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Assessment of the nutritional status of elderly subjects by considering their anthropometric measurements and dietary intake

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Abstract: ***Nutritional well-being is an integral component of the health, independence, and quality of life of the older individuals. Poor nutritional status is a primary concern for the elderly. Nutrition of aged individuals is a neglected area, and from time to time the fact that the elderly individuals are malnourished though very little studies have been conducted to directly correlate nutrition and ageing. A survey was conducted on the purposely selected samples of 156 elderly residing in the different old age homes of the Varanasi city. To conduct the study anthropometric measurement and dietary intake were recorded in the interview schedule. The present study revealed that there were slight differences in different BMI groups respective to their sex and age-group. Lower BMI is associated with lower intake of different nutrients like carbohydrate, protein and fat.***

Keywords: Nutritional Status, anthropometric, dietary, BMI, RDA.

I. INTRODUCTION

Nutritional well-being is an integral component of the health, independence, and quality of life of the older individuals. There is growing awareness that the major health problems and even mortality in the aged have nutritional contributors and can be (in part) prevented by food intake. These health problems do not necessarily need to occur with ageing and death can be delayed.

Poor nutritional status is a primary concern for the elderly. Nutritionally inadequate diets can contribute to or exacerbate chronic and acute diseases, hasten the development of degenerative diseases associated with ageing, and delay recovery from illness. A number of studies indicate that the diets of many older do not provide the level of nutrients needed to maintain a healthy body and mind. Chronic disease and poverty are two important influences on the nutritional status of the elderly.

Nutrition of aged individuals is a neglected area, and from time to time the fact that the elderly individuals are malnourished though very little studies have been conducted to directly correlate nutrition and ageing. Serious consideration of the nutritional needs of the elderly population should be an area of high priority. These were some of the important issues which have been explored in the present investigation.

II. METHODOLOGY:

A survey was conducted on the purposely selected samples of 156 elderly residing in the different old age homes of the Varanasi city. To conduct the study a pre designed and pre tested interview schedule was used which was based on the anthropometric measurement technique and dietary intake. Anthropometric measurements were taken by using standard technique at the time of interview of each respondent. The height of the subjects was recorded using metallic measuring tape in nearest 0.1 cm, with respondents standing erect with their heels and back against wall. After taking standing height, the respondents were told to lie down on bed, so that their horizontal length could also be taken and then both the heights were cross checked. A personal weighing scale was used in order to record the weight of the respondents with zero standard error. The subjects were asked to stand erect without shoes and the arms hanging by the sides and the head in straight ways without leaning forward or back-ward to distribute weight evenly between the feet. The weight was recorded after correcting the zero error each time. The body mass index (BMI) was calculated later on by using the following formula and recorded on the interview schedule.

BMI = Weight (kg)/Height ($m.^2$)

Dietary intake of respondents was determined by the 24 hours recall method by using the standard utensils such as cup, glasses, spoon and bowl which were standardized in Home Science Department, B.H.U. Varanasi. Every assistance was given to the elderly individuals to help him/her to recollect details of diet and their meal pattern. The food consumed by each respondent was recorded nearest to the actual intake and values of intake were calculated and recorded on schedule from the reference values (C. Gopalan, 2004).

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III. Result and Discussion:

Anthropometric measurement technique is widely used as tool for assessing the nutritional status of population and for monitoring health of individual. The most frequently used anthropometric techniques are height and weight for the community. BMI of the elderly subjects was calculated for assessing their nutritional status from the height and weight recorded for the study. Hickson et al. (2003) stated that height is most commonly required to calculate BMI, which is frequently used to assess nutritional status. Inaccurate height estimates could lead to large discrepancies in the BMI value.

Table No. 1 Sex wise distribution of the respondents according to the level of BMI

Level of BMI ($kg/m.^2$)	Sex					
	Male		Female		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
<18.5	14	28.0	31	29.2	45	28.8
18.5-22.99	15	30.0	35	33.0	50	32.1
23.0-24.99	04	8.0	10	9.4	14	9.0
25.0-29.99	14	28.0	25	23.6	39	25.0
> 30	03	6.0	05	4.7	08	5.1
Total	50	100.0	106	100.0	156	100.0
$\chi^2 = 0.57$, df = 4, P > 0.05						

The body mass index (BMI) was calculated and categorized according to standards of WHO (2002) and presented in table 1. The overall prevalence of underweight (BMI<18.5) was observed in 28.8 per cent of respondents in which 29.2 per cent were females and 28.0 per cent were males, where as in normal BMI category (18.5-22.99), the proportion of male and female respondent were 30.0 per cent and 33.0 per cent respectively. Out of total respondents 30.1 per cent were obese (25.0-29.99 & ⩾ 30) in which male subjects were more than the female subjects and only 9.0 per cent of respondents were in BMI group (23.0-24.99) i.e., was at risk of obesity. Statistically $\chi 2$ tests signify the fact that the difference in the proportion of male and female respondents regarding various BMI group was not found to be significant. Vijayaraghavan et al. (2000) reported that the mean height of elderly decreased in both sexes as the age advances. Perissinotto et al. (2002) reported that the mean values of all anthropometric measurements significantly differed between gender.

