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NUTRITIONAL ASSESSMENT OF 60-80 YEARS OLD GERIATRIC POPULATION RESIDING IN MUMBAI- A CROSS-SECTIONAL STUDY

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ABSTRACT

Ageing is an inevitable biological process that begins with conception and stops with death, and is characterized by several molecular pathways and biochemical events that cause significant alterations in all organs system. Age-related multi-morbidity is a common condition that has been observed to occur more frequently in developing nations. **Aim:** To assess the nutritional status of geriatric population between the age group of 60-80 years residing in Mumbai. **Methodology:** This observational cross-sectional study was conducted in Mumbai on 100 male and female participants between the ages of 60 and 80 years. A 24-hour recall and food frequency questionnaire were used to evaluate dietary intake. Anthropometric measurements (weight, height, BMI, MUAC, waist circumference, hand-grip) were taken. Interviews were conducted to obtain information about demographics, medical history, and lifestyle. **Results:** Mean age was 68.83 ± 5.3 years (n=35) for male subjects and 65.89 ± 5.12 years (n=65) for female subjects. The mean weight and height of male participants was 69.0 ± 10.7 kg and 164 ± 7.3 cm, respectively. The female participants had a mean weight of 67.9 ± 13.6 kg and a mean height of 156.5 ± 6.8 cm. The majority of participants were obese because their waist circumference, BMI, and MUAC were higher than the cut-off values. Handgrip was low among all the participants, and was significantly correlated with weight ($p= 0.010$) and height ($p = <0.001$) and also with intakes of energy ($p = 0.015$) and carbohydrate ($p = 0.015$). In macro and micronutrient consumption the mean average intake of energy, calcium, vitamin A, C, and B12 was low, while carbohydrate ($p = 0.015$), protein ($p = 0.303$), fat ($p = 0.163$), and vitamin D were higher compared to the Estimated Average Requirements (ICMR, 2020). In contrast to women, men consumed more iron and females consumed more folate. **Conclusion:** With increasing life spans, it has become important that the adults in the age group of 60-80 years are careful about their diet as it will have a long-term impact. Presence of low hand-grip strength along with obesity indicates sarcopenic obesity despite low energy and a good protein intake. Micronutrients deficiency and low physical activity may play an important role. Education regarding proper diet and lifestyle is an important aspect to be taken care of.

Index terms: elderly, aging, anthropometry, dietary-intake, handgrip, nutrients.

I. INTRODUCTION

Globally, the average life expectancy is rising every year, which is causing a rise in the population of elderly people. In all parts of the world, emphasis is placed on lowering mortality and morbidity rates, raising life expectancy, and enhancing overall quality of life (Ghani et al., 2013).

Ageing is an inevitable biological process, and the United Nations predicts that by 2025, there will be 1.2 billion people 60 years or older, and by 2050, the number will be 2 billion, representing 22% of the world's population (Kritika et al., 2014). Old age is characterized by social change, ageing, and diseases, which can lead to a decline in metabolic rate, low basal metabolic rate, and impaired sensory function.

According to the 2011 census, 8.6% of India's population is in the geriatric age group, which includes those 60 years of age and older (Lahiri et al., 2015). By 2050, 27.8% of Europeans will be over 65, according to the European Union (EU) (Dedeyne et al., 2020).

A balanced, nutritious diet is essential for elderly, as they often suffer from chronic diseases. As they age, muscle tissue is gradually lost, resulting in sarcopenia, a condition causing weakness, loss of independence, and increased healthcare expenses (Sheen, 2011; Marchell, 2003). Sarcopenia affects 9.9%-40.4% of older adults, with higher morbidity in urban areas (Dedeyne et al., 2020).

Malnutrition is common among the elderly due to declining food intake, poor appetite, muscle atrophy, weight loss, and consumption of low calorie food contributing to nutritional deficiencies. This leads to a lower quality of life, increased risk of infection, complications, muscle atrophy, hospitalization, and higher mortality (Lahiri et al., 2015; Tamang et al., 2019).

