.57±0.40

Table-7 : t-values showing age group wise differences in the bizygomatic breadth of rural and urban Brahmin females of the present study with Jat Sikh and Bania females

Age Group (in years)	Rural Brahmin Females	Urban Brahmin Females	Jat Sikh Brahmin Females	Bania Brahmin Females
40 - 45	-18.20***	-15.69***	-18.92***	-16.44***
46 - 50	-8.78***	-15.20***	-8.65***	-15.01***
51 - 55	-17.25***	-19.80***	-16.67***	-17.86***
56 - 60	-16.21***	-12.98***	-18.09***	-14.54***
61 - 65	-14.78***	-22.37***	-16.52***	-24.26***
66 - 70	-15.36***	-17.27***	-15.74***	-18.32***

$p < 0.05^*$; $p < 0.02^{**}$; $p < 0.01, .001^{***}$

Figure-3 : Comparison of bizygomatic breadth of rural and urban Brahmin females with Jat Sikh and Bania females



Similarly Bigonial breadth of rural and urban punjabi Brahmin females show lower mean values than Jat Sikh and Bania females (Singal, 1979) (table-8, Fig,-5). t-values also reveal highly significant results at all age levels (table-9).

Table-8: Age group wise comparison of bigonial breadth of rural and urban Brahmin females of the present study with Jat Sikh and Bania females

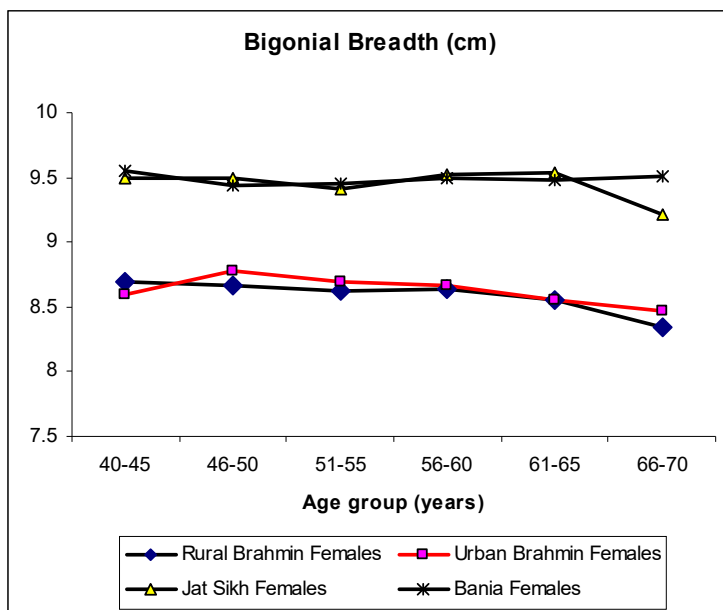
Age Group (in years)	Rural Brahmin Females	Urban Brahmin Females	Jat Sikh Brahmin Females	Bania Brahmin Females
40 - 45	8.69 ± 0.60	8.60 ± 0.44	9.50 ± 0.65	9.55 ± 0.60
46 - 50	8.66 ± 0.74	8.78 ± 0.65	9.49 ± 0.52	9.44 ± 0.49
51 - 55	8.63 ± 0.61	8.69 ± 0.45	9.41 ± 0.52	9.45 ± 0.52
56 - 60	8.64 ± 0.59	8.66 ± 0.51	9.52 ± 0.47	9.49 ± 0.46
61 - 65	8.56 ± 0.62	8.56 ± 0.40	9.53 ± 0.45	9.48 ± 0.48
66-70	8.34±0.72	8.47±0.35	9.22±0.43	9.51±0.55

Table 9 : t - values showing age group wise difference in the bigonial breadth of rural and urban Brahmin females of the present study with Jat Sikh and Bania females

Age Group (in years)	Rural Brahmin Vs Jat Sikh	Urban Brahmin Vs Jat Sikh	Jat Sikh Brahmin Vs Bania	Bania Brahmin Vs Bania
40 - 45	- 7.41***	- 9.26***	-8.62***	-10.68***
46 - 50	-6.97***	-6.48***	-6.97***	-6.41***
51 - 55	-7.15***	-7.87***	-8.23***	-8.89***
56 - 60	-7.74***	-8.35***	-7.25***	-7.85***
61 - 65	-7.32***	-10.20***	-7.66***	-10.29***
66 - 70	-5.76***	-8.64***	-7.42***	-10.85***

p<0.05*; p<0.02**; p<0.01, .001***

Figure-5 : Comparison of bigonial breadth of rural and urban Brahmin females with Jat Sikh and Bania females



Thus it emerges from the above discussion that the morphological facial height and facial breadth (bizygomatic breadth and bigonial breadth) of rural and urban punjabi Brahmin females of the present study show a decline in their mean values with aging, but the magnitude of change is very small. This is in accordance with previous study of Bishara, et. al., (1994) stating most of the facial changes in adulthood are of relatively small magnitude and these changes are considered as part of the normal maturational process. Farkas, et. al., (2004) c reported that no consistent pattern emerged during adulthood in increase or decrease within the facial framework among white North American of European ancestry. Age related changes that occur during the period of growth, imply that the underlying structural physical properties of face are invariant to a certain extent (George and Hole, 1998). Hence such findings are helpful to promote the general well being of populations, formulate health and related policies and monitor their effectiveness.