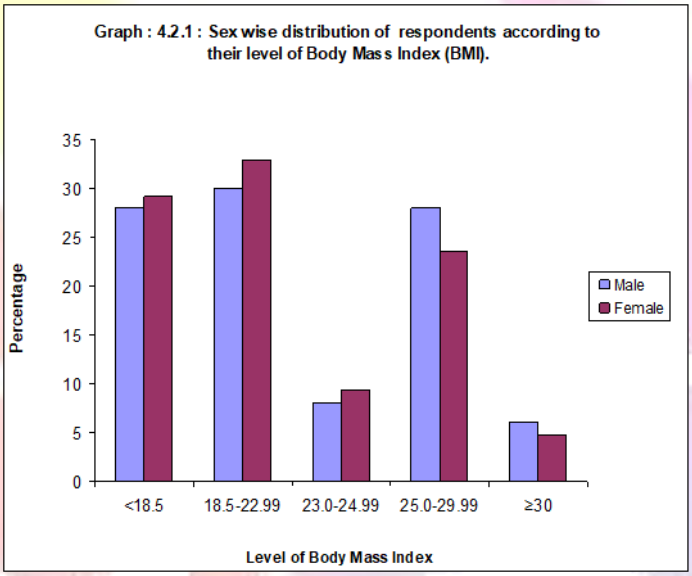

Table No. 2 Age wise distribution of elderly individuals according to the BMI categories

Categories of BMI ($kg/m.^2$)	Age Groups (Years)							
	60-69		70-79		80 & above		Total	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
<18.5	14	26.9	17	25.0	14	38.9	45	28.8
18.5-22.99	16	30.8	24	35.3	10	27.8	50	32.1
23.0-24.99	03	5.8	08	11.8	03	8.3	14	9.0
25.0-29.99	14	26.9	18	26.5	07	19.4	39	25.0
≥ 30	05	9.6	01	1.5	02	5.6	08	5.1
Total	52	100.0	68	100.0	36	100.0	156	100.0
$\chi^2 = 7.74$, df = 8, P > 0.05								

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Out of the total respondents who were in underweight BMI category (<18.5), majority (38.9 per cent) of the respondents in age group of 80 years and above followed by 26.9 per cent (60-69) years of age group and minimum 25.0 per cent in the age group of (70-79) years of age group respectively. Just a reverse trend was observed in obese I (25.0-29.99) and obese II category (≥30). In Normal (18.5-22.99) and in at risk group of BMI (25.0-29.99), the proportion of respondents was near about same in early and late elderly group and more in the age group of (70-79) years. There were differences in various age groups according to the level of BMI but statistically insignificant. Vijayaraghavan et al. (2000) reported that the mean BMI was higher in the younger age-group of males while in the case of females it was higher in the older age group. The other study like Ravishankar (2000) reported 49.0 per cent of elderly were underweight in rural community of Varanasi respectively which is higher than the present study.

Table No. 3 Distribution between average intake of nutrient and BMI group of the study subjects

