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RESEARCH ARTICLE

ANTHROPOMETRIC INDICES AND PERCENT ADEQUACY OF FOOD AND NUTRIENT INTAKE OF ELDERLY

^{1,*}Dr. Varsha Zanvar and ²Ms. Madhuri Revanwar

¹Assistant Professor, Dept. of Home Science, Shri Yoganand Swami Arts College, Basmath, Hingoli (MS)

²SMS, KVK, Sagroli Dist, Nanded

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ABSTRACT

Present study was conducted to assess the nutritional status of 600 elderly population residing in urban (200), rural (200) and tribal area (200) of Nanded district of Marathwada region of Maharashtra state, India. out of total elderly subjects 279 male and 321 were female. Anthropometric status of selected elderly was determined by recording height (cm.), weight (kg.), hip circumference (cm.), waist circumference (cm.) and body mass index was calculated using values of height and weight. On the basis of BMI, selected subjects were categorised under different grades of undernutrition. Daily food intake of each selected elderly was recorded with the help of two days dietary recall method and weighment method. By using food consumption table of ICMR (Gopalan et al., 2004) the nutrient intake of the elderly was calculated. Food and nutrient intake of the elderly was compared with the balanced diet and ICMR recommended dietary allowances (ICMR 2012) to find out the percent adequacy in consumption. Result revealed that, the height and weight of elderly ranged from 147.01±6.01 to 164.72±17.01 and 42.55±10.00 to 63.69±8.68. Tribal elderly male and female exhibited very low values than urban and rural elderly male and female. More percent of female were belonging to either underweight or overweight. The mean intake of cereals (229.15±77.67 gm.), pulses (29.48±14.33 gm.), green leafy vegetables (18.45±30.36 gm.), roots and tubers (36.91±34.61 gm.), milk and milk products (63.53±61.53 gm.) and sugar and jaggery (16.75±8.09 gm.) was more by elderly male than female. Percent adequacy of all food stuffs was found higher in elderly male than female. Statistically significant difference was noted for almost all nutrients intake between male and female elderly except iron, fat and vitamin c. However, among elderly male and female highest percent adequacy was noted for fat and phosphorus. Other nutrients reported 40 to 63 percent adequacy among male and 34 to 63 percent among female.

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INTRODUCTION

The elderly are one of the most vulnerable and high risk group in terms of health status in any society. Remarkable advances in the medical science and improvement in socioeconomic conditions has led to the most striking change in the demography of the world towards aging process. Old age is characterised by changes such as wrinkled skin, decalcification of bones, muscle atrophy, slow and less coordination of body movements, decreased cardiac output, diminished function of body organs, decline and deterioration of functioning cells, deranged enzyme actions, delayed synthetic processes etc. Anthropometric measurements are now regarded as important indicator of an individual's nutritional status. Malnutrition, either under nutrition or over nutrition gives rise to detrimental alterations of body composition.

*Corresponding author: Dr. Varsha Zanvar,
Assistant Professor, Dept. of Home Science, Shri Yoganand Swami
Arts College, Basmath, Hingoli (MS).

If the loss of available energy reserve in the malnourished is severe enough, it can result in increased morbidity or mortality. It also provides a means of monitoring the appropriateness of nutritional therapy (Rahman, et al., 1998). Nutritional requirement of aged are also affected due to changes in absorption, utilization and excretion of nutrients which are influenced by biological changes in old age, such as decreased basal metabolism, body composition, body weight, diminished enzyme production, slow reflexes etc (Ensminger et al. 1994). At the same time, the requirements of major nutrients are reduced by 10 to 11 percent in view of their reduced physical activity (Pasricha and Thimmayamma, 1998). Certain environmental non nutritional factors also equally but indirectly contribute to the health and nutritional status of an individual. These include area of living, sex, economic status, educational level etc. Data regarding nutritional status of elderly are most needed for providing multiple facilities such as physical, social, economic, health and spiritual or emotional securities for wellbeing of elderly to have successful aging

(Pawar and Nalwade, 2015). Considering the above things researcher carried out study to assess the anthropometric indices and percent adequacy of food and nutrient intake of selected elderly from Marathwada area particularly Nanded District.

