



Original Research Article

A Study on the prevalence of overweight and obesity and its influencing factors among rural geriatric population in Kerala

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ABSTRACT

Obesity is a global health problem affecting all ages. It is a major health problem among the elderly in both developed and developing countries. In elderly, obesity results into early onset of chronic morbidity and also initiate premature mortality. With the advance of age, obesity is more likely than those at younger age. The risk relationships between obesity and chronic disease are well known in the elderly and it include gait and many problems affecting various organs. To assess the prevalence of overweight and obesity and its factors affecting in elderly population aged above 60 years and above in a rural area of Kerala. A cross sectional study was conducted in selected sample of 89 subjects. The study setting was in a rural area in Kollam district of Kerala. Anthropometric measurements including Height and weight were taken as per WHO criteria. Body Mass Index were calculated and classified accordingly as normal, overweight and obese. Details of factors influencing were obtained using a pretested questionnaire in a pilot study. A simple random sampling technique was applied for selecting the sample and the sample size was determined to be 89, by using the standard formula. Simple measures like Mean and Standard deviation were calculated. Since the sample size is greater than 30 and to find the association between various risk factors, the Chi-Square test was applied. The P value for significance is fixed as $P < 0.05$. The statistical software used was SPSS (Version 20). The study had revealed overall a high prevalence of overweight (44%) and Obesity (10%). In males 35% were overweight and 11% were obese, while in females 49% were overweight and 9% were obese. Relation with increased frequency of meals ($P = 0.007$), increased sleep duration ($P = 0.003$) and regular Exercise ($P = 0.047$) were found to be significant. Increased prevalence of overweight among female and obesity among males in rural area were observed. The importance of regular physical activity and certain aspects of healthy ageing need to emphasize in the elderly population. Growing old is not an end to everything but an opening for challenges and approach.

Keywords

Obesity,
Overweight,
Geriatric,
Obese,
Pre-obese

Introduction

Overweight and obesity are the fifth leading risk factor for global deaths. Once considered a problem of developed country,

overweight and obesity are now on the rise even in developing countries, particularly in urban settings. Globally, the elderly

population is increasingly becoming obese regardless of socio-economic status. The WHO recognises obesity as the greatest health threat of 21st Century. The rapid rise in prevalence across the world has caught governments and health services by surprise, and the consequences are clearly evident. As per WHO 2.8 million adults die each year directly or indirectly as a result of being overweight or obese (Campbell and Haslam).

The prevalence of Obesity in the United States is increasing in all age groups. During the past 30 years, the proportion of older adults who are obese has doubled (Newman, 2009). In 1991, 14.7% of persons in the United States who were 60–69 years of age and 11.4% of those who were greater than 70 years old were obese. In 2000, the prevalence of obesity in these age groups increased to 22.9% and 15.5% respectively. More than 15% of the older American population are obese and obesity is more common amongst older woman than in men (Villareal *et al.*, 2005). Majority of people are leading a sedentary life style compared to their parents and grandparents with the arrival of television, computers, videogames Washing Machines and other modern convenience devices.

Central obesity in the elderly population of India is a major public health problem and a phenomena existing in India called as “Syndromic ‘x’ or metabolic disease”. Projection indicates that by the year 2020, there will be 470 million people aged 65 years and above in developing countries, which will be more than double the number of cases of developed countries (Swami *et al.*, 2005).

Behavioural Risk Factor Surveillance System (BRFSS) 2002 data shows that the prevalence of obesity among adults age 65

and above has increased from approximately 12% in 1990 to 19% in 2002 (Baldrige, 2002). Being physically active helps older people remain mobile and independent. The BRFSS data shows that the percentage of older adults who meet the recommended level of physical activity (that is 30 minutes of moderate intensity activity for five or more days per week) increased marginally from 1998 to 2000, but is still relatively low. Women had consistently lower level of recommended activity than men (Baldrige, 2002).

Obesity can be seen just as one of a defined cluster of non communicable diseases (WHO, 1999). Elderly people who belong to middle and higher income groups are prone to develop obesity and its related complications due to sedentary lifestyle and decreased physical activity (Ingle and Anita Nath, 2008).

