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## Assessment of nutritional status of selected geriatric respondents in Bangalore City

**Deepa Terdal and Neena Joshi**

**Abstract**

As age proceeds our functional decline starts and these are influenced by genetics, nutrition, socio-economic, psychological state, illness and health care. There is limited research study among geriatrics [(n=300), Male (n=114) and Female (n=186)] who were residing in living home and old age institutions. Hence a purposive study was carried on geriatric respondents in Bangalore city. At baseline study there dietary adequacy was recorded through food frequency questionnaires, 24-hrs recall method along with demographics and anthropometry. Nearly half of geriatrics was aged between 60 and 69 years. In around 62% both the spouses was alive. 41% were from forward caste. Only 14 % had college level education and 38 % was illiterate. 42% had monthly incomes of < 500 Rs/month and nearly half lived in joint family. Majority (71 %) had  $\leq$  two meals per day. While 28 per cent skipped either breakfast/lunch. Majority of them used functional ingredients in their diets. BMI was  $26.5 \pm 4.4$  and  $25.4 \pm 4.5$ , WHR was  $0.9 \pm 0.1$  and  $0.8 \pm 0.1$  and per cent body fat  $13.6 \pm 1.8$  and  $12.7 \pm 1.3$  in male and female respectively. A dietary intake was less than 80% of their respective RDAs in majority of the population. Majority had inadequate intakes for most of the nutrients. A mean energy intake by male and female respondents was  $977.3 \pm 175.2$  and  $1099.1 \pm 226.5$  Kcal/day respectively. Nearly 3/4<sup>th</sup> of the males was below or equal to normal BMI. Geriatrics had reduced food intake resulting in inadequate intake in nutrients. Findings suggest that there is need of balanced nutrition for geriatric population.

**Keywords:** geriatrics, dietary adequacy of aged, anthropometry, food frequency questionnaire

**Introduction**

The world's geriatric population continues to grow at an unprecedented rate. Today, 8.5 per cent of people worldwide (617 million) are aged 65 and over. This percentage is projected to rise to nearly 17 percent of the world's population by 2050 (1.6 billion) [1]. The factors underlying this transition are increased longevity, declining fertility, and aging of "baby boom" generations [2]. India has emerged as "aging India" in the beginning of the 21st century. During the aging process, certain inevitable degenerative changes that occur result in functional decline. Thus, growing absolute and relative number of older people in the both developed and developing countries have emerged as one of the biggest challenges facing the world today.

The disease burden of the global society has increased considerably as risk of developing certain chronic and debilitating disease is significantly higher in advanced ages. Therefore, it is important to improve the quality of life in old age to sustain their productivity and enable elders to enjoy a reasonable standard of life [3].

The lack of guaranteed sufficient income to support themselves, the absence of social security, loss of social status and recognition, unavailability of opportunities for creative use of time and persistent ill health are some of the daunting problems the elderly face in the country [4]. This increases the demands on the care givers, the society and the health services of a country.

In order to design interventions to improve the health and quality of life it is important to study the background characteristics of the specific population. Considering these facts, the present study was undertaken to assess the socio-demographic, dietary pattern, anthropometric and nutritional status in the geriatric respondents of Bangalore city.

**Methodology**

**Sample Population and size:** A purposive sample of the geriatric population was drawn from urban and rural areas in and around Bangalore city. The geriatric persons were recruited from old age home and those who resided in their homes (Table 1).

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**Table 1:** The following table depicts the source of geriatric population.

Residence	Areas	Name of the places	Number
At home	Urban	Malleswaram and Gandhi krishi vignana kendra	103
Old age home	Urban	Asaktha poshaka shaba in Visveswarapuram	139
Old age home	Rural	Navachaithanya in Banaswadi	58

### Selection criteria

- Male or female above the age of 60 years
- Respondents willing to participate and co-operate
- The geriatric study group was classified according to age and was divided into three groups (WHO, 2009): a. Young old: In the age range 60-70 yrs physically active and mentally alert and the opportunity could be economically productive as middle age. b. Old-old: In the range 70-80 yrs moderate physical activity and mentally stressed. c. Very old: Over 80 yrs physically frail with different types of impairment, eye vision, hearing and locomotion and with various types of mental disorders.