MATERIALS AND METHODS

Present study was conducted to assess nutritional status of elderly population residing in Nanded district of Marathwada region of Maharashtra state, India. The sample comprised of elderly male (279) female (321) were selected randomly from urban (200), rural (200), and tribal (200) areas. Anthropometric measurements like weight, height, waist circumference and hip circumference was recorded by using standard methods and procedure (Jelliff, 1966) and BMI was calculated by given formula (ICMR, 1986). Food intake was assessed by two day recall method and weighing method. By using food consumption table of ICMR (Gopalan et al., 2004) the nutrient intake of the elderly was calculated. Food and nutrient intake of the elderly was compared with the balanced diet for elderly and ICMR recommended dietary allowances (ICMR 2012) to find out the percent adequacy in consumption.

RESULTS

An anthropometric measurement of elderly male and female from different residential area is illustrated in Table 1.

It is evident from the table that, the height and weight of elderly ranged from 147.01 ± 6.01 to 164.72 ± 17.01 and 42.55 ± 10.00 to 63.69 ± 8.68 . when compared among male and female in urban, rural and tribal area, statistically significant difference was noted. But, values shows clearly that, the values of height and weight recorded by female were comparatively less than their counterparts. However, urban elderly recorded more height and weight than rural and tribal elderly subjects. Whereas, among urban and rural areas, the difference between BMI was statistically non significant with the range of 20.91 ± 3.07 to 23.06 ± 3.40 . Contrary to the height and weight, female recorded more BMI in urban and rural area. However, among the tribal elderly, statistically significant difference was noted for BMI. Waist circumferences of elderly male from all three areas were slightly more than female. But statistically non significant difference was noted. In case of hip circumference, elderly female from urban area recorded more values (93.01 ± 9.28 cm) as compared to elderly male (88.86 ± 8.86 cm). While no remarkable difference was observed among rural and tribal area. Waist hip ratio exhibited very negligible difference in between two genders in all three areas. On the whole, when observed for all anthropometric values in all three residential areas, statistically significant difference was noted for height and weight among all groups. However, statistically non significant difference was recorded for other anthropometric measurements. Tribal elderly male and female exhibited very low values than urban and rural elderly male and female. Prevalence of under nutrition among selected male and female is reported in Table 2.

Table 1. Anthropometric measurements of selected elderly as per sex and area (n=600)

Anthropometric measurements	Urban (Mean \pm SD)			Rural (Mean \pm SD)			Tribal (Mean \pm SD)		
	Male (n=95)	Female (n=105)	Z value	Male (n=94)	Female (n=106)	Z value	Male (n=90)	Female (n=110)	Z value
Height (cm)	164.72 \pm 17.01	155.56 \pm 5.67	5.03**	161.95 \pm 5.77	154.15 \pm 5.21	10.12**	155.75 \pm 7.02	147.01 \pm 6.01	9.5**
Weight (kg)	63.69 \pm 8.68	56.52 \pm 9.11	5.73**	54.82 \pm 8.99	50.72 \pm 10.12	3.05**	49.03 \pm 7.71	42.55 \pm 10.00	5.22**
BMI(kg/m ²)	22.96 \pm 3.15	23.06 \pm 3.40	NS	20.91 \pm 3.07	21.27 \pm 3.65	NS	20.07 \pm 2.82	18.92 \pm 2.30	3.38**
West circumference(cm)	85.31 \pm 7.94	85.01 \pm 7.82	NS	83.37 \pm 9.25	81.35 \pm 9.39	NS	70.03 \pm 8.40	68.35 \pm 9.39	NS
Hip circumference (cm)	88.86 \pm 8.86	93.01 \pm 9.28	3.24**	87.75 \pm 10.11	88.66 \pm 11.58	NS	76.32 \pm 8.55	76.83 \pm 10.40	NS
West hip ratio	0.95 \pm 0.02	0.91 \pm 0.03	NS	0.94 \pm 0.04	0.91 \pm 0.04	NS	0.91 \pm 0.03	0.88 \pm 0.05	NS

Table 2. Prevalence of under nutrition among selected elderly men and women (n=600)