References

- Bagga, A (1997) Normality of Ageing : A cross-cultural perspective. *J. Hum. Ecol.*, 9 (1) : 35-46.
- Banerjee, B., and Sen, T. (1984) : Ageing in the marine fishermen community of balassore, Orissa. *Ind. Anthropol.*
- Bartlett, S.P., Grossman, R., and Whitaker, L.A. (1992) : Age related changes of the cranial facial Skelton and anthropometric and histologic analysis. *Plast Reconstr. Surg.* Oct. 90 (4) : 592-600.
- Bishara, S.E., Treder, J.E. and Jakobsen J.R. (1994) Facial and dental changes in adulthood. *Aim. J. Orthod Dentofacial Orthop.* Aug. 106 (2) : 175-186.
- Damon, A., Seltzer, C.C., Stoudt, H.W., and Bell, B. (1972) : Age and physique in healthy white veterans at Botson. *J. Gerontology.* 27, 202-208.
- Ellis, D.A. and Ward, D.K. (1986) : The aging face. *J Otolaryngol.* Aug. 15 (4) : 217-23.
- Farkas, L.G., Eiben, O.G., Sivkov, S., Tompson, B., Katic, M.J., and Forrest, C.R. (2004) : Anthropometric measurement of the facial framework in adulthood : age related changes in eight age categories in 600 healthy North American of European ancestry from 16 to 90 years of age. *J. craniofac Surg.* Mar; 15 (2) : 288-298.
- George., P.A., Hole, G.J. (1998) : Recognising the ageing face; the role of age in face processing. *Perception* : 27 (9) : 1123-24.
- Hussain, T. (1997) : A study of ageing in a population of Maharashtra : Ph.D. Thesis (Unpublished), Pune University, Maharashtra.
- Hooton, E.A. and Dupertuis, C.W. (1951) : Age Changes and selective survival in Irish males. *Studies in physical anthropology.* Am. Assoc. Phys. Anthropol. Wanner. Green foundation, for Anthropological Research, New York, 2, 1.

- Joyce, K.P. and Kapoor, S. (1994) : Age changes in physiological parameters and their relationship with physical traits among Rajput females. *Man in India*. 75 (4) : 379-388.
- Majumdar, P.P., Bhattacharya, S.K., Mukherjee, B.N. and Rao, D.C. (1990) : Genetic epidemiological study of blood pressure in sedentary rural agricultural population of West Bengal (India). *Am. J. Phys. Anthropol.*, 81 : 563-572.
- Sidhu, L.S., Sodhi, H.S. and Bhatnagar, D.P. (1975) : Anthropometric changes from adulthood to old age. *Ind. J. Phys. Anthropol. Hum. Genet.* 1, 119-127.
- Sidhu, S. (1982) : A study of fertility and physique in the scheduled caste women of punjab with special reference to age changes. Ph.D. Thesis (Unpublished), Punjabi University, Patiala.
- Singal, P. (1979) : Morphological age changes in females belonging to two communities of Punjab (India) with special reference to senescence. Ph.D. thesis (unpublished), Punjabi University, Patiala.
- Tungdim, M.G. and Kapoor, S. (2003) : Morpho-physiological changes among high altitude aged. *Ind. J. Phys. Anthropol. & Hum. Genet.* Vol. 22, No. 1 : 73-86.
- Tyagi, R and Kapoor, S. (1999) : Morpho-physiological changes with age among high altitude females. *Man in India*, 79 (1 and 2) : 173-178.
- Weiner, J.S. and Lourie J.A. (1981) : *Practical Human Biology*. Academic Press, London.
- Zimble, M.S., Kokoska, M.S., and Thomas, J.R. (2001) : Anatomy and pathophysiology of facial aging. *Facial plast. Surg. Clin North Am.* May; 9 (2) : 179-87, 7.2001

Indian Journal of Gerontology
2007, Vol. 21, No. 1, pp 75-80

Mental Health Status of the Aged Migrants

B. Nagarathnamma

*Department of Psychology
Sri Venkateswara University,
Tirupati - 517502 (A.P.)*

ABSTRACT

The present study intends to examine the Mental Health status of the migrated elderly subjects in Hyderabad city of Andhra Pradesh. 60 migrated elderly subjects and 60 non-migrated elderly subjects residing in rural area were administered Psychological well being scale. (Bhogle and Indira 1995). The quality of life of the migrated elderly was found to be very low. Their Mental Health Status was low compared to their counter partners residing in the rural areas. Males expressed better mental health.

Keywords : Migrated, Elderly, Non-migrated, Mental Health.

In India, the number of older persons is more than seventy millions. It is estimated that this figure would rise to 180 millions by 2025 AD. This drastic rise in the number is posing many a challenge to India, W.H.O. is now committed to this enigma. India has already reached significant increase in life expectancy. W.H.O. states that longer life can be both a penalty and a prize. According to 2001 census of India, the average life expectancy is 64 in women and 62 in men.

