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Research article

A STUDY OF PREVALENCE OF OBESITY AND AN ASSESSMENT OF NUTRITIONAL STATUS IN ELDERLY SOUTH INDIAN POPULATION.¹Ramesh Bhat, ²Ganaraja B, ³Bhagyalakshmi, ⁴Meenu S, ³Vinodini A and ³Nayanatara AK¹Professor, ²Additional professor, ³Associate professor, ⁴Tutor, Department of Physiology, KMC, Mangalore, (A Unit of Manipal University), INDIA.Email: ganaraj.b@gmail.com Ph: 0091 9449642150.

ABSTRACT: Obesity and abnormal nourishment are the biggest concerns of developed and developing societies. We analysed the nutritional status using Mini Nutrition Assessment (MNA) and correlated the findings with BMI, Waist – to – Hip (W/H) ratio in elderly population of Dakshina Kannada District of Karnataka. Total of 221 elderly subjects above the age of 50 years (105 were males and 116 were females) were recruited, who did not have any morbid diseases. Their Anthropometric parameters namely BMI and W/H were recorded and tabulated. They were grouped into Underweight, Normal, Over weight and Obese and the respective numbers were segregated and shown in table. MNA scores of each group were found out and the correlation was done. Results were analysed by using ANOVA and Tukey – Kramer test using SPSS version 16. The results suggested that there is a correlation between the BMI, W/H ratio with the MNA scores. Underweight elderly had low scores while overweight and obese subjects had higher scores. Women showed a higher tendency to become over weight and obese compared to men. This study reiterates that there is a correlation between anthropometric parameters and the nutritional status. A wider study with more number of subjects could yield more insight into the findings and be useful guide for suggesting any lifestyle modification.

Key Words: Obesity, elderly population, MNA Score**INTRODUCTION**

Discoveries in medical science and improved social, economic and environmental conditions during the past few decades have increased the life span of man as much as 25 years (The World Health Report, 1998) as a consequence the elderly constitute today the fastest growing segment of the world's population.(Rosenburg.IH, Sastre.A,2002) India has acquired the label of aging nation with 7.7% of its population being more than 60 years old and it has been estimated that it would become 12% of total population by 2030. (Irudaya RS, Sarma PS et al. 2003). This rapidly increasing aging population adds to the socio economic challenges that face India. (Mishra US, Irudaya RS, et al. 1999) Numerous epidemiological studies have revealed a large and growing frequency of overweight and obesity in the elderly population in the vast majority of developed and developing countries.(Juan L. Gutiérrez-Fisac et al.2004). The prevalence of obesity in different Countries varies from 10%-40%. (Sood R, gupta A 1996) Prevalence of overweight (BMI > 25) was observed in 33.14% and obesity (BMI >30) in 7.54% of Indian elderly population.(Swami HM, Bhatia V et al.2005). There are multiple adverse conditions like diabetes, hypertension, cardiovascular disease, cancer, sleep apnea, and other diseases that appear to be associated with overweight and obesity which contributed to the risk of dying not only from heart diseases and diabetes but accounted for 14% and 20% of all deaths from cancers in men and women respectively.(Eugenia EC,Carmen R.et al. 2003; Young TP, Oeppard PE et al. 2002; Rogers RG.Hummer RA.et al.2003) Hence Obesity is now a growing epidemic in elderly and unless steps like lifestyle changes which included weight loss through dietary fat and calorie control or reduction, appropriate exercise, variety in food choices, and consumption of fruits and vegetables are taken to arrest this trend, mortality from diseases associated with obesity will continue to increase.(Davis RB.Turner LW. 2001)

The prevalence of malnutrition ranges from 5-10% in free-living elderly to 30-85% in homebound, nursing home, and hospitalised elderly.(Guigoz Y, Vellas BJ. 1997). Early detection of malnutrition is important to allow targeted nutritional intervention and should be a key component of the geriatric assessment. The MNA test is a simple, noninvasive, well-validated screening tool for malnutrition in elderly persons and is recommended for early detection of risk of malnutrition.(Guigoz Y, Lauque S, et al.2002) Evaluation of nutritional status is important for any nutritional or dietary modification. We therefore decided to evaluate the nutritional status of elderly living in our community, in the city of Mangalore, undertook this study of mini nutritional assessment (MNA score) along with anthropometry especially BMI to assess the prevalence of overweight and obesity and W/H ratio to assess the risk of development of cardiovascular disease in elderly subjects. W/H Ratio has been found to be a more efficient predictor of mortality in older people than waist circumference or BMI. (Price GM, Uauy R et al.2006)

MATERIALS AND METHODS

A total of 221 Elderly subjects above the age of 50 years were randomly selected in the elderly population of Mangalore city over a period of 30 days. As it was a time bound study, those elderly subjects available during the limited time period were included. Among the subjects studied 105 were males and 116 were females. Informed consent was taken from all the subjects. Approval from the college ethics committee was obtained before the study started.