In all 300 participants eventually completed the study in 2013. Written informed consent was obtained from the participants. The draft questionnaire was circulated amongst practicing doctors and nutrition experts (n=8) and the suggestions were incorporated. The questionnaire was pilot tested on geriatric persons (n=5).

### Data collection

**Socioeconomic profile:** For the questionnaire on general background and socio-economic status of geriatric population included information about the participant's age, education, family size, occupation, source of income. Existing standard questionnaires were relied upon [5].

**Anthropometric measurements:** Anthropometric measurements of height, weight, WC, HC, MUAC were taken. BMI and WHR were derived using standard equations [6]. Minimum waist (WC) and maximum hip (HC) circumferences and mid-upper-arm circumference (MUAC) were measured to the nearest 0.1 cm using a tape measure. Three skin folds namely, triceps (TSF), sub-scapular (SSF) and supra-iliac (SISF) by using a Harpenden's skin fold caliper. The body mass index (BMI), waist hip circumference (WHR), and Conicity Index (CI) were computed using the following standard equations.

**Dietary pattern and food habits:** Information about type of diet and frequency of meals studied by using 24 hr recall method: Food consumption pattern was assessed by 24 hours recall method [7]. Data was collected for the previous day or 24 hr preceding the interview. A set of standardized vessels were used to obtain estimates of the amount of raw and cooked food consumed by geriatric population and by Food frequency questionnaire (FFQs): Food frequency questionnaire are designed to obtain information about usual food consumption patterns. They provide estimates on intake over a specified time period, ranging from a week to one month. A FFQ was designed [6] for collecting the information on location and age specific foods.

**Statistical Analysis:** Descriptive statistics are reported as mean  $\pm$  SD. The effects of time on dietary intakes were assessed by one-factor repeated measures analysis of covariance (ANOVA). The non-parametric Wilcoxon rank sum test was used to analyse the socioeconomic data. P values < 0.05 (two-tailed) were regarded as statistically significant.

Level of significance was tested at both 5% and 1% levels. The data analyses were performed with SPSSPC for Windows (SPSS, version 15, Chicago, IL, USA).

### Results and Discussion

Effects of place of residence on demographic and socio-economic profile of the geriatric respondents are presented in the Table 2. Highly significant differences for gender, marital status (p=0.01 in Chi square test) and in both groups most of them were married (Male: 54 % & Female: 60 %). Educational levels determined residency. Fewer people in rural areas received salary or pension when compared to urban people. A significant numbers of urban old both residing at home (60 %) and in old age home (24 %) were getting Rs 501-1000 and Rs 1000-10,000 per/month respectively. More than half of respondents living in home were in nuclear family systems in urban area (61 %). People in old age homes in both rural and urban area were from joint family systems.

Place of residence was influenced by several variables such as marital status and occupational status except for age and these findings were correlated with [8, 9] who studied the rural old age people of India and who reported that improved literacy status in urban living members resulted in better employment status and comfortable health and living conditions. In rural areas members with illiteracy and low income suffered with more nutritional and physiological problems. The present investigation has brought to light that respondents in rural old age homes had less income compared to those residing at home in urban areas.

The reasons for this could be attributed to the fact that urban respondents living at home had better education which brings higher income. However, in old age home respondents had lower income through doing part time work in old age homes (doing paper cutting, greeting card, making pens from paper, candle making, jute products etc.). Most of the urban people in home led sedentary life style without doing any work. The present study finding was in conformity with the results of [10] who reported that income earned by elderly were through employment, business, farming, rent, pensions, dividends, interest, social security. According to the findings of [11] the family still accounts for a large proportion of the support received by the elderly. In most of the studies it has been reported that majority of the old age people lived in families. In the present study a purposive selection of respondents from different residential settings was done. Therefore there is a divergence in the nature of living arrangements.

The data on dietary habits of the respondents was classified by their living arrangements (Table 3). Number of meals, skipping of meals, consistency of food and use of functional ingredients mainly fenugreek seed was found to be significantly different among groups. Diet is a vital determinant of health and nutritional status of people. The dietary habits of individuals/families/communities vary according to socio economic factors, regional customs and traditions. Inadequate nutrition ranks as one of the major problems of old age. It is very difficult to persuade elderly people to eat increased amounts of food, making it hard to correct nutritional deficiencies common in this population [12].