Older persons do not enjoy a decent status in the Indian society (Ramamurti 2003). The good old joint family system is a dying

institute. Only 14% of the families are joint in true sense (Singh 2003). In India the plight of old is cloaked by myth or traditional bond (Dandekar 1996). The principles of modern care of the aged are based on healthy and independent living. But the increase in population, illiteracy and poverty are incapacitating the Indian government to make good policies that suit to the well being of the aged. Gerontological and Sociological approaches to ageing have failed to attend to the well being of the aged in India.

The term “Mental Health” is ambiguous. It is not only difficult to agree on its general application, but even in a single context it may be used in different ways. This lack of agreement will probably continue because the term has been adopted for variety of purposes. Bhatia (1965) states that a mentally healthy person is one who is self confident and can live effectively. He/she lives in the world of reality rather than fantasy, and is capable of tolerating frustration. Such a person lives a well balanced life of work, rest and recreation. Kasi (1973) suggested four different criteria of mental health. They are Functional effectiveness, well being, mastery and competence of psychiatric signs and symptoms. Verma’s (1998) Dual Factor Theory of Mental Health states that Mental Health is described as something more than a mere absence of mental disorders. This theory considers that (1) factors contributing to mental ill health their absence does not lead to positive mental health, though the presence of these factors indicate mental disorder or ill health (2) factors whose presence leads to positive mental health but their absence does not lead to mental disorders negative mental health or absence of mental ill health is considered as freedom from inferiority, depression, conflicts, neuroticism, Dissatisfaction etc. Positive mental health is the presence of factors like sense of well being, satisfaction, happiness, creativity, social support and so on.

In India, women are especially inclined to feel the burden of ageing. Poor nutrition, dangerous working conditions (like construction works, cooking etc.) violence are some of the factors which bother them. (Bagchik, 1999).

Usually feelings, satisfactions and constraints felt by the older persons may be used to gauge their sense of well being (Mallya 2003). It is an universal belief that men and women, as contrasting groups display characteristic sex differences in their behaviour and that these differences are so deep seated and pervasive as to lead distinctive character to the entire personality. In India women do not enjoy liberty and a good status and living the life of a widow, brim with woes and worries (Ramamurti 1989). The status of older widows in Indian culture is unenviable. They are viewed as inauspicious and tabooed in several social situations and rituals. Mohammad (2003) concluded that there is a better sense of subjective well being in men than in women. Nagarathnamma (2002) examined the factors contributing to well being and mental health of the aged men and women and found significant difference between men and women in the well being factors.

The present investigation is focused on studying the mental health status of the aged migrants in Hyderabad and also their counter partners residing in the rural scenario and making a comparison.

The impact of migration is even seen in rural India. The family bondage is weakening, joint family system is vanishing and most of the aged are forced to be engaged in rural occupations till their physical incapacity prevents them from working. In spite of physical disability the older persons continue to work for their livelihood. Most of them without any help independently. Among elderly persons of rural area, disengagement from work is very rare.

Objectives

1. to study the problems encountered by the aged migrants in Hyderabad city.
2. to study the gender differences of the elderly migrants with regard to mental health status.
3. to make a comparison of the mental health status of the rural and urban elderly.

4. to study the formal and informal care systems of elders in Hyderabad.
5. to study the functions and problems of old age homes.
6. to evolve suggestions to improve mental health status of the elderly.

Method

Sample

60 migrated people and 60 non-migrated people residing in rural areas were chosen as the sample of the study. The subjects of the study comprised 120 old persons in the age group of 65-85. The study intended to investigate the mental health status of the migrated and non-migrated elderly. Further the impact of gender on the mental health status also was examined.

Tool

The mental health status was assessed by using psychological well being scale of Bhogley and Indira (1995). The scale covers different factors like meaninglessness, somatic symptoms, suicidal ideas, social support, wellness and so on and gives a comprehensive score about mental health.

Results and Discussion

Table 1 : Means, SDs and t-value of the mental health scores of the rural and Urban elderly migrants.

Locality	N	Mean	SD	t-value
Rural	60	23.63	1.77	7.91**
Urban	60	19.98	2.90	

The rural elderly showed relatively better mental health. The urban elderly migrants were facing many socio-psychological problems like separation from their kith and kin, stress at working place besides adjusting with the new climate, language, people and thereby community at large.

Table 2 : The means, SDs and t-value of the mental health scores of male and female elderly.

Gender	N	Mean	SD	t-value
Male	74	23.69	2.95	7.21**
Female	46	20.48	1.92	

***Significant at 0.01 level.*

Male aged migrants showed higher well being than the female aged. Males were found to have higher social support and life satisfaction than females. In India old men enjoy better status than older women has been remarked that no other dichotomy in human experience appears to have as many entities as does the distinction between male and female.

Conclusion

The findings revealed that, the urban migrants experienced loneliness, low quality of life, very little savings and no pension. Most of them were unhappy, frustrated and not well adjusted. 25 per cent women of the sample were found to be deserted by their men and their children were hardly taking care of them. 20 per cent old women of the sample were found to be supporting the men economically. Only 5 per cent of the subjects of the present study were living in old age homes (free ones). Some of them were very happy, well adjusted and great full to the management. But some were unhappy as they were missing the home environment and had grievances with the management. An important reason for the dissatisfaction among the inmates was lack of timely medical aid and non availability of Geriatriests.