Nutrients	BMI (kg/m.^{2})										Value of
	<18.5		18.5-22.99		23.0-24.99		25.0-29.99		≥30		
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	F , P
Energy (Kcal.)	1487.14	451.67	1537.73	435.92	1738.23	371.73	1618.98	409.39	1677.33	489.85	1.27, >0.05
Carbohydrate (g.)	265.50	72.95	278.97	68.91	283.85	72.59	268.74	70.77	280.77	66.97	0.36, >0.05
Protein (g.)	45.15	15.63	48.47	18.48	58.44	14.14	52.43	14.47	52.73	16.23	2.31, >0.05
Fat (g.)	35.01	15.99	32.91	17.46	42.58	11.53	39.12	15.43	38.33	23.00	1.43, >0.05
Fiber (g.)	5.66	2.18	6.67	2.58	6.06	1.96	6.36	1.69	6.95	1.86	1.52, >0.05
Calcium (m.)	653.43	369.09	656.04	497.82	933.44	421.57	827.36	411.70	736.43	481.40	1.97, >0.05
Iron (mg.)	10.36	4.03	12.05	5.19	11.94	3.67	13.36	4.45	13.03	4.14	2.23, >0.05
Vitamin A (µg.)	976.33	1406.11	1929.38	21.13	708.90	369.25	1252.49	1400.79	973.38	588.97	2.95, >0.05 Significant pairs (1vs2),(2vs3)
Thiamine (mg.)	1.22	0.66	1.31	0.50	1.33	0.42	1.36	0.36	1.43	0.42	0.55, >0.05
Riboflavin(mg.)	1.11	0.73	1.06	0.54	1.35	0.53	1.33	0.51	1.18	0.58	1.51, >0.05
Vitamin C (mg.)	53.85	42.92	69.90	44.51	75.29	93.88	73.35	60.61	78.04	50.27	0.98, >0.05

The average consumption of specified nutrients according to different group of BMI of study subject is arranged in table 3. It adduces that the average intake of energy, carbohydrate, protein, fat, calcium and riboflavin were found to be maximum in (23.00-24.99) BMI group of respondents while it was minimum in BMI group (>18.50) kg/m^2, except the consumption of fat.

In the other nutrients like fiber, iron, thiamine and vitamin C, the average intake was accounted to be high for the elderly who belonged to > 30 BMI group while minimum in (<18.50) B.M.I group. As vitamin A was concerned, it was consumed by those elderly in maximum quantity who belonged to the range of BMI group (18.50 to 22.99) while minimum in (23.00-24.99) of BMI group. The differences in average intake of various stated nutrients among different BMI groups of elderly were not found to be statistically significant with the exception of vitamin A.

Thus, it may be concluded from the results that the respondents who were underweight (<18.5) consumed the various nutrients in less quantity, except fat and vitamin A. The remaining elderly of BMI group (23.00-24.99) and (≥ 30) consumed the maximum quantity of various stated nutrients, except vitamin A. The findings of the study are supported by the Feldblum et al. (2009) who reported that body mass index lower than 23kg/m^2 was associated with nutritional risk. Sulander et al. (2005) found in a study that over weight (BMI 25 to <30kg/ m^2) men had slightly better functional ability then those with normal weight (BMI<25kg/ m^2).

Table No. 4 Distribution of respondents according to the Mean (±SD) nutrient intake by per cent of RDA and BMI

Nutrients	BMI (kg/m.^{2})										Value of
	<18.5		18.5-22.99		23.0-24.99		25.0-29.99		>30		
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	F , P
Energy	81.17	26.81	82.87	19.51	95.33	22.73	86.94	22.62	90.18	28.87	1.26,>0.05
Protein	83.29	29.39	87.83	27.05	107.83	23.56	95.05	24.78	96.79	33.44	2.70,<0.05 Significant pairs (1vs3),(2vs3)
Fat	81.31	36.57	74.64	34.81	99.48	25.91	90.66	36.72	87.59	52.01	1.89,>0.05
Calcium	69.71	38.57	69.21	50.31	100.07	44.46	88.51	44.49	78.27	50.16	2.21,>0.05
Iron	27.27	10.61	32.23	13.67	31.41	9.67	35.17	14.34	34.28	10.89	2.23,>0.05
Vitamin A	103.05	151.61	204.67	228.59	74.52	40.15	133.51	145.39	100.31	62.26	2.94,<0.05 Significant pairs (1vs2),(2vs3)

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Thiamine	76.80	44.63	81.02	26.25	83.22	23.10	83.81	21.93	89.95	33.65	0.44,>0.05
Riboflavin	70.01	47.76	65.63	30.87	84.97	33.07	82.80	32.76	73.59	36.72	1.58,>0.05

An analysis was made regarding the average per cent intake of various nutrients with respect to RDA in different BMI groups of respondents and presented in table 4. The results reveal that the mean per cent intake of energy, protein, fat, calcium and riboflavin was slightly less or equal to RDA in the respondents of (23.00-24.99) BMI group while it was minimum in BMI group (<18.5) regarding energy and protein and in case of fat, calcium and riboflavin minimum was observed in BMI (18.50-22.99) group of elderly respectively. The mean per cent intake was maximum in respondents belonged to BMI group (25.00-29.99) and thiamine in (>30) BMI group whereas both the nutrients were minimum in the respondents belonged to underweight category. The average per cent intake was just double than the RDA by the respondents belonged to (18.50-22.99) BMI group while minimum by the BMI group (23.00-24.99) respectively. There were some differences in mean per cent intake of stated nutrients among different BMI group but statistically were not significant except nutrients, protein and vitamin A intake. Sumathi et al. (1999) carried out food and dietary intake survey in institutionalized elderly population age 60 year and over. Gross deficiencies were observed in several major as well as minor nutrients just like the findings of the present study.