In a study [13], reported that 18 per cent of diabetics included foods such as bitter gourd (18%), fenugreek leaves (4 %) and drumstick leaves (2 %) for their health promoting benefits. The recommendation that frequent and short meals when compared to two heavy meals are better suited for diabetes and hypercholesterolemia [14], was being followed by most of the respondents. However a small number (15 %) skip one or the other meal. This is one of the problems faced by the elderly and may contribute to poor food intake. The reason for poor food intake among elderly has been attributed to presence of disease, restriction or reduced activity. In addition, changes in taste sensitivity have been reported with advancement of age [15]. The prevalence of vegetarianism is region and community specific; in present study more respondents were non-vegetarians.

Although the differences were not statistically significant the present investigation (Table 4) showed that the mean BMI decreased as age increased in both male and female geriatric respondents. Compared to male, female had higher BMI. Even for the indices waist to hip ratio, arm muscle circumference and coinicity index there were no significant differences between male and female geriatric respondents. However there was significant difference between male and female for % body fat. The mean per cent body fat was 14.10 and 13.05 for male and female aged 70-79 years respectively. The high prevalence of overweight and obesity observed (as well as the absence of underweight) could be explained in part by an overestimation of BMI values associated with height loss – especially among women, in which bone loss is greater [16]. The use of the BMI in older people is controversial. Several studies have shown an association between high BMI values and minimal mortality risk in men and women over 70 years of age [17, 18, 19]. In their study, no relationship was found between BMI and active ageing. Nevertheless, the prevalence of obesity in men and women is troubling, particularly taking into account the high values of waist circumference and coinicity index observed, which is an indicator of metabolic syndrome and cardiovascular risk [20]. Skin fold measurement has also been shown to correlate with body fat [21]. According to [22] the skin fold measurement of women showed differences that were related to aging whereby the measurements were lowered with age. The present study to some extent validates the above trends.

Fig 1 depicts the mean intakes of nutrients of geriatric respondents. Between the male and female geriatric respondents there was a significant difference for variables such as fat, carbohydrate, energy, phosphorous, iron,

thiamine. The mean intake of energy was 977.3 Kcal and 1099 Kcal in male and female geriatric respondents ( $t=3.43^*$  at 5% level). The mean intake of protein was similar in both male and female (30 g/day). The intake of protein was almost half of the RDA (30g/day) in both the gender when compared with RDI (55-60g/day). Consumption of mean fat intake was 19.8 g/day and 18.9 g/day in male and female geriatric respondents ( $t=3.87^*$  at 5% level).

Mean nutrient intake of iron was 13.2g/day and 18.5g/day in male and female respondents respectively. Females had higher RDI than males for most of the nutrients. The male have lower mean intake of B-complex vitamins as compared female respondents. The mean intake of phosphorous and vitamin C for both genders was high. Intakes of calcium, thiamine and niacin were adequate and other nutrients were found inadequate in both the gender. In the present study the majority were inadequate for most of the nutrients. The mean intakes of energy for male and females were  $977.3 \pm 175.2$  and  $1099.1 \pm 226.5$  Kcal/day respectively. The values were lower than those reported by NNMB [23]. They reported intakes of energy for male and females as 2167 and 1764 Kcal. In their study about 65% elderly population consumed more than the RDI of energy.

Protein- Calorie adequacy status was observed in large proportion of elderly (male: 90% and female: 67%). This may be because in present study higher number of respondents were living in old age homes compared to their study. The mean intake levels of energy and protein were found to be lower than those reported for Chinese elderly [24], which were 112 % and 28 % of the RDA, respectively. James, (1988) observed that the mean intake declined with increasing age. NNMB, [23] survey found that the mean and median intake of protein was slightly below the RDI in both the sexes. In the case of vitamin A and riboflavin, the intakes were below the RDI. In about 59%, the intakes of Vitamin A were less than 30% of RDI and only 13% consumed more than the RDI.

The decreased intakes during old age could be attributed to reduction in BMR and physical activity. Decreased physical activity and changes in body composition and decreased basal metabolic rate affects the macronutrient energy, protein requirements. Decreased gastric secretion and intestinal motility affect the absorption and intake of nutrients especially calcium, iron, vitamin B<sub>12</sub> and fibre in the diet. The dietary fibre intake is also reduced with age. Thus the elderly in the present study are definitely suffering from poor nutrition and are in special needs category.

