PREVALENCE OF CHRONIC ENERGY DEFICIENCY, OVERWEIGHT AND OBESITY AMONG THE GERIATRIC POPULATION IN A RURAL AREA IN TAMILNADU

R. Shankar[a], S. Sangeetha Balamurugan[a]

ABSTRACT:

Background: *The Current geriatric population in India is about 8% which is expected to rise by 10% in 2025. Among various health problems in geriatric population, nutritional problem plays a major role. Chronic energy deficiency, overweight and obesity are the commonest nutritional problems among the elderly. Limited studies are available in literature documenting nutritional problems in geriatric population. The present study would highlight the nutritional status of the elderly in a rural community of Tamil Nadu.*

Objectives: *1) To assess the prevalence of Chronic Energy Deficiency, overweight and obesity among the geriatric population in a rural area in Tamil Nadu and 2) To study various factors influencing the nutritional status among the geriatric population.*

Methodology: *A cross sectional study was conducted on 400 early individuals (aged > 60 years) on basis of simple random technique, at Attayampatti village near Salem in Tamil Nadu. The height and weight of all those individuals were measured and the Body Mass Index(BMI) was evsaluated and also various questions were administered to them to assess their nutritional status.*

Results: The present study revealed that the prevalence of chronic energy deficiency (CED), obesity and overweight was 10%, 13% and 27% respectively. The prevalence of CED among both males and females were almost equal (10%) while males were slightly more as compared to the females(25%) . However, the BMI suggested that the prevalence of obesity in females (17%) was almost twice as that of the males (8%). The factors like age, occupation, income, dependency, calorie and protein intake showed an impact over the nutritional status of the elderly population.

Conclusion: *Apart from CED, overweight and obesity are emerging as another major nutritional health challenge among gertiatric population in India.*

Key words: *chronic energy deficiency, geriatric, nutritional status, obesity.*

SRJM 2011;4:24-29

INTRODUCTION:

Ageing is a natural process. Discoveries in medical science and improved social condition during past few decades have increased the life span of man. The expectation of life at birth in developed countries is over 70 years. In India, the current geriatric population is about 8% which is expected to go upto 10% by 2025.[1]

Among various health problems in geriatric population, nutritional problem plays a major role. With increasing age, there are metabolic changes and also reduction in physical activity and, as a result, energy requirement in elderly is substantially lower than younger adults. Elderly individuals also face problems in ensuring appropriate dietary intake because of alteration in taste with increasing age and loss of teeth.[2] There is relatively little data on the prevalence of undernutrition among the elderly in the developing world. However, studies of the African elderly showed that up to 36 percentof the men and 27 percent of the women were undernourished.[3] A recent study in the Philippines showed about 30 percent of the elderly were underweight.[4] The tribal population in India is among India's poorest groups, and one study found that more than 60 percent of the tribal

men and women over age 60 suffered from a chronic deficiency in needed calories.[5]

Similarly ,obesity and overweight is emerging as an important health problem in India. The Nutrition Foundation of India (NFI) study showed that 32.3% of middle class males and 50% of middle class females in Delhi are obese. The prevalence of obesity has increased and is now an epidemic worldwide.[6]

As such in India, very few studies have been done to assess the nutritional status in geriatric population, when compared to children or adolescent. So the present study was undertaken to highlight various factors affecting the nutritional status among geriatric population in a rural area in Tamilnadu.

MATERIAL AND METHODS

The objective of the study was

1) To assess the nutritional status-Chronic energy Deficiency, overweight and obesity among the geriatric population in a rural area in Tamilnadu.

2) To study various factors influencing the nutritional status among the geriatric population in a rural area in Tamilnadu.

Study area: Attyampatti village

Study period: October 2010- December 2010

Study design: cross sectional study

Study population : population of 400 aged > 60 years, got by using the standard formula for calculation of sample size (4PQ/e²)

CORRESPONDING AUTHOR :

Dr. R. Shankar

Assistant Professor- Community medicine
Vinayaka Missions Kirupananda Variyar Medical College
Chinna Seeragapadi, Salem - 636 308, Tamilnadu.
e-mail : shnkr_radhakrishnan@yahoo.com
[a]Dept. of Community Medicine, Vinayaka Medical Mission College, Salem

Sampling : simple random technique.