BMI	Men (%) (n = 279)	Women (%) (n = 321)
Underweight (<18.5)	59 (21.14)	87 (27.10)
Normal (18.5 – 25)	187 (67.02)	182 (56.69)
Overweight (>25)	33 (11.82)	52 (16.19)

Figures in parenthesis indicates percentages

Table 3. Average food intake by the selected elderly men and women (n = 600)

Food groups (gm)	Balanced diet for men	Balanced diet for women	Male (n=280)	Female n = 320)	Z value
Cereals	350	225	229.15 \pm 77.67	210.11 \pm 78.18	2.98*
Pulses	50	40	29.48 \pm 14.33	26.02 \pm 13.62	3.03*
Green leafy Vegetables	50	50	18.45 \pm 30.36	16.25 \pm 25.15	NS
Roots and tubers	100	100	36.91 \pm 34.61	33.6 \pm 32.98	NS
Other vegetables	200	150	18.88 \pm 30.09	18.82 \pm 29.62	NS
Fruits	200	200	27.86 \pm 36.76	27.90 \pm 34.07	NS
Fats and oil	25	20	10.31 \pm 5.68	10.98 \pm 4.98	NS
Milk & milk products	300	300	63.53 \pm 61.53	53.46 \pm 53.29	2.12*
Sugar & jiggery	20	20	16.75 \pm 8.09	15.60 \pm 7.71	NS

Table 4. Percent adequacy of food intake by the selected elderly male and female (n = 600)

Food groups (gm)	Male (n= 280)	Female (n= 320)
Cereals	93.21	65.78
Pulses	65.11	58.99
Green leafy Vegetables	37.09	32.22
Roots and tubers	36.74	33.63
Other vegetables	12.46	9.51
Fruits	13.99	13.83
Fats and oil	54.89	41.32
Milk and milk products	21.08	17.82
Sugar and jiggery	83.64	78.04

Table 5. Average nutrient intake of the selected elderly men and women (n=600)

Nutrient	RDA		Nutrient intake (Mean \pm SD)		Z values
	Men	Women	Men (n= 279)	Women (n= 321)	
Protein (gm)	60	50	34.69 \pm 11.23	31.62 \pm 11.54	3.33**
Carbohydrate (gm)	424	328	216.19 \pm 63.42	198.83 \pm 65.10	3.30**
Fat (gm)	20	20	20.29 \pm 10.15	20.01 \pm 9.48	NS
Energy (Kcal)	1976	1784	1197.12 \pm 378.79	1110.88 \pm 382.87	2.76**
Iron (mg)	28	30	12.35 \pm 6.12	11.52 \pm 6.08	NS
Calcium (mg)	800	800	308.09 \pm 187.14	274.6 \pm 170.76	2.27*
Phosphorus (mg)	800	800	778.45 \pm 301.64	706.04 \pm 299.69	2.94**
Vitamin C (mg)	40	40	25.25 \pm 27.31	22.70 \pm 20.86	NS

** - Significant at 1%, * - Significant at 5 %, NS - Non significant

Table 6. Percent adequacy of nutrient intake by the selected elderly male and female (n = 600)

Nutrient	Male (n= 279)	Female (n= 321)
Protein (gm)	57.87	63.17
Carbohydrate (gm)	51.06	60.53
Fat (gm)	101.47	99.90
Energy (Kcal)	60.62	62.19
Iron (mg)	44.10	38.38
Calcium (mg)	38.49	34.25
Phosphorus (mg)	99.27	88.15
Vitamin C (mg)	63.24	56.60