References

- Bagchik Puris (1999) : *Diet and Aging - Exploring some facets*, New Delhi. Society for Gerontological Research and Help age, India.
- Bhatia, BD. (1965) : *Elements of Psychology and Mental Hygiene for nurses in India*. Orient Longmns Ltd., 149.

- Bhogle Sudha and Prakash Indira Jai (1995) : Development of the Psychological Well being questionnaire, *Journal of personality and clinical Studies*, Vol. 11., No. 1,-2, 5-9.
- Dandekare (1996) : *The elderly in India*. Sage Publications, New Delhi.
- Kasis V. (1973) : Mental Health and Work Environment. *Journal of Occupation Medicine*, 15(6) : 509-518.
- Mallya I. (2003) : Implications of International migration of Children on Older Persons. A case study in Gujarat. A Dissertation submitted to MS University, Baroda.
- Mohammed E.(2003) : Gender and Mental Health. *Indian Journal of Clinical Psychology*. 30(1) : 4-7.
- Nagarathanmma (2002) : Factors contributing to Well Being and Mental Health of the Aged men and women. *Journal of Community Guidance and Research*. 19(1).
- Ramamurti P.V. (2003) : Empowering the Older person in India. *Indian Research and developmental Journal*, 9(2) : 5-9.
- Singh, JP. (2003) : Nuclearization of Household and family in urban India. *Sociological Bulletin* 52 (1).
- Verma S.K. (1998) : Quality and quantity of mental health. *Journal of Indian Academy of Applied Psychology*, 24(1-2) : 59-62.

Indian Journal of Gerontology
2007, Vol. 21, No. 1, pp 81-86

The effect of companionship of spouse upon life satisfaction among elderly

Ira Das and Archana Satsangi

*Department of Psychology,
Dayalbagh Educational Institute,
Dayalbagh, Agra. (U.P.)*

ABSTRACT

The purpose of the present investigation was to see the effect of companionship of spouse upon life satisfaction of elderly people. The sample consisted of randomly selected 40 elderly above the age of 60 years, who were financially independent from their offspring. The scale for measuring the role of companionship of spouse was prepared by the investigator herself. 'P.G.I Well-being scale' by Moudgil, Verma, Kaur and Pal was used to measure life satisfaction. The sample was dichotomized on the basis of Median of scores on 'companionship of spouse'. The two groups thus formed were (1) High companionship of spouse (N=20) & (2) Low companionship of spouse (N=20). Results indicated that there is a significant effect of companionship of spouse upon life satisfaction of elderly ($p < .01$). This shows that people with higher companionship of spouse were more satisfied with their lives in comparison to those who enjoyed less companionship with their spouse.

Keywords : Companionship, Spouse, Life satisfaction, Elderly.

Marriage is an important milestone in an individual's life. The companionship of spouse is an integral part of marriage. An understanding and supportive spouse can serve as a buffer or as an agent for the coping mechanism for the stressed individual (Seers, McGee, Serey and Grean, 1983). This relationship makes him feel needed, wanted, desired, admired, appreciated, approved and belonged to a degree not available in any other human relationship (Coleman 1964; Kumar and Makwana 1991). It serves as "an emotional island in the sea of stress" (Lown 1993).

The independence of each nuclear family from its own kin and the relative social isolation of urban house-holds makes the spouse the primary companion and sources of emotional substances.

Although the companionship of spouse plays an important role in the well-being of individual at all age groups, in old age its importance increases more. The first important adjustment around family relationship elderly people must make, is establishing good relationship with their spouse. With the role change from worker to retiree most people have opportunity to spend more time at home than they ever had before. If their relationships with their spouse are good, this will contribute to the happiness of both. If however, their relationships are strained, friction is increased by constant contacts.

As is true of other times in the life-span, happiness in old age too depends upon fulfillment of the three 'A's of happiness-acceptance, affection and achievement. If all the three 'A's are being received in the companionship of spouse, then it may lead to the happiness and life satisfaction of elderly people. The investigator has therefore, investigated the effect of companionship of spouse upon life satisfaction among elderly.

Method

Problem

To study the effect of companionship of spouse upon life satisfaction of elderly. It was hypothesized that there is a significant

positive effect of companionship of spouse upon life satisfaction of elderly.

Sample

The sample consisted of randomly selected 40 elderly above the age of 60 years who were financially independent from their offspring. Subjects from only middle to high socio-economic status were selected. Individuals in this sample were at least matriculated.

Measures

1. **Life satisfaction** : Well-being measured by 'P.G.I. Well-Being Scale' by Moudgil, Verma, Kaur and Pal (1986). Five more items taken from the life satisfaction test constructed by Diener *et al.*, (1985) were added along with the items of P.G.I. Well-Being Scale by the researcher herself to improve the validity of the scale. The scale used in this study consisting of 20 items and were translated in Hindi language.