Methodology : Using a pretested semistructured questionnaire, house to house visit was done on simple random basis. A two page questionnaire in Tamil was made and the CRRI's of our hospital was trained in administering the questions to the study population and in assessing the diet survey. Questions regarding family history, diet history-including their calorie and protein consumption, their personal habits, their dependency status ,socioeconomic and occupation history and history of any chronic morbidity among elderly were taken. Their height and weight were measured and the BMI was calculated. Attayampatti town panchayat has a population of 10,000 and in that the geriatric population is 800(keeping the national average of 8%). Keeping the prevalence of chronic energy deficiency as 50% [5] n the geriatric population and taking the confidence interval as 95% and the maximum allowable error as 5%. Applying these values in the standard formula for calculation of sample size ($4PQ/e^2$), the study population came to 400. Total of 2500 houses are there in the Attayampatti village which constitutes the sampling frame and all the houses were numbered accordingly. Then by using a random number table we selected the houses and in those houses all the geriatric people were interviewed still we obtained the required sample size of 400.

The dietary assessment was done by diet survey questionnaire, using a 24 hr recall period for three consecutive days. The food item taken by the individuals for the past 24 hours listed and the amount of calorie and proteins in those food items was calculated by using a Standard nutritional chart. The average of those three days is calculated as the total calorie and protein consumed by the individual.

The chronic energy deficiency is defined as BMI less than 18.5 and overweight is BMI > 30 and obesity is BMI > 35[5]

Relation of nutritional status with respect to occupation, income and dependency was assessed. The occupation was categorized as skilled (tailor, carpenter etc), semiskilled (powerloom worker , agriculturist), unskilled (coolie, peon), semiprofessional (teacher, bank employee). The income of the study population was categorized at the scale of 1000 interval stating from 1000 to 6000. The dependency was categorized based on their economic needs as dependant and not dependant.

Statistical analysis: The data was entered in the SPSS software and the analysis was done. Statistical inference test life "F" test was used in the analysis to see the association between BMI and the other variables used in the study.

RESULTS

Table-1 shows the prevalence of chronic energy deficiency (CED) is 10%,the prevalence of obesity is 13% and prevalence of overweight is 27%.The prevalence of CED among both male and female are almost equal(10%),and that of the overweight is slightly more in males(29%) as compared to the females(25%),whereas the prevalence of

obesity in female(17%) is almost twice as that of the males(8%).

Table 1 also shows the relationship between sex and BMI among different age-groups. It is found that among males, the prevalence of CED and overweight is almost same in the age group of 60-62yrs (37%), and the prevalence of obesity is more in the age group of 69-71yrs(41.7%). It is found that among females, the prevalence of CED is more in the age group of 78-80yrs (29.2%).The prevalence of overweight is more in the age group of 60-62yrs(48.4%) and the prevalence of obesity is more in the age group of 60-62yrs(50.0%).As the age increases in females, the prevalence of CED increases, which is found to be statistically significant by F-test.(p < 0.001)

Table-2 shows that the maximum number of males (57.1%), were engaged in semi-skilled occupation. It was found that , prevalence of CED is more in semiskilled workers (68.8%),as compared to other occupations. The prevalence of overweight and obesity is also more among semiskilled workers 64.4% and 75% respectively.

Similarly among females, maximum number of them 39.3% were unemployed. The prevalence of CED is more in unemployed females 45.8%,as compared to other occupations. The prevalence of overweight is 32.3% equal in both homemakers and unemployed women and the prevalence of obesity is 40.5% among unemployed women. Both the differences among males and females are not statistically significant.

Table 3 shows that maximum number of elderly people 25.8% were getting income in the range between Rs1000-2000. The prevalence of CED (60%), overweight(28%) and obesity(27.8%) found to be maximum in the income group of less than 2000 as compared to other income groups and the difference is not statistically significant.