In many countries, particularly among the elderly, overnutrition and obesity are also on an increase along with undernutrition. Both of these conditions lead to functional decline and disability and are linked to increased mortality, type 2 diabetes, impaired glucose tolerance, hypertension, lipid abnormalities, stroke, and coronary heart disease. Therefore, anthropometric evaluation is crucial for assessing the nutritional status of the elderly, as they are more susceptible to malnutrition and chronic diseases (Arlappa et al., 2014).

The age group 60 to 80 years typically experiences lot of physiological and psychological changes in their body and are more prone to several acute and chronic illnesses which results in decreased food intake leading to the elimination of numerous macro and micronutrient. Therefore, the present study was planned with an aim to investigate the dietary intakes of the macronutrients and micronutrients (calcium, iron, folic acid, vitamin B12, Vitamins A, C and D) and compare them to EAR, to assess the anthropometric status, morbidity status and socio-economic profile of 60 to 80 years old adults residing in Mumbai.

II. METHODOLOGY

An observational cross-sectional study was carried out among 100 males and females participants between the age group of 60 to 80 years from December'22-February'23. Individuals between the mentioned age group, residents of Mumbai, and those willing to participate were included, while mentally disabled people and individuals confined to wheel chair or bed were excluded from the study. Data was collected using a questionnaire and the participants were selected using snowball non-random sampling technique. Anthropometric measurements like height, weight, waist circumference, handgrip, waist to height ratio, MUAC and BMI were recorded. Socio-demographic data, physical activity, medical history and nutritional status and questions related to lifestyle were noted. To record the consumption of commonly available foodstuffs, FFQ was used, whilst 24-hour-recall was used to assess the diet of each individual. Ethics approval was obtained from Inter System Biomedica Ethics Committee, Mumbai.

III. STATISTICAL ANALYSIS

Statistical analysis was done using SPSS Software. Frequencies and percentages were calculated for categorical data and means and SDs calculated for continuous. T test and chi square tests were used.

IV. RESULTS AND DISCUSSION

This was an observational cross-sectional study conducted among 100 geriatric participants between the age group of 60 to 80 years of age in Mumbai consisting of 35 males and 65 female participants. The results of the study revealed that mean age of the male subjects was 68.83 ± 5.3 years and 65.89 ± 5.12 years for female subjects. The mean weight and height of male participants was 69.0 ± 10.7 kg and 164 ± 7.3 cm, respectively. The female participants had a mean weight of 67.9 ± 13.6 kg and a mean height of 156.5 ± 6.8 cm.

In this study 89.2% of female participants were homemakers. The majority of males were retired (54.3%), followed by self-employed (25.7%) and in service (20%). The majority of participants had an annual family income of 5 - 10 lakhs. A 69.0% of the participants had their children as breadwinners, while 19.0% of

participants were self-employed and for 12.0%, spouses were the breadwinners. The results show that 55.0% lived in a nuclear family, and 45.0% lived in a joint family.

Table. 4.1. Distribution of participants according their anthropometric measurements

Anthropometry	Male (n=35) Mean ± SD	Female (n=65) Mean ± SD	Total (n=100) Mean ± SD
Weight (kg)	69.0 ±10.7	67.9 ±13.6	63.8 ±12.6
Height (cm)	164 ± 7.3	156.5 ± 6.8	159.3 ± 7.9
BMI (kg/m2)	25.6 ± 4.1	27.4 ± 5.8	26.8 ± 5.8
Waist circumference (cm)	103.8±10.9	109 ± 11.1	107.2 ±11.3
MUAC (cm)	30.3 ± 2.8	31.7 ± 4.7	31.2 ± 4.2
Handgrip (kg)	15.6 ± 9.6	7.5 ± 4.3	10.3 ± 7.6

Table 4.1 depicts gender wise mean anthropometric values. Mean BMI and waist circumference were greater for females and the handgrip strength was much less for the females.