Reliability of The Test

The obtained indices of different type of reliabilities are as follows:

Inter-Rater Reliability	Inter-Scorer Reliability	Test-Retest Reliability
0.86	1.0	0.86

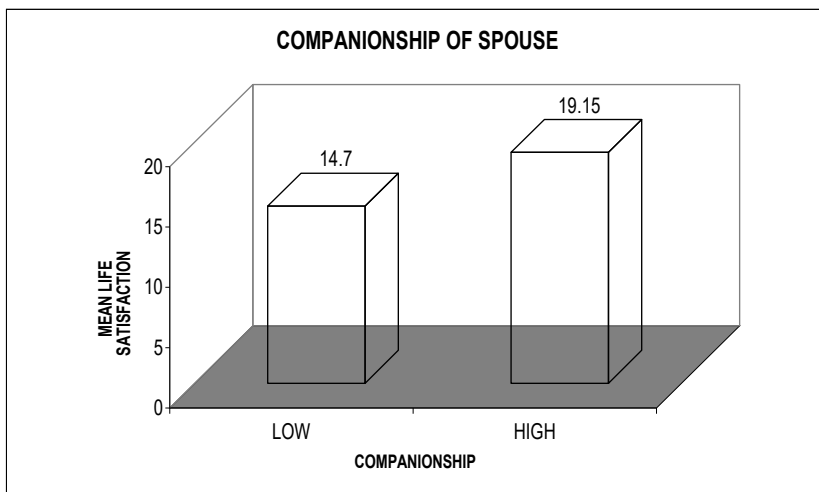
Validity of The test : Criterion related validity coefficient of life satisfaction scale against the criterion of neuroticism was found to be $r = -0.75$ which is highly significant. This indicates that as the neuroticism decreases feeling of life satisfaction or well being increases. Thus the test has high criterion related validity.

2. The scale for measuring the role of Companionship of Spouse was prepared by the investigator herself. The scale consists of 20 items and answers were obtained through 4 multiple options.

Results and Discussion

Table-1 :

Comparison of spouse	N	Df	Life Satisfaction Mean	SD	SEd	t
Low	20	38	14.7	5.57	1.506	2.95*
High	20	38	19.15	3.79		



On the basis of Median of scores of companionship of spouse the total sample of 40 elderly was dichotomized into two groups i.e. (1) High companionship of spouse (above median) and (2) Low companionship of spouse (below median). The mean life satisfaction scores of these two groups were then compared. The Table-1 reveals that there is a significant difference between life satisfaction of two groups i.e. High companionship of spouse group and low companionship of spouse has less life satisfaction (Mean value = 14.7, S.D. = 5.57) in comparison to high companionship of spouse group (Mean value = 19.15 and S.D. = 3.79).

The result of the present study shows that the 't' = 2.95 (df = 38) is significant at 0.01 ($p < 0.01$) level. The investigator therefore

concludes that there is a positive significant effect of companionship of spouse upon life satisfaction of elderly.

Through above mentioned result it can be concluded that companionship of spouse is an important support that creates joy and a sense of belonging through shared time together and expression of love and affection. It also provides assistance such as financial support or help with chores, through all life's changes. The cause of more life satisfaction for older couples may be that there are many opportunities to enjoy their lives together and to grow closer. In addition, spouses provide extraordinary companionship and support when health and mobility decline and a partner needs assistance.

The significance of companionship of spouse can be estimated through the study of Hess and Soldo (1985). As it was clarified in that study, the longer the relationships the more salient it is to self-identity and the harder to disengage from or admit failure.

As the companionship of spouse is an important unit of social support, Studies by Vallient, Meyer, Mukamal and Soldz (1998) have reported positive relationship of social support with well being in aged. Chadha and Agarwal (1991) also in their study brought out the importance of social support in maintenance of happiness in old age.

As the findings of the present study show that there is a positive significant effect of companionship of spouse upon life satisfaction, it supports the view by Seers *et al.*, (1983) that an understanding and supportive spouse can serve as a buffer or an agent for the coping mechanism for the stressed individual.

Reference

- Chadha, NK and Agarwal, V (1991) : Hopelessness, alienation and life satisfaction among aged. Paper presented at the 78th Session of *Indian Science Congress*, Indore.
- Coleman, J.C (1964) : *Abnormal psychology and modern life*. Bombay : Taraporewala.

- Diener, E. Emmons, R.A., Larson, RJ and Griffin, S. (1985) : “The satisfaction with life scale”. *Journal of Personality Assessment*, 49 : 71-75.
- Hess, B and Soldo, B. (1985) : Husband and wife networks. In : Saur, W. and Coward, R.(eds.). *Social support network and care of the elderly*. New York : Springer, 67-92.
- Kumar, P. and Makwana, SM (1991) : Factors affecting sexual satisfaction in married life. *Journal of the Indian academy of Applied Psychology*, 17, 1-2 : 31-34.
- Lown, B. (1993) : Into the heart of the unexplained. *Indian Express*, Dec. 4.
- Moudgil, Verma, Kaur and Pal (1986) : *P.G.I. Well - Being Scale*.
- Seers, A., McGee, G.W., Serey, T.T., and Graen, G.B. (1983) : The interaction of job stress and social support. A strong influence investigation. *Academy of Management Journal*.
- Vaillant, G.E., Meyer, S.E., Mukamal, K. and Soldz S. (1989) : Are social support in late midlife a cause or a result of successful physical ageing ? *Psychological Medicine*, 28 : 1159-68.