Table-4 shows that maximum number of people(72.5%),who had CED,were consuming less than 1700 calories per day. Contrast to this ,maximum number of them who were overweight(62.6%) and those who were obese(61%), were consuming 1900-2300 calories per day. Therefore it was found that, the intake of calories was directly proportional to the increase in BMI, which was found to be statistically significant by F- test(p < 0.001)

Table-5 shows that maximum number of people (52.5%), who had CED, were consuming proteins of less than 40 gms per day,while ,maximum number of them who were overweight(75.7%) and those who were obese(61%), were consuming 46-60gms of proteins per day.Therefore it was found that,with increase in the intake of proteins, BMI increased,leading to overweight and obesity,which was found to be statistically significant by F- test(p < 0.001)

Table 6 shows that 236(59%)persons are dependent on the others for their living. The prevalence of CED among dependents are 47.5%,while that of overweight is 61.7% and prevalence of obesity is 70.3%.The prevalence of CED among non dependents are 52.5%, while that of overweight is 38.3% and the prevalence of obesity is 29.6%. CED is

TABLE-1 : BMI related to age and sex of the study population

Sex	Age	BMI						Total
		< 18.5 (%)	18.5-24.99 (%)	25-29.99 (%)	30-34.99 (%)	35-39.99 (%)	>40 (%)	
Male	60-62	6(12.4)	25(51.02)	17(34.7)	1(2.0)	0(0)	0(0)	49
	63-65	2(7.7)	14(53.8)	7(26.9)	3(11.5)	0(0)	0(0)	26
	66-68	4(22.2)	7(38.9)	6(33.3)	1(5.5)	0(0)	0(0)	18
	69-71	1(4.0)	16(64.0)	3(12.0)	5(20.0)	0(0)	0(0)	25
	72-74	1(7.7)	8(61.5)	4(30.8)	0(0)	0(0)	0(0)	13
	75-77	0(0)	7(53.8)	5(38.5)	0(0)	1(7.7)	0(0)	13
	78-80	2(22.2)	4(44.4)	2(22.2)	0(0)	0(0)	1(11.1)	9
	>80	0(0)	2(66.6)	1(33.3)	0(0)	0(0)	0(0)	3
	Total	**16**	**83**	**45**	**10**	**1**	**1**	**156**
Female	60-62	4(4.5)	33(37.5)	30(34.1)	16(18.2)	5(5.7)	0(0)	88
	63-65	2(3.4)	34(57.6)	12(20.3)	3(5.1)	7(46.7)	1(1.7)	59
	66-68	1(5.6)	7(38.9)	7(38.9)	1(5.6)	2(11.1)	0(0)	18
	69-71	5(13.9)	20(55.6)	8(22.2)	2(5.6)	1(2.8)	0(0)	36
	72-74	2(40.0)	2(40.0)	0(0)	1(20.0)	0(0)	0(0)	5
	75-77	2(20.0)	4(40.0)	3(30.0)	1(10.0)	0(0)	0(0)	10
	78-80	7(36.8)	9(47.4)	2(10.5)	1(5.3)	0(0)	0(0)	19
	>80	1(11.1)	7(77.8)	0(0)	1(11.1)	0(0)	0(0)	9
	Total	**24**	**116**	**62**	**26**	**15**	**1**	**244**