Fig.4.1. show's that according to the Asian BMI cut-offs, the majority of participants (65.0%; 46% females and 19% males) were obese, while 25.7% of men and 9.2% of women were overweight. Only 16% had a normal BMI and 4% were underweight. The mean BMI was 26.8 ± 5.3 kg/m2, with males having a BMI of 25.6 ± 4.1 kg/m2 and females having a BMI of 27.4 ± 5.8 kg/m2. There was no significant association of BMI with physical activity or nutrient intake. The present study found that most participants were obese, with women being more obese than men, similar to Indian LASI study (Muhammad et al., 2022).

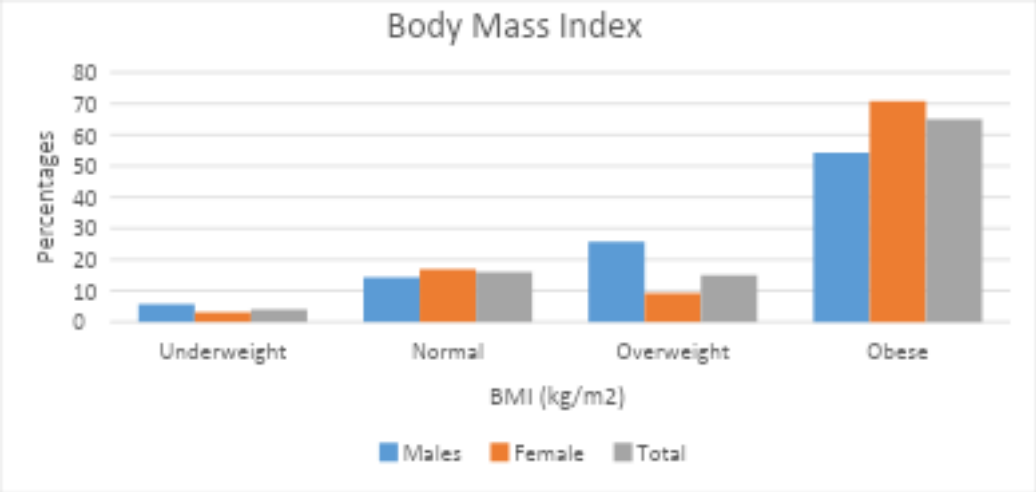

Fig. 4.1. Distribution of the participants according to BMI

The average waist circumference was 107.2 ± 11.3 cm, with males measuring 103.8 ± 10.9 cm and females 109 ± 11.1 cm. Only 2.0% of men had waist circumferences under 90 cm (Fig. 4.2), while the remaining men and all women participants had abdominal obesity, according to the Asian cut-offs for waist circumference. This-was higher than that reported in another Indian study on geriatric population (72.8%) (Hari et al., 2021).