Indian Journal of Gerontology
2007, Vol. 21, No. 1, pp 87-90

Recent advances on anti-aging

HL Dhar

*Director, Medical Research Hospital,
Mumbai - 400 020*

Abstract

Aging is normal and inevitable but one can increase active life span with changing lifestyle including diet and exercise. However, meditation will increase glamour, personality, vigor and intelligence as well as reduce illness and aging process. Quantum Meditation in addition to all benefits of meditation will reverse the aging process with all its manifestations and disease process beyond the reach of drugs and chemicals. Practice by a normal individual will make him highly intelligent and immune to all disease processes including aging process without wrinkles and graying of hair and practice by a mother before conception will be assured of giving birth to an intelligent healthy baby particularly if earlier issue was abnormal.

Key words: Quantum meditation, Saral Meditation, Anti-aging, Jeevani

Change in life style, hygienic condition, nutrition and less calorie intake (Roth *et al.*, 2001; Dhar 2002a) and regular exercise (Dhar 2000a) are known to increase longevity as well as good health.

Recently it has been shown that active sex life (Menon *et al.*, 2005) also increases life span however, meditation has been reported as best anti-aging medicine (Dharmasingh 2005; Dhar 2006a). Still recently, it has been reported that Quantum mechanical body does not age (Dhar 2006b) and Quantum meditation reverses aging process with all its manifestations (Dhar 2006c; Dhar 2006d) i.e. including wrinkles and graying of hair.

Anti-aging drugs

A number of drugs have been identified through animal studies but till today there is no proved anti-aging safe drugs. However, melatonin hormone has been reported to increase life span through improved sleep and adding to anti oxidant activity (Piepaoli *et al.*, 1987). Similarly, substitution of dihydro-epiandrosterone whose secretion decline with aging has also been reported to increase life span (Nawata *et al.*, 2002).

Anti-aging herbs

Recent research has shown that number of herbs e.g. Ginkgobioba, Billberry, Korean or Chinese Ginseng, Echinacea etc. help in preventing diseases associated with aging and enables us to live a ripe old age and avoid risk of developing an age related ailments (Dhar 2006 a, Mills *et al.*, 2000). Still recently a herbal compound named Jeevani (an original herb from Kerala) has been marketed by Great Earth companies Inc of the US claiming DNA-protecting capabilities of the plant (Don Sebastian 2006).

Meditation as anti-aging

However, it has been reported that meditation is the best anti-aging medicine (Dharmasingh 2005; Dhar 2006 a) with wide ranging benefits. It has been shown that Transcendental Meditation (TM) (Maharishi 1996) as well as Saral meditation, a simplified version of TM but without mantra increases intelligence, performance and reduces illness, tension and aging process. In addition Saral meditation reduces sleeplessness and converts loneliness into solitude (Shah, *et al.*, 2001; Dhar 2002b; Shah *et al.*, 2003). It has been shown that practice of saral meditation for 3 year makes one younger by 6 years (Dhar 2006c; Dhar 2006d). It has been further demonstrated that saral

meditation improves cognitive function and makes the brain function in alpha wave in EEG when most people (about 95%) function in Beta range while awake (Dhar 2004; Dhar 2006e).

Quantum meditation and aging process

All meditations are known to work at molecular level, reversing the aging process (Dhar 2006e) but Quantum meditation acts far beyond atoms and molecules (Quantum is million times smaller than an atom) (Dhar 2006c, Dhar 2006d). Saral meditation has been shown to reverse the aging process (Dhar 2006e) however, Quantum meditation (advanced saral meditation with mantra (primordial sound) and Bliss reverses the aging process with all its manifestations including graying of hair and wrinkles (Dhar 2006d) including long standing disease process (like cancer) and prevent foetal abnormality if mother practices it before conception and during the period of pregnancy (Dhar 2006c, Dhar 2006d, Dhar 2006f).

It may not be feasible for a normal individual pursuing Quantum meditation for the sake of reversing aging process since practicing saral meditation for just 20 minutes a day one can maintain health, reduce incidence of disease and reverse aging process (Dhar 2001; Dhar 2006c). However, practice of Quantum meditation will make one immune to all diseases and increase longevity without usual sign symptoms of aging in addition to all other benefits of meditation. It will prevent aging with all its signs symptoms and increase cognitive functions (intelligence, memory etc.) improving allround quality life.

Conclusion

Quantum meditation is the first of its kind practice of which will ensure immunity to all disease process and aging, prolonging longevity without any signs symptoms of aging or disease.

References

- Dhar H L (2000b) : Saral Meditation. *BHJ*; 42 (4) : 605-607.
- Dhar H L (2006a) : Approach to antiaging. *BHJ* (press)
- Dhar HL (2000a) : Exercise health and elderly. *Ind J Gerontol*, 14 (10/2) 35-43.