The main aim of this study to find the prevalence of obesity in a rural setup among elderly and to assess the health problems due to obesity in the selected persons. And also to find the relationship of obesity with advancement of age and other variables like sleep duration, lack of physical activity, occupation, family history, frequency of meals and gender prevalence specificity

Materials and Methods

The present cross sectional study was undertaken in Veliyam village of Kottarakkara Taluk of Kollam district, Kerala State. 89 subjects who were above 60 years were enlisted for the study by random allocation of sample with the use of Random Number Table. This study was carried out from August to November 2013.

With the help of Anganwadi worker, data on subject were collected by, visiting their

houses and after getting an informed consent of subjects the data was collected. A predesigned and pretested interview schedule was used to interview the study participants to elicit the information on individual characteristics like age, sex, type of diet, frequency of food intake, habit of physical exercise, sleep duration, family history of obesity and duration of watching TV. The responses of the subjects were noted during the time of data collection and if any subject was absent on the day of data collection then he was excluded from the study.

Data on height and weight were collected for each through direct anthropometric examinations. Body weight was measured with the subjects standing motionless on the weighing scale with feet 15cm apart, and weight equally distributed on each leg.

Height was measured with subject standing in an erect position against a vertical scale. Body Mass Index is a simple index of weight-for-height which is used for classifying over weight and obesity subjects. For the purpose of the study BMI was calculated by formula - a person's weight in kilograms is divided by the square of the height in meters (Kg/m^2). The overweight is taken when as BMI falls between 25 and 29.9, Obese is classified when BMI is greater than or equal to 30.0, The BMI of healthy weight corresponds between 18.5 and 24.9 (Ryan, 2010).

Results and Discussion

The data collected was compiled, coded and entered in Microsoft Excel 2007, Spread sheet and were analysed using IBM SPSS VERSION 20. Prevalence of overweight and obesity is presented as percentage. The association were assessed by using the Pearson Chi-square test. Conventionally for

all statistical tests, P value less than as 0.05 is considered as statistically significant.

Findings

The variables studied with reference to BMI are Frequency of meals, sleep duration, regular Exercise, consumption of alcohol, family history of obesity, duration of watching TV and occupation. Out of which statistically significant results has been found for frequency of meals, regular exercise and sleep duration. No significant relationship was found with respect to consumption of alcohol, family history of obesity, duration of watching TV and occupation.

A total number of 89 subjects who were aged 60 years and above were screened for their height, weight and thus Body Mass Index were calculated. Out of 89 subjects 55 (62%) were women and 34 (38%) were men. Mean age of the population was 66 years. Average age of males was found to be 67 years and that of females is 65 years. The study reveals prevalence of geriatric overweight / obesity to be 54%. It was observed that 47% of males and 58% of females were overweight and obese. There is high percentage of prevalence of overweight in females than compared to males with high percentage of obesity in males vis-a-vis females. Prevalence of obesity (15%) is found to be more age group 65–69 ages and overweight (83%) were seeing in 75–79 age groups (Table 1)

Frequency of Meals

Considering frequency of meals, those who take 4-5 times meals in a day were found to be more obese and overweight when compared to those who take 3 meals a day i.e. 64 % were overweight and 14% were obese among those who take 4–5 times meals daily. There exist a significant relationship between obesity/ overweight

and frequency of meals intake in a day ($P=0.007$) (Table 2)

Physical Exercise

Only 9% of subjects do physical exercise regularly, those who do exercise 87% are having normal BMI and only 1% was found to be pre-obese. Exercise was also found to be a significant factor for obesity/overweight ($P=0.047$) (Table 3).

Sleep Duration

Those who sleep 9-10 hours daily are found to be more overweight (52%) and obese (20%), when compared to those who sleep 6-8 hours were overweight is 31% and obese is 6%. Overweight and obesity is found to be significantly related to the sleep duration ($P=0.003$) (Table 4)

Duration of watching TV

Duration of Watching TV was not considered to be the significant factor for Overweight/ Obesity. Those who watch TV for 3-4 hours a day, 48% were overweight and 15% were obese, which is more than, who watch TV for 1-2 hours a day (Table 5).