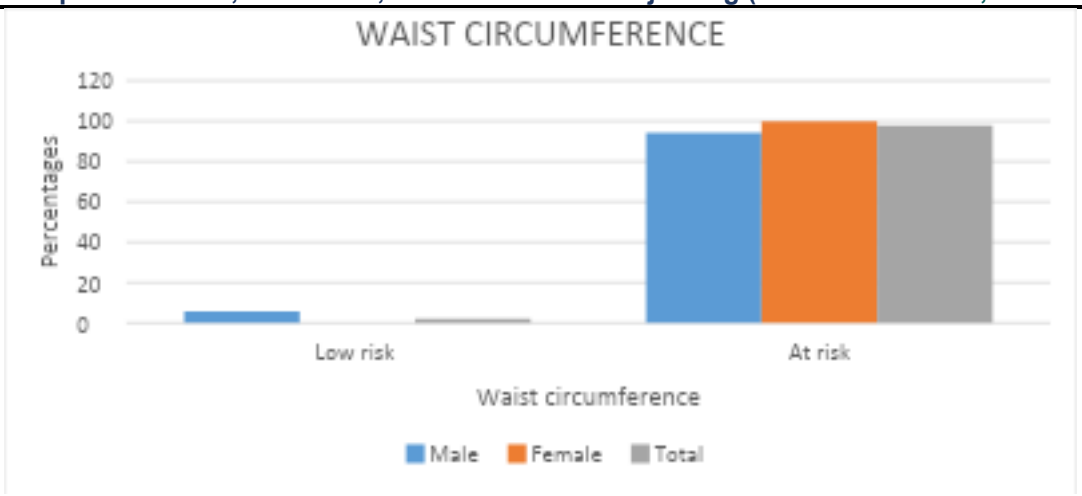

Fig. 4.2. Distribution of the participants according to waist circumference

A higher mean MUAC for men (30.3 ± 2.8 cm) and higher for women (31.7 ± 4.7 cm), was seen when compared to the cut-offs of Goswami et al. (2018) study (28.5 in males and 27.5 cm in females indicate overweight/obesity). High MUAC has been reported to be linked to high levels of SBP, DBP, BMI, waist circumference, fasting glucose, triglycerides, and cholesterol by Shi et al. (2020).

The present study also found that 97% of participants had low handgrip, with men having a better hand grip strength than women (15.6 ± 9.6 kg vs. 7.5 ± 4.3 kg), which is less than that in a study in Kolkata, India, where also men had greater hand grip strength than women (18.4 ± 27.03 vs. 11.94 ± 4.37) (Sinha et al., 2013).

Table. 4.2. Correlation between handgrip and nutrient intake and handgrip and anthropometry

	r value	p value
Energy (kcal)	0.243	0.015*
Carbohydrate (g)	0.242	0.015*
Protein (g)	0.104	0.303
Fat (g)	0.141	0.163
Weight (kg)	0.258	0.010**
Height (cm)	0.336	<0.001**
BMI (kg/m2)	0.078	0.443
MUAC (cm)	0.134	0.185
Waist circumference (cm)	0.170	0.91

*(Pearson coefficient * significant at 0.05 level ** significant at 0.01 level)*

Handgrip was statistically correlated with energy (0.015) intake and carbohydrate intake (0.015), and it was highly significantly correlated with weight (p = 0.010) and height (p = <0.001). Total energy, protein, and polyunsaturated fatty acids were found to favourably correlate with handgrip strength in the 2016 (KNHANES VII-1) study (Tak et al., 2018).

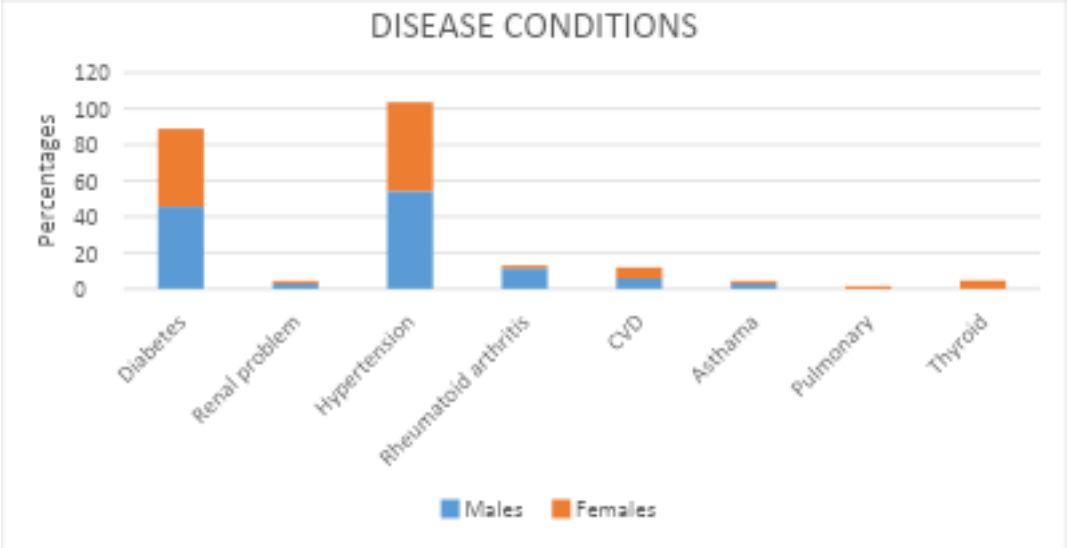

Fig. 4.3. Distribution of the participants according to the diseases they are afflicted with