- Dhar HL (2001) : Saral meditation - An unique technique for health, intelligence, performance and confidence. *BHJ*; 43 (3) : 357-360.
- Dhar HL (2002b) : Meditation, health, intelligence and performance. *Medicine Update, APICON*; 12 (202); 1376-1379.
- Dhar HL (2004) : Mechanism of Saral meditation without mantra that improves all round quality of life. *BHJ*; 46 (3) : 291-294.
- Dhar HL (2006b) : Practice of Integral geriatric medicine. *BHJ*, 48 (1): 103-103.
- Dhar HL (2006c) : Quantum Meditation in Reversal of Aging and Disease process. *BHJ*, 48(2) : 326-329.
- Dhar HL (2006d) : Meditation for young, old and the Diseased; *Ind J Clin Pract*, 16 (10) : 25-27 and 30.
- Dhar HL (2006e) : Saral Meditation-Scientific evidences special reference to Quantum Meditation. *Ind J Clin. Pract* (press).
- Dhar HL (2006f) : Meditation and quantum healing. *BHJ* (press).
- Dhar HL. (2002a) : Nutritional status of Indian Elderly. *Medicine Update, APICON*, 12 (202); 1376-1379.
- Dharmasingh Khalsa (2005) : Meditation an anti-aging medicine. [http://www. Whole fitness camp meditation html](http://www.Wholefitnesscampmeditation.html) 21.07 p. 1-3.
- Don Sebastian (Tiruvananthapuram) (2006) : Kerala invents anti-aging drug, America patents it. *DNA* Thursday 12.01. P. 13.
- Menon KS, Laxmi VA, Dhar HL *et al.*, (2005) : Sex and Indian elderly. *In J Gerontol*, 19 (2) : 157-162.
- Mills S, Bone K (2000) : *Principles and practice of Phytotherapy. Modern herbal medicine* Edinburgh Churchill Livingstone, 418-432.
- Nawata H, Yanase T, Coto K, *et al.*, (2002) : Mechanism of action of anti-aging DHEA's and replacement of DHEAs. *Mech aging Dev.*, 123 (8) : 1101-1106.
- Piepaoli W, Maestromic G. Melatonin (1987) : A principal neuroimmuno regulatory and antistress hormone, its anti-aging effects. *Immunol Lett*; 16 (3-4) : 355-361.
- Roth GS, Ingram DK, Lane MA. (2001) : Calorie intake restriction in primates and relevance to humans *Am NY Acad Sci*, 928 : 305-315.

Scientific research on Maharishi's Transcendental meditation a review.
 Maharishi International University Press. Fair field USA 1996; 3-16.

Shah AH, Joshi S V, Mehrotra PP, Mahadik UD, Naina Potdar, Dhar HL (2001) : Effect of Saral meditation on intelligence, performance and cardiopulmonary function. *Ind J Med Sci.*, 55(4): 604-608.

Shah AH, Joshi SV, Potday Naina, Dhar HL (2003) : Effect of Saral meditation comparative study of short and long term practice. *BHJ*; 45 (4) : 586-589.

Indian Journal of Gerontology
 2007, Vol. 21, No. 1, pp 91-93

Book-Review

Elderly Women in Mega Polis : Status and Adjustment

Archana Kaushik Panda, Concept Publishing Co.
 New Delhi, 2005, Price Rs. 300/-

Recently, interest of Indian Gerontologists is expanding in studies of aging. Although most needed real multi disciplinary researches are rare, but different researchers remaining in their disciplinary boundaries from the medical, biological and social sciences are being engaged in the field. Indian Journal of Gerontology is an example of representing such interest of the researchers from different fields. Increase in graying population deserves academic attention to provide insights into the problems of aging. Growing population of elderly is not only an individual problem but also a problem of society and communities, particularly in developing countries. With scarce medical and financial resources it is a challenging task to the government and other service providers. More so in the context of rapid social change the task is much more difficult and complex then it appears to be.

In the above back drop the publication of the present volume by a scholar from social work discipline is a welcome one. It is also important in the context of relatively lesser attention of the Indian researchers on aging women. Indian elderly women grew in a traditional socio- cultural context and witnessing now a sea change in that context. They are bewildered and have to cope up with several new events happening around and with their deteriorating health condition.

The volume reports the study of elderly women from middle-income group families living in a Government colony of New Delhi. The study mainly focused on social adjustment, which is likely to vary with several factors out of which research concentrated on physical health, economic security, mental-health, and social relationships.

In order to place the present study in the context of other related studies done in the field the author has noted some critical issues (page 28- 29) like shooting up of the age, increasing dependency ratio, lack of gender specific outlook, specific needs, challenges for elderly women, and urban characteristics surrounding them. The objectives of the study were set as to study demographic status and socio economic background of aged women in metropolis, and to ascertain level of social adjustment in association with health status, their acceptance by family and neighborhood, sense of security and life satisfaction. Selection of these variables seems arbitrary without logical or theoretical justification and also researcher expectations. Simply finding out relationships of social adjustment with above stated variables seem obvious, as these variables are part of social adjustment. For example, one of the stated objectives of the study was “to examine the linkage between their (elderly women) social adjustment and their acceptance by family and neighborhood” (P.30). One cannot expect a negative relationship between these variables. After all social adjustment as author rightly stated that “is an ongoing process, which facilitates one to adopt one self to social environment”, their family and neighborhood are part of the social environment, and hence relationship between the two becomes obvious because of inclusiveness. This is true for other relationships reported in this study. Hence the selection of variables to find their linkages with social adjustment lose their meanings and scientific value of such a well planned and aptly executed study.