It is evident from the table that, 67.02 percent male were found to be normal and remaining were either underweight (21.14) and 11.82 were overweight. Whereas, among female elderly 56.69 percent were categorized as normal followed by underweight 27.10 percent and overweight 16.19 percent. When compared between male and female, more percent of male were found to be normal than female. Contrary, more percent of female were belonging to either underweight or overweight. The data on average daily intake of different food stuffs per day by the selected elderly male and female is presented in Table 3. It is evident from table that, the mean intake of cereals (229.15 \pm 77.67 gm.), pulses (29.48 \pm 14.33 gm.), green leafy vegetables (18.45 \pm 30.36 gm.), roots and tubers (36.91 \pm 34.61 gm.), milk and milk products (63.53 \pm 61.53 gm.) and sugar and jaggery (16.75 \pm 8.09 gm.) was more by elderly male than female. Whereas, respective values for female was 210.11 \pm 78.18, 26.02 \pm 13.63, 16.25 \pm 25.15, 33.6 \pm 32.98, 53.46 \pm 53.29 and 15.60 \pm 7.71 gm. Mean intake of other vegetables, fruits, fats and oil was at par in both genders. Statistically significant difference for intake of cereals, pulses and milk and milk products was observed. Mean intake of all food stuffs by elderly male and female was comparatively low than recommended dietary allowances for elderly.

The results reported by Zanvar and Dhutmal (2019) on food and nutrient intake of women (20 to 60 yrs) from Nanded District are in line with the present results. Table 4 revealed the percent adequacy of food intake by the selected elderly male and female. Gender wise data interpreted that, the percent adequacy of all food stuffs was found higher in elderly male than female. However, when seen critically, it was observed that more than 80 percent adequacy was noted for cereals (93.21%) and sugar and jaggery (83.64%) followed by pulses (65.11%) and fats and oil (54.89%) among male elderly. Whereas, < 10 to 20 percent adequacy was noted for other vegetables and milk and milk products among female elderly. Average nutrient intake by selected elderly male and female is given in Table 5. When compared with RDA, mean nutrient intake of all nutrients was found to be very low. It is further observed from the table that, daily nutrient intake of selected elderly male was protein (34.69 \pm 11.23 gm.), carbohydrate

(216.19 \pm 63.42 gm.), fat (20.29 \pm 10.15 gm.), energy (1197.12 \pm 378.79 kcal), iron (12.35 \pm 6.12 mg.), calcium (308.09 \pm 187.14 mg), phosphorus (778.45 \pm 301.64 mg.), and vitamin C (25.25 \pm 27.31 mg). While respective values for elderly female were 31.62 \pm 11.54 gm., 198.83 \pm 65.10 gm., 20.01 \pm 9.48 gm., 1110.88 \pm 382.87 kcal., 11.52 \pm 6.08 mg., 274.6 \pm 170.76 mg., 706.04 \pm 299.69 mg., and 22.70 \pm 20.86 mg. When compared among men and women, statistically significant difference was noted for almost all nutrients except iron, fat and vitamin c. Table 6 illustrate the data on percent adequacy of nutrient intake by selected male and female elderly. It is inferred from the table that, percent adequacy of nutrient intake ranged from 38.49 (calcium) to 101.47 percent (fat) among male elderly and 34.25 (calcium) to 99.90 percent (fat) among female elderly. Percent adequacy for protein, carbohydrate, fat and energy among elderly male was 57.87, 51.06, 101.47 and 60.62 percent. While respective values for the same nutrients among elderly female were 63.17, 60.57, 99.90 and 62.19 percent respectively. Further it was also noted that, percent adequacy of iron, calcium, phosphorus and vitamin c was 44.10, 38.49, 99.27 and 63.24 percent and 38.38, 34.25, 88.15 and 56.60 percent was recorded for elderly male and female respectively. However, among male and female highest percent adequacy was noted for fat and phosphorus. Other nutrients reported 40 to 63 percent among male and 34 to 63 percent among female.

Conclusion

It can be concluded from the findings that, the height and weight of elderly ranged from 147.01 \pm 6.01 to 164.72 \pm 17.01 and 42.55 \pm 10.00 to 63.69 \pm 8.68. Highest anthropometric values were recorded by elderly male. More percent of female were belonging to either underweight or overweight. Mean intake of other vegetables, fruits, fats and oil was at par in both genders. Statistically significant difference for intake of cereals, pulses and milk and milk products was observed. The percent adequacy of all food stuffs was found higher in elderly male than female. Statistically significant difference was noted for almost all nutrients intake except iron, fat and vitamin c. Percent adequacy of nutrient intake ranged from 38.49

(calcium) to 101.47 percent (fat) among male elderly and 34.25 (calcium) to 99.90 percent (fat) among female elderly.

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