Figure 4.3. show's that 51.0% of participants in the present study were hypertensive and 44.0% diabetic, with 45.7% males and 43.1% females having diabetes. Similar prevalence has been seen in previous studies of Xiao et al. (2021) in China (50.6% hypertensive) and Alam et al. (2015) in India (50% hypertensive), and 32.33% of participants having diabetes in India (Kakali et al., 2024). Other health issues included cardio-vascular disease, renal problems, rheumatoid arthritis, and asthma. Thyroid and pulmonary problems were only observed in females.

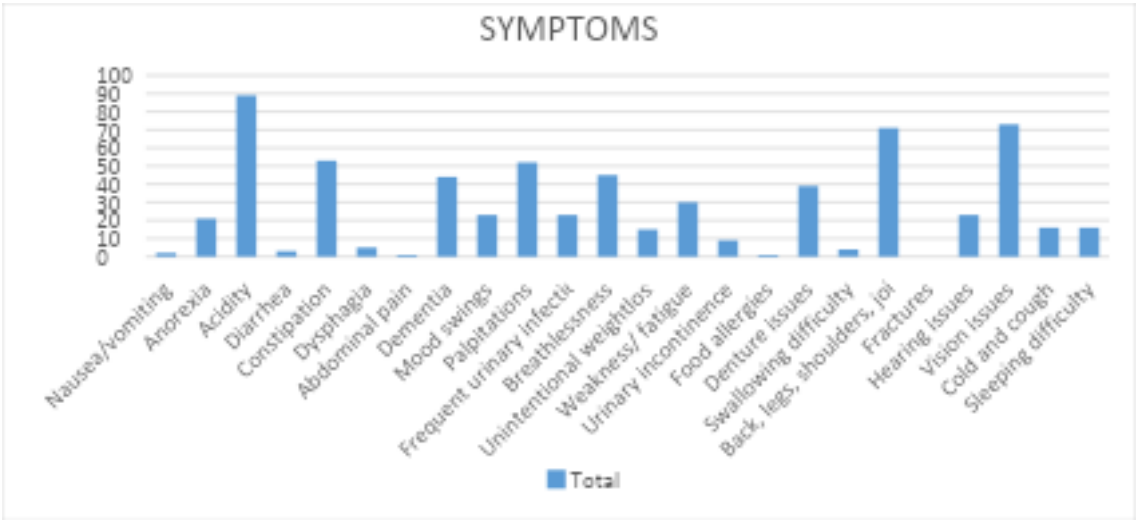

Fig. 4.4. Distribution of participants according to different symptoms.

Figure 4.4. show's that 89.0% of participants experienced acidity, with constipation (53.0%) and breathlessness (45.0%) being the next most common condition. Females were more anorexic (52.3%) but still obese due to lack of physical activity. They experienced frequent urinary infections (30.8%) and dementia (52.3%) than males. Other common symptoms included weight loss, weakness, fatigue, mood swings, vision, denture, and hearing problems, with most participants experiencing back, leg, shoulder, and joint discomfort, with females outnumbering males.

The majority of the participants, 70.0%, were not exposed to sunlight, possibly due to lack of access or unwillingness to go to sunlight-rich areas. Kung et al. (2006) revealed that even in China majority disliked sunlight and knew little about its benefits. Only 44% of participants in present study were engaged in physical exercise, with a majority of them doing brisk walking, which is similar to the elderly in Yunnan Province, China, where 51.1% were inactive (Xiao et al., 2021).

In the present study 97.0% of participants were non-vegetarian, with 96% consuming three meals daily, and most consumed home-cooked food, and only 3.0% following a diet plan.