Inclusion criteria

ElderlySubjects over 50 years of age were included in this study.

Exclusion criteria

Subjects with cancer, end-stage renal disease or terminal illness.

Those receiving artificial enteral or parenteral nutrition.

A detailed history was taken and clinical examination was done for each subject.

Every subject under study was individually assessed for nutritional status with anthropometry and Mini nutritional assessment.

Anthropometry

Height and weight of all the subjects were measured and their Body mass index (BMI) were calculated. Waist and hip circumferences were also measured and W/H ratio calculated.

Accordingly the W/H ratio of the elderly subjects were divided into normal or at risk groups.

Mini nutritional assessment- MNA score:

The test involves (1) anthropometric assessment (weight, height, weight loss)

(2) General assessment (six questions related to lifestyle, medication and mobility) (3) dietary assessment (eight questions related to number of meals, food and fluid in-take, and autonomy of feeding); and (4) subjective assessment (self perception of health and nutrition). The test did not require any modification to be applied in the study population. A score was given to each subject on the basis of MNA questionnaire. The scoring categorizes the elderly subjects in the following manner:

>23.5 - satisfactory nutritional status

17-23.5-at risk of malnutrition

< 17 -malnutrition

Written informed consent from all the subjects along with Ethics committee clearance was taken before starting the study.

The total subjects were 221 divided into:Males (105)& females 116)

who were divided (males & females) into 4 groups as per their BMI.

< 18.5 Underweight (UW)

18.5 – 24.9 Normal weight. (N)

25 – 29.9 Overweight. (OW)

> 30Obesity. (OB)

Statistical Analysis: Parameters were analyzed statistically by using SPSS version 16.0. ANOVA, Mean, Standard Deviation. Tukey- Kramer comparison test was used for comparisons of Inter sub-groups of BMI. Students Unpaired 'T' test was used to compare different BMI sub-groups between Males and Females. (p value < 0.05 was considered to be statistically significant).

RESULTS

Out of the 105 elderly males 14% were Under weight (Average BMI 17.39 ± 0.44), 43% Normal Healthy (22.2 ± 1.86), 26% Over-weight (26.46 ± 1.25) and 17% Obese (32.42 ± 1.37) whereas out of 116 females 14% were Underweight (17.46 ± 1.25), 36% Normal Healthy (22.0 ± 2.05), 28% Overweight (27.06 ± 1.3) and 22% Obese (34.52 ± 0.89). Under weight elderly males belonged to a significantly ($p < 0.05$) higher age group (65 ± 3.72) when compared to Normal (57.13 ± 10.8) whereas other groups of males did not show any significant difference with the age. W/H ratio showed a very highly significant increase ($P < 0.001$) in both Over weight (1.12 ± 0.16) and Obese (1.13 ± 0.16) males.

When compared to Normal & Under -weight males showing ($W/H > 9.5$) greater risk of stroke, coronary artery disease and diabetes mellitus in Over weight and Obese males. Under weight males belonged to Malnutrition group ($MNA < 17$), Over weight and obese males are at the risk of malnutrition ($17 - < 23.5$) whereas normal elderly males belonged to (> 23.5) - satisfactory nutritional status. Underweight subjects showed significantly reduced values than normal and Over weight (OW) and Obese (OB) subjects revealed higher values when compared to Normal and underweight subjects. Obese and, Over weight females belonged to older age group when compared to Normal and underweight elderly females. Significant W/H ratio showed a very highly significant increase ($P < 0.001$) in both Over weight (1.02 ± 0.07) and Obese (1.25 ± 0.33) females when compared to Normal & Under -weight females ($W/H > 8.5$). Underweight females belonged to Malnutrition group ($MNA < 17$), Over weight and obese females are at the risk of malnutrition ($17 - 23.5$) whereas normal elderly females belonged to (> 23.5) - satisfactory nutritional status. Underweight males showed a very highly significant ($p < 0.001$) increase in age when compared to underweight females whereas normal males only showed a highly significant increase ($p < 0.01$) in age and both Overweight & Obese males & females did not show any significant difference in age.

Under Weight males showed a $p < 0.001$ increase in age compared to UW females whereas Normal UW males only showed a $p < 0.01$ increase compared to Normal UW females. OW & OB males & OW & OB females did not show any significant difference. BMI only showed a $p < 0.001$ increase in OB females compared to OB males whereas other groups did not show any difference. W/H Ratio showed a $p < 0.001$ increase in UW & Normal males & only HS < 0.01 increase in OW males compared to females. MNA score did not show any change between males & females.

Table: 1 Comparison of Various BMI groups in Elderly Males.