Table-2 : BMI related to the occupation of the study population

Sex	Occupation	BMI						Total
		< 18.5 (%)	18.5-24.99 (%)	25-29.99 (%)	30-34.99 (%)	35-39.99 (%)	>40 (%)	
Male	Unemployed	1(2.7)	24(64.9)	10(27.0)	1(2.7)	0(0)	1(2.7)	3
	Semiskilled	11(12.4)	40(44.9)	29(32.6)	8(8.9)	1(1.1)	0(0)	89
	Unskilled	3(11.5)	17(65.4)	5(19.2)	1(3.8)	0(0)	0(0)	26
	Skilled	1(33.3)	2(66.7)	0(0)	0(0)	0(0)	0(0)	3
	Semiprofessional	0(0)	0(0)	1(100.0)	0(0)	0(0)	0(0)	1
	Total	**16**	**83**	**45**	**10**	**1**	**1**	**15**
Female	Home maker	6(9.1)	29(43.9)	20(30.3)	5(7.6)	5(7.6)	1(1.5)	66
	Unemployed	11(11.5)	48(50.0)	20(20.8)	10(10.4)	7(7.3)	0(0)	96
	Semiskilled	3(7.3)	18(43.9)	13(31.7)	6(14.6)	1(2.4)	0(0)	41
	Unskilled	4(10.3)	21(53.8)	8(20.5)	5(12.8)	1(2.6)	0(0)	39
	Semiprofessional	0(0)	0(0)	0(0)	0(0)	1(100.0)	0(0)	1
	Skilled	0(0)	0(0)	1(100.0)	0(0)	0(0)	0(0)	1
	Total	**24**	**116**	**62**	**26**	**15**	**1**	**244**

Table-3 : BMI related to the income of the study population

Income	BMI						Total
	< 18.5 (%)	18.5-24.99 (%)	25-29.99 (%)	30-34.99 (%)	35-39.99 (%)	> 40 (%)	
< 1000	12(12)	47(47)	26(26)	10(10)	5(5)	0(0)	100
1000-2000	12(11.65)	51(49.51)	30(29.12)	6(5.82)	3(2.91)	1(0.97)	103
2001-3000	7(12.06)	3(5.17)	14(24.13)	3(5.17)	2(3.44)	1(1.72)	58
3001-4000	4(8)	2(4)	1(2)	4(8)	3(6)	0(0)	50
4001-5000	4(8)	25(50)	14(28)	7(14)	0(0)	0(0)	50
5001-6000	0(0)	8(40)	6(30)	5(25)	1(5)	0(0)	20
> 6000	1(5.26)	9(47.36)	6(31.57)	1(5.26)	2(10.52)	0(0)	19
Total	**40**	**199**	**107**	**36**	**16**	**2**	**400**

Table-4 BMI related to the calorie intake among the geriatric population

BMI	Calorie intake							Total
	< 1700 (%)	1700-1900 (%)	1900-2100 (%)	2100-2300 (%)	2300-2500 (%)	2500-2700 (%)	> 2700 (%)	
< 18.5	29(72.5)	9(22.5)	2(5)	0(0)	0(0)	0(0)	0(0)	40
18.5-24.99	23(11.55)	76(38.19)	60(30.15)	24(12.06)	14(7.03)	2(1)	0(0)	199
25-29.99	1(0.93)	16(14.95)	34(31.77)	33(30.84)	13(12.14)	7(6.54)	3(2.80)	107
30-34.99	0(00	3(8.33)	10(27.77)	11(30.55)	3(8.33)	5(13.88)	4(11.11)	36
35-39.99	0(0)	0(0)	6(37.5)	5(31.25)	1(6.25)	2(12.5)	2(12.5)	16
> 40	0(0)	0(0)	1(50)	0(0)	0(0)	1(50)	0(0)	2
Total	**53**	**104**	**113**	**73**	**31**	**17**	**9**	**400**

Table-5 : BMI related to the protein intake among the geriatric population

BMI	Protein Intake							Total
	< 40 (%)	40-45 (%)	46-50 (%)	51-55 (%)	56-60 (%)	61-65 (%)	66-70 (%)	
< 18.5	21(52.5)	18(45)	1(2.5)	0(0)	0(0)	0(0)	0(0)	40
18.5-24.99	18(9.04)	87(43.71)	62(31.15)	15(7.53)	13(6.53)	4(2.01)	0(0)	199
25-29.99	0(0)	8(7.47)	26(24.29)	25(23.36)	30(28.03)	18(16.82)	0(0)	107
30-34.99	0(0)	2(5.55)	3(8.33)	9(25)	12(33.33)	9(25)	1(2.77)	36
35-39.99	0(0)	0(0)	2(12.5)	3(18.75)	3(18.75)	7(43.75)	1(6.25)	16
> 40	0(0)	0(0)	0(0)	0(0)	2(100)	0(0)	0(0)	2
Total	**39**	**115**	**94**	**52**	**60**	**38**	**2**	**400**