**Table 2:** Demographic and Socio Economic of the Geriatric Respondents by residence (N=300) (in terms of percentage)

Characteristics /respondents		At home	Old age homes		Combined	$\chi^2$ Value	$\chi^2$ Value
		Urban (103) a	Urban (139) b	Rural (58) c	(197) d	a vs d	b vs c
Gender	Male	37	26	69	39	NS	32.0**
	Female	63	74	31	61		
Marital status	Married	54	68	60	66	34.5**	NS
	Widow (ed)	29	32	40	35		
	Unmarried	17	1	0	0		
Source of income	None	06	11	14	12	93.6**	8.7*
	<500	09	55	72	60		
	501-1000	60	29	12	24		
	1000-10,000	25	05	02	04		
Occupational status	None	26	1	10	4	43.9**	41.8**
	Retired	6	15	26	18		
	Employee	6	11	38	19		
	Agriculture	62	73	26	59		
Education	Illiterate	16	54	41	50	134.6**	43.5**
	Primary	14	45	28	40		

Family type	Secondary	29	1	31	10	18.2**	22.1**
	College	42	0	0	0		
	Joint	31	63	33	54		
	Nuclear	61	32	43	35		
	Extended	08	05	24	11		

Significant at 1% Level, \*Significant at 5% Level, NS: Non-Significant

**Table 3:** Dietary habits of the geriatric respondents in the study group – distribution by residence (N=300) (In terms of percentage)

Dietary habits/ Respondents		At home	Old age homes		Combined	$\chi^2$ Value	$\chi^2$ Value
		Urban (103) a	Urban (139) b	Rural (58) c	(197) d	a vs d	b vs c
Type of diet	Vegetarian	29	22	31	25	NS	NS
	Non-veg.	71	78	69	75		
Number of meals per day	Two meals	75	59	95	69	6.5*	24.8**
	Three meals	25	41	05	31		
Skipping of meals @	Breakfast	19	07	28	13	NS	6.30*
	Lunch	10	02	47	15		
Use of functional ingredient @	Methi seeds	47	12	3	9	25.9*	13.2*
	Amruthballi	19	13	24	16		
	Ashwgandha	20	23	36	27		

\*\*Significant at 1% Level,\*Significant at 5% Level, NS: Non-Significant @ Multiple responses

**Table 4:** Anthropometric indices of geriatric respondents in the study group distribution by gender and age (N=300)

Parameters	Age (Yrs)	Respondents			
		Male (n=114)		Female (n=186)	
		Mean	SD	Mean	SD
BMI	60-69	26.56	4.4	25.81	4.6
	70-79	26.56	4.1	25.47	4.6
	80-89	26.43	4.7	24.93	3.6
	F-Test	0.01 <sup>NS</sup>		0.60 <sup>NS</sup>	
Waist to hip ratio	60-69	0.81	0.1	0.81	0.1
	70-79	0.80	0.1	0.80	0.1
	80-89	0.83	0.1	0.80	0.1
	F-Test	1.63 <sup>NS</sup>		0.34 <sup>NS</sup>	
Percent body fat	60-69	13.10	1.4	13.12	13.10
	70-79	14.10	2.0	13.05	14.10
	80-89	13.75	1.9	12.08	13.75
	F-Test	3.11**		3.36**	
Coinicity index	60-69	1.15	0.2	1.14	0.2
	70-79	1.14	0.2	1.13	0.2
	80-89	1.16	0.2	1.12	0.1
	F-Test	0.07 <sup>NS</sup>		0.23 <sup>NS</sup>	

\*Significant at 5% Level, NS: Non-Significant

## Conclusion

Findings of the purposive study in geriatric respondents of Bangalore city show on one hand overweight and obesity were high among males and burden of chronic diseases were high among the geriatric population. The prevalence of malnutrition is significantly higher in upper age group of geriatric (70 years and above) population. Management of nutritional status in the geriatric population requires the involvement of multiple disciplines for its diagnosis and treatment. Hence there is need of balanced nutrition for geriatric population was necessary to combat malnutrition in geriatrics.

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