Table.4.3. Distribution of the participants according to the mean values of nutrient intake

Nutrients	Group	Mean±SD	EAR (2020)	% EAR
Energy (kcal)	Male (n=35)	1915 ± 328	2110	91.4%
	Female (n=65)	1578 ± 275.4	1660	95.0%
Protein (g)	Male (n=35)	57.5 ± 13.7	42.9	134.6%
	Female (n=65)	47.2 ± 13.5	36.3	130.0%
Calcium(mg)	Male (n=35)	594.7 ± 167.8	800	74.3%
	Female (n=65)	534 ± 150	800	66.7%
Iron (mg)	Male (n=35)	15 ± 3.7	11	137.1%
	Female (n=65)	13.4 ± 3.6	15	89.5%
Folate (mcg)	Male (n=35)	171.7 ± 188.2	250	68.6%
	Female (n=65)	195 ± 353	180	108.3%
Vitamin-D (IU)	Male (n=35)	1178.9 ± 372	400	294.7%
	Female (n=65)	1018.3 ± 353.3	400	254.5%
Vitamin-A (mcg)	Male (n=35)	366.7 ± 343	460	79.7%
	Female (n=65)	294.4 ± 291.9	390	75.5%
Vitamin-C (mg)	Male (n=35)	47.7 ± 32.9	65	73.5%
	Female (n=65)	47.4 ± 30	55	86.3%
Vitamin-B12 (mcg)	Male (n=35)	0.37 ± 0.64	2	18.7%
	Female (n=65)	0.39 ± 0.59	2	19.5%

The ICMR-NIN established EAR (Estimated Average Requirement) values, which represent the average daily nutrient intake level considered to be adequate to meet the dietary requirements of half of the healthy individuals in various age groups and according to gender. For each participant in this research, the mean and %EAR for macronutrients and micronutrients were calculated. Table 4.3., demonstrates that while intake of energy, calcium, vitamins A, C, and B12 were low, consumption of protein, and vitamin D was high. In contrast to women, men consumed more iron, and females consumed more folate than males.

An earlier study in China demonstrated that with a decrease in socioeconomic status, the average usual intakes of micronutrients decreased in comparison to EAR (Liu et al., 2019). According to a survey of elderly residents of Pune, they consumed more carbohydrates and fats and less protein when compared to the RDA (Khole et al., 2018).

The present study also inquired the participants about their food consumption frequency. All consumed rice and wheat daily, with millets being consumed by few. Lentils were the most commonly consumed pulse and legume. Most participants ate vegetables such as drumstick, parwar, peas, pumpkin, capsicum, field beans, onions, tomatoes bittergourd, bottle gourd and broccoli, radish leaves, dil leaves, amaranth leaves and baby corn were among the vegetables that majority of participants never consumed. Non-vegetarians consumed egg daily and beef and chicken once a week. Fruits, nuts and oilseeds were occasionally consumed by most of the participants, but some never ate due to financial constraints or lack of awareness. According to another study conducted in West Bengal, 75% of the subjects with normal nutritional status and only 34.8% of those at risk for malnutrition consumed two or more servings of fruits and veggies every day (Lahiri et al., 2015).

Therefore, the findings of the present study indicate that most participants had abdominal obesity due to low physical activity. Despite consuming enough protein and vitamin D, they had poor hand grip, this could be due to physiological changes and low nutrient absorption. Diabetes and hypertension were common co-morbidities. Participants primarily consumed carbohydrates and fats, mainly saturated fats, and low fruit consumption, possibly due to financial constraints.

V. CONCLUSION

Thus, it may be concluded that the dietary intake of the participants when compared to EAR was inadequate. The majority of the participants were physically inactive, had diabetes, hypertension, had high BMI and abdominal obesity. Although the participants consumed a sufficient amount of protein and vitamin D, they had poor hand grip. Due to time and financial constraints this study has few limitations. A larger sample size and 3-day recall or 7-day recall could give better results regarding the consumption of macronutrients. Elderly people must eat well because they frequently have persistent illnesses. Regular anthropometry evaluation should be done, it is an essential component of nutritional assessment and its markers are used to predict both chronic and acute disease. In order to improve decision-making and quality of life in elderly, it is essential to raise awareness of their own lifestyle changes, such as increased physical exercise, mental stability, way of life, and clinical outcomes.

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