Table-6 BMI related to the dependency factor among the geriatric population

Dependency	BMI						Total
	< 18.5 (%)	18.5-24.99 (%)	25-29.99 (%)	30-34.99 (%)	35-39.99 (%)	> 40 (%)	
Dependant	19(8.0)	113(47.9)	66(28.0)	24(10.2)	13(5.5)	1(0.4)	236
Independent	21(12.8)	86(52.4)	41(25.0)	12(7.3)	3(1.8)	1(0.6)	164
Total	**40**	**199**	**107**	**36**	**16**	**2**	**400**

more in people who are not dependant, and the prevalence of overweight and obesity is more among people who are dependant than people who are not dependant.

DISCUSSION

According to the NNMB reports 2002, the prevalence of chronic energy deficiency (CED) among the geriatric population as assessed by BMI < 18.5 was relatively more among males (53.5%) than in females (49.4%). It also stated that over the two decades there is a reduction in the prevalence of CED both in men and women but the reduction is more in women where as in our study, the prevalence of CED among both male and female are almost equal (10%). The NNMB reports also shows that the prevalence of overnutrition was higher in elderly men as compared to elderly women[5] and similarly in our study the overweight is slightly more among males(29%) as compared to the females(25%) and the prevalence of obesity in female(17%) is almost twice as that of the males(8%).

According to the study done on the older adults of desert areas of western Rajathan, the prevalence of Chronic Energy Deficiency (CED = BMI < 18.5) was e" 40% in desert areas of India, indicating a "very high" public health problem. It was higher among older women (52%) compared with men (42.4%) and higher in those belonging to Scheduled Caste and Scheduled Tribes and in HHs of laborers, artisans, landless individuals, marginal farmers, and below poverty line families[7], whereas the prevalence of CED in our study is only 10% without any sex variation and it is more likely related to their diet, physical activity and their dependency factor.

The study done on the nutritional status of the tribal elderly in India, Chronic Energy Deficiency (CED = BMI < 18.5) was relatively higher (65.4%) in females compared with their male counterparts (61.8%). The prevalence of CED was significantly higher (p < 0.001) among the elderly living in kutchaand landless households. The tribal elderly are subsisting on inadequate diets, which are reflected in the poor intakes of all the nutrients and higher prevalence of undernutrition,[8] whereas, in our study there is no sex predominance among the CED prevalence but it is reflected to the poor intake of calories and proteins.

The National Cardiovascular Disease Database of the year 2000 showed a higher prevalence of 54% (criteria: BMI > 22.25) was recorded among elderly populations (age group: > =60) during 2000.[9] An Epidemiological Study of obesity among elderly in Chandigarh showed the prevalence of overweight was 33.14% and obesity was 7.54% of the elderly and that of CED is only 14.36%. Over weight/obesity was higher among females (42.1%) than males (20.9%).[10]

According to the study done on the prevalence of overweight and obesity amongst elderly patients attending a geriatric clinic in a tertiary care hospital in Delhi, the mean age of the study subjects were 68.5 years. It was found that 34% of men and 40.3% of women were overweight and obese, respectively. The prevalence of obesity was higher in females as compared to males, whereas, in our study the prevalence of overweight is slightly more in males(29%) as compared to the females (25%),whereas the prevalence of obesity in female(17%) is almost twice as that of the males(8%). The results of the present study revealed that overweight and obesity highlight an emerging health problem amongst elderly.[11]