IV. CONCLUSION

The present study revealed that there were slight differences in different BMI groups of elderly respective to their sex and age-group. Lower BMI is associated with lower intake of different nutrients like carbohydrate, protein and fat. Feldblum et al. (2009) reported that body mass index lower than 23kg/m.^{2} was associated with nutritional risk. Bhooma et al. (2005) reported that in spite of low-calorie intake by the elderly man and women, their BMI was found to be in the normal category. P. Mehta et al. (2009) conducted a study on Health and Nutritional Status of very old elderly (85+ years) and found that good fitness among very old elderly seem to be associated with diet rich in antioxidants, regularity of meals, high self-esteem and involvement in regular physical activities, religious activities, yoga and meditation. Thus, it can be concluded Anthropometric and nutritional characteristics are related to genetic, environmental, socio-cultural conditions and to lifestyle, health and functional status. Anthropometry is an essential tool in geriatric nutritional assessment to evaluate underweight and obesity condition, which are both important risk factors for severe diseases and disability in the elderly (Jensen & Rogers, 1998 and Visser et al., 1998). Ageing brings changes in process of absorption and assimilation of different nutrients which effects nutrient retention and weight gain in old age not only the lower dietary intake leads to low weight.

References:

1. Bhooma N. & Chitra P., Trace Minerals, Calcium and Magnesium Profile of Institutionalized Elderly, The Ind. J. Nutr. Dietet., May, 42, 201,2005.
2. Feldblum I., German L., Bilenko N., Sahar A., Enten R., Greenbery D., Harman I., Castel H. & Shahar D.R., Nutritional
3. Risk and Health Care Use Before and After An Acute Hospitalization among the Elderly, Nutrition 25 ,415-420,2009.
4. Gopalan C., Rama Sastri B.V. & Basubramanian, Nutritive value of Indian foods, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India, 2004.
5. Hickson M. & Frost G., A comparison of three methods for estimating height in the acutely ill elderly population, The British Dietetic Association Ltd., J Hum Nutr Dietet, 16, 13-20,2003.
6. Indian Council of Medical Research Nutrient requirements and recommended dietary intakes for Indians, 1989.
7. 7.Jensen G.L. & Rogers J., Obesity in older persons, Journal of the American Dietetic Association, 98, 1308-1311,1998.
8. 8.Mehta P., Sharma M. & Chauhan K., A Study on Health and Nutritional Status of Very Old Elderly (85+ years) and Centenarians,Indian Journal of Gerontology, Vol. 23, No. 3, 277-284, 2009.
9. 9.Perissinotto E., Pisent C., Sergi G., Grigoletto F., Anthropometric Measurmentns in the Elderly : Age and Gender Differences, British Journal of Nutrition, 87-177-186,2002.
10. 10.Ravishankar : Health Profile of Elderly in the Rural Field Practice Area of Deptt. of Community Medicine, Thesis submitted for MD Community Medicine to B.H.U., Varanasi, 2000.
11. 11.Sulander T., Martelin T., Rahkonen O., Nissinen A. & Uutela A., Associations of functional ability with health-related behavior and body mass index among the elderly, Archives of Gerontology and Geriatrics, 40, 185-199,2005 (Available at www.sciencedirect.com).
12. 12.Sumathi A., Malleshi N.G. & Rao S.V., Nutritional Status of Institutionalized Elderly in an Old Age Home in Mysore City : Dietary Habits and Food and Nutrient Intakes, Nutrition Research, Vol. 19, N. 10, 1459-1469, 1999.
13. 13.Vijayaraghavan K., Brahman G.N.V., Balakrishna N., Arlappa N. & Kumar S., Report on diet and nutrient status of elderly, National Institute of Nutrition, ICMR, 2000.

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14. 14.Visser M., Langlois J., Guralnik J.M., Cauley J.A., Kronmal R.A., Robbins J., Williamson J.D. & Harris T.B., High body fatness, but not low fat free mass, predicts disability in older men and women : The Cardiovascular Health Study, American Journal of Clinical Nutrition; 68, 584-590,1998.
15. 15.World Health Organization: The World Health Report (2002), Reducing risks, promoting health life, Geneva: WHO, 2002.

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