The author has very meticulously selected the desired sample of women and conducted long interviews with required precautions. Similarly, the collection of secondary data and their analyses is adequate as reflected in a separate chapter reporting 'demographic, social and economic background of the elderly women. This chapter begins with census data showing figures of population of Delhi by sex and age group cited from Delhi Statistical Hand Book, 2000, and then for age distribution she has reported age and sex-wise distribution of male and female elderly in India from 1981-1991 Census. And then she reported the age distribution of the sample of the study. This becomes irrelevant without presenting any comparison of her sample data with the Census data of Delhi or old all India data. Of course, she presented other data from her own study regarding marital status, religious affiliations, caste, education, mother-tongue, period of stay in Delhi, family background, size of household and occupational status with this demographic scenario author wished to "look adjustment abilities and problem of the aged females of urban context" (P.74)

The chapter on- Pattern of Social adjustment begins with the discussion of the concept of adjustment and factors influencing social adjustment. Then she has described construction of measure of social adjustment scale, which includes four dimensions of social adjustment viz. attitudinal, conflict, need and role adjustment. Each dimension of the scale was treated separately, and its association with different variables has been reported.

Each dimension of social adjustment and composite scores of social adjustment, if would have been correlated with the same set of variables the findings could have been more focused and meaningful and their interpretations might have been interesting. On the contrary the author has presented the percentage of women in different categories of any two abruptly selected variables and tried to describe various aspects and problems of elderly women in subsequent chapters on health and well being and social adjustment, social acceptance of the elderly females, sense of security and adjustment. The treatment of the interview data could not portrait a coherent picture of elderly women selected for the study. Of course, for incorporating qualitative data in terms of case studies and the statements made by elderly women the author deserves appreciation The last chapter on conclusion is very general and the finding of the present study could

not find proper space to show either extension of earlier research or new ideas or insights making the whole presentation not interesting.

As a whole the volume fails to capture and sustain the attention of a reader, but valuable for those who are interested in such studies and wants not to repeat such a style of presentation, so that they can come out with some fresh insight on such a social problem.

Uday Jain

Former Professor of Psychology
Barkatullah University, Bhopal (M.P.)

FOR OUR READERS

ATTENTION PLEASE

Members of **Indian Gerontological Association** (IAG) are requested to send their **Annual Membership Fee** Rs. 250/- (Rupees Two hundred and fifty only) Life Membership fee is Rs. 1,000/- (Rs. One thousand only). Membership fee is accepted only by D.D. in favour of Secretary, Indian Gerontological Association or Editor, Indian Journal of Gerontology. Only Life members have right to vote for Association's executive committee.

REQUEST

Readers are invited to express their views about the content of the Journal and other problems of Senior citizens. Their views will be published in the Readers Column. Senior citizens can send any problem to us through our web site : www.gerontologyindia.com Their identity will not be disclosed. We have well qualified counsellors on our panel. Take the services of our counselling centre - RAHAT.

VISIT OUR WEBSITE : www.gerontologyindia.com

You may contact us on : klsvik@yahoo.com or klsvik@hotmail.com

CALL FOR PAPERS

PAPERS ARE INVITED FOR SPECIAL ISSUE (VOL. 21, 2007) ON **AGEISM**. SEND ONLY RESEARCH OR REVIEW ARTICLES BY THE END OF MARCH 2007.

NEW MEMBERS

(**L** stands for Life membership and **A** stands for Annual Membership)

523L. Mr. Ram Lingam Mahesh, (Research Scholar), Department of Siddha Medicine, Tamil University, Vakaiyur, Thanjavur - 613005 (T.N.)

Res. : 71, South Street, Melanikuli (P.O.) 612903 Meensurath (Via) Perambalur (Dt.) T.N.

524L. Dr. Kamal Saini, Jai Gurudev High School, VPO Ismailabad, Distt. Kurukshetra, Haryana - 136129

525L. Dr. Deepesh Chandra Prasad,
Psychological Testing, Counselling and Study Centre, Hardwar (Uttanchal)

Res. : C-62, Shivalik Nagar, BHEL, Hardwar - 249403 (Uttanchal)

526A. Dr. Swapnananda Rath, Reader in Zoology, B.J.B. College, Bhubaneshwar - 751014 (Orissa)

BOOKS RECEIVED FOR REVIEW

Studies in Gerontology (Ed.)

By K.L. Sharma

Rawat Publications, Jawahar Nagar, Jaipur

For our Advertisers

A few pages of the journal are available to select class of advertisers/ This is to preserve the academic character of the Journal which has large circulation in India and abroad.

Below are given the rates for the advertisement :

Cover page inside	:	Rs. 2000/-	\$ 150/-
Full page inside	:	Rs. 1500/-	\$ 75/-
Half page inside	:	Rs. 750/-	\$ 40/-

WE REQUEST THE READERS TO DONATE TO THE CAUSE OF SENIOR CITIZENS

Rebate in Income tax on Donations available under section 80G