A study on prevalence of nutritional disorders and nutrient deficits in elderly people in a rural community in Tamilnadu, India, the mean height and body weight of both male and female were 155cm/48kg and 145cm/43kg respectively. The prevalence of underweight in this rural elderly community (55%) while obesity was uncommon (1,9%). It was found that 93.2% of the elderly people studied were on low calorie intake when compared to RDA (ICMR 1989), the average calorie intake in the study being 929 Kcal. 98 % of the subjects had their protein intake less than ICMR recommended allowance. The average daily intake of protein was 24g,[12] and similar study done on morbidity pattern among the elderly population in the rural area of Tamil Nadu, India. The average height was 1.53m. (SD 0.096), males 1.58m and females 1.48m. The average weight was 45.4 kgs (SD 10.9), males 49.4 kgs and females 42.2 kgs. The mean BMI was 19.02 kg/m2 (SD 9.21), males 19.31 kg/m2 (SD 12.7) and females 18.83 kg/m2 (SD 8.95). CED at the community level was 49 % and 9.7% were overweight[13] where as the mean height and weight of both male and female in our study is 154cms/56kg and 143cms/50kg respectively and the average calorie intake in our population is 2000Kcal and protein is 50gms.

CONCLUSION :

Though many past studies indicates that in geriatric population CED is the Chief nutritional problem whereas the present study reflects that along with CED, overweight and obesity is also becoming a major nutritional problem in India . Since very few studies as such for assessing the nutritional status of the elderly, has been done in India a large multi centric studies should be taken up in different parts of India to throw some light on this dual problem and based on the results obtained, suitable interventions can be planned for them.

REFERENCES :

1. K Park. Preventive Medicine in Obstetrics, Pediatrics and Geriatrics.Text book of Preventive and Social Medicine. 19th edition.Jabalpur;M/s Banarsidas Bhanot,:475.

2. Underweight, Undernutrition, and the Aging,Programme and Policy Implications. Population Reference Bureau .Today's Research on Aging, 2007;8:1-5.

3. E Charlton, Donald Rose.Nutrition among Older Adults in Africa: The Situation at the Beginning of the Millennium.Journal of Nutrition,2001;131:2424-2428.

4. Kristi Rahrig Jenkins, Nan E. Johnson, Mary Beth Ofstedal. Patterns and Associations of Body Weight Among Older Adults in Two Asian Societies.Journal of Cross Cultural Gerontology.2007;22(1):83-99.

5. NNMB National Nutritional Monitoring Bureau. 1979-2002. NNMB reports. National Institute of Nutrition, Hyderabad.

6. N. Arlappa, Balakrishna N, Brahmam GN, Vijayaragavan K. Nutritional Parameters and Chronic Energy Deficiency in Older Adults of Desert Areas of Western Rajasthan, India, Journal of Nutrition For the Elderly,2009;28(1): 61 - 71

7. Arlappa N, Balakrishna N, Brahmam GN. Nutritional status of the tribal elderly in India, J Nutr Elder,2005;25(2):23-39.

8. WHO – Obesity: preventing and managing the global epidemic. Report of a WHO consultation World Health Organisation Technical Report Series 2000; 894: 1-253.

9. National Cardiovascular Disease Database Supported by Ministry of Health & Family Welfare, Government of India, 2000.

10. H.M. Swami,V Bhatia, A K Gupta, S P S Bhatia. Epidemiological Study of Obesity Among Elderly in Chandigarh, Indian Journal of Community Medicine, 2005;30(1):11-3

11. Preeti Singh, Umesh Kapil, AB Dey.Prevalence of overweight and obesity amongst elderly patients attending a geriatric clinic in a tertiary care hospital in Delhi, India, Indian Journal of Medical Sciences, 2004;58:162-3.

12. V.S. Natarajan, Shanthi Ravindran, B Krishnaswamy, V Kumar, J Muthukrishnan, Pradeepa Prabhu. High Prevalence Of Nutritional Disorders And Nutrient Deficits In Elderly People In A Rural Community In Tamilnadu, India, Journal of Hong Kong Geriatric society, May 1995; 6:40-3**.**

13. Anil Jacob Purty, Joy Bazroy, Malini Kar, Kavita Vasudevan, Anitha Veliath, Purushottam Panda. Morbidity Pattern Among the Elderly Population in the RuralArea of Tamil Nadu, India**,** Turk J Med Sci**,**2006;36 :45-50