Variable	Under Weight (UW) N=15	Normal (N) N= 45	Over weight (OW) 27	Obese (OB) N=18
Age	65 ± 3.72	57.13 ± 10.8	57.89 ± 8.11	60.89 ± 12.38
BMI	$17.39 \pm 0.44^{**}$	22.2 ± 1.86	$26.46 \pm 1.25^{**\dagger\dagger}$	$32.42 \pm 1.37^{**\dagger\dagger}$
W/H ratio	0.93 ± 0.09	0.94 ± 0.05	$1.12 \pm 0.16^{**\dagger\dagger}$	$1.13 \pm 0.16^{**\dagger\dagger}$
MNA score	$16.41 \pm 0.66^{**}$	23.95 ± 2.91	$22.10 \pm 1.70^{**}$	$22.13 \pm 1.84^{**}$

Values are Mean \pm SD; * = Comparison of Normal VS other groups;

\dagger = Comparison of Underweight VS other groups. $\dagger\dagger$ - $p < 0.001$; ** - $p < 0.001$.

Table: 2 Comparison of Various BMI groups in Elderly Females

Variable	Under Weight N=16	Normal N= 42	Over weight N= 33	Obese N=25
Age	57.38±2.06	52.62±5.70	60.52±2.00	64.24±3.82
BMI	17.46±1.25	22.0±2.05	27.06±1.37**††	34.52±0.89**††
W/H ratio	0.83±0.07	0.80±0.03	1.02±0.07**††	1.25±0.33**††
MNA score	16.83±1.14**††	24.79±1.43	23.26±2.68	22.26±1.44**††

Values are Mean ± SD; * = Comparison of Normal VS other groups;
 † = Comparison of Underweight VS other groups. †† - p<0.001; ** - p<0.001.

Table: 3 Comparison of Different BMI groups between Males and Females.

Variable	UW male N=15	UW female N=16	N male N=45	N female N=42	OW male N=27	OW female N=33	OB male N=18	OB female N=25
age	65 ± 3.72	57.38± 2.06	57.13± 10.61	52.62± 5.69	57.89± 8.11	60.52± 2.00	60.89± 12.34	64.24± 3.82
BMI	17.39± 0.44	17.46± 1.25	22.20± 1.86	22.00± 2.05	26.46± 1.25	27.06±1.37	32.42± 1.37	34.52± 0.89**
W/H	0.93± 0.09	0.83± 0.07**	0.94± 0.05	0.81± 0.07**	1.12± 0.16	1.02± 0.08*	1.13± 1.16	1.25± 0.33
MNA	16.41± 0.66	16.83± 1.14	23.9± 0.66	24.79± 1.43	22.10± 1.70	23.26± 2.68	22.13± 1.84	22.26± 1.44

Values are Mean±SD; * - p<0.01; ** - p<0.001

DISCUSSION

This study revealed a correlation between the gender and obesity among the elderly population in the south Indian town. The MNE scores of the subjects revealed that those having low MNE scores were usually underweight and obese subjects had shown a higher MNE scores. Among Male subjects, (n=105) fifteen were underweight and about 18 were obese. These subjects showed corresponding variations in BMI and W/H ratio. There was a direct correlation between these factors and MNE scores. These findings were in agreement with the earlier reports.(Al-khazrajy LA, et al. 2010). It has been noted that, in males, percentage of underweight subjects was almost similar to that of obese. (Table.1). Among the female subjects (n=116), sixteen were underweight and twenty five were obese. Numerical data suggests that the females had more prevalence of obesity when compared to males. (Table 3).

The study group showed higher BMI in females when compared to males and obesity was more in females. But number of overweight subjects was comparable in both male and females. MNA scores did not show any significant difference among the genders. This finding suggested that the obesity is more severe and commoner among females than men in elderly population of South Karnataka. These findings were in agreement with the results of a larger study group in Taiwan which revealed that even though older men were heavier than women, the females had significantly higher BMI.

They also reported that more females among the cross section of population were obese compared to males. (Hsieh SD, Muto T. 2006) Waist/Hip ratio showed a very highly significant increase ($P < 0.001$) in both Over weight (1.02 ± 0.07) and Obese (1.25 ± 0.33) females when compared to Normal & Under –weight females showing ($W/H > 8.5$) a greater risk of stroke, coronary artery disease and diabetes mellitus in Over weight and Obese females. (Hsieh SD, Muto T. 2006; Hsieh SD, Yoshinaga H et al. 2003). Waist-Hip ratio > 9.5 in men and > 0.85 in women have a greater risk of stroke, coronary artery disease and diabetes mellitus. (Baron RB. 2006)

However the number of subjects in our pilot study is relatively small. But this study indicated a trend which is shown in the studies conducted in other Asian countries. (Hsieh SD, Muto T 2006) The overall findings that females were more prone to obesity in old age is indicated and necessary life style modification and medical attention should be given to prevent the complications resulting from obesity in the advanced age group. Study with larger sample size may reveal more information.

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