Occupation

Occupation is not considered to be the significant factor for obesity/overweight, in Pre-obese category, cashew factory workers were more nearly 54%, and obesity is more in unemployed persons about 20% (Table 6).

Family History

Family History was found to be insignificant factor for overweight / obesity. People who are having the family history of obesity are more prone to obese (17%) and overweight (45%) than who are not having the family history (Table 7).

Alcohol Consumption

Alcohol consumption was not found to be the significant factor for Overweight/ Obesity. All (100%) subjects who consume Alcohol regularly are found to be overweight and none of them are found to be obese (Table 8).

In our study the overall prevalence of geriatric overweight and obesity was found to be 54%. It was found that 47% of men and 58% of women were overweight and obese respectively. In a study, done at Delhi, it was found that in men the prevalence of overweight and obesity was 34% and for women it was 40.3% (Singh *et al.*, 2004). The prevalence of overweight and obesity is more for women than that of men and the prevalence of overweight and obesity is more for both groups in our study when compared to the referred study. As our study is a rural based study and about 62% of persons were females, among them majority (75%) were housewives with sedentary life style and lack of awareness may be the reason for high prevalence of obesity among women. The above study was carried out in urban settings where the women are more health conscious and aware. In present study majority (79%) of men are retired persons and unemployed, which may be the reason for high prevalence.

In another study, also the prevalence of obesity was found to be high for females (31%), when compared to male (11.9%) (Carter *et al.*, 2006). In our study among women nearly half of them are in the category of overweight. Majority (75%) of women subjects were house wives and nearly half of them were taking 4-5 meals per day with no physical activity. In men also most of them were leading a sedentary life style and that may be the reason for,

obese is more in men (11%) than in women (9%)

In a study it was found that prevalence of obesity was about 40% among older Americans in the age group of 60–69, and 30% of persons between ages 70–79 years (Gallagher Camden and Gates, 2006), but in present study the prevalence of overweight and obesity in 60–69 age is 44% and 12% respectively, in 70–79 years it was 43% and 1% respectively. Prevalence of obesity is less compared to the referred study, since the areas selected is a rural area. The quoted study has done in USA, and the change in lifestyle, the policies; all contribute to obesity in geriatric group.

In a study of NHANES-III the prevalence of overweight (BMI 25–29.9) was higher for men, but the prevalence of obesity (BMI 30 or greater) was lower for men (NHANES-III). We found just the reverse; prevalence of overweight was more for women while obesity was more for men.

Increased frequency of meals intake was found to be a significant factor for the condition of obesity. In a study woman subjects who took 2–3 meals per day had greater BMI and a greater proportion was overweight / obese (Ortega *et al.*, 1998). We found high significant relationship between frequency of meals and obesity; those who take 4–5 meals per day are more obese when compared to subjects who take 3 meals per day. In our study set up for breakfast, lunch and dinner most of them will take only rice as main food item and in between they used to take tapioca, which is dense in starch and carbohydrate. Most of our subjects are leading a sedentary life style with less physical activity all that contributes to obesity.

Physical exercise is another important risk

factor which is found to be significant. In studies, decreased physical performance resulted with elevated BMI, decreased physical activity and decreased energy expenditure with ageing predispose to fat accumulation and fat distribution and association between obesity and sedentary life style was found (Jensen, 2005; Kennedy *et al.*, 2004; Ryan, 2010; Kaplan *et al.*, 2003). In our study most of subjects are leading a sedentary life style and most are house wives, cashew factory workers and unemployed persons. In the study only very small proportion of persons are doing physical exercise and among them almost all of them are within normal BMI except one. During their leisure time they are watching TV and take rest.

In men alcohol consumption was not found to be significant factor for obesity in the present study (Kaplan *et al.*, 2003). In another study lower and higher use of alcohol is found to be significant risk factor for overweight and obesity.

Sleep duration is found to be high significant factor for obesity in our study. In a study (Santana *et al.*, 2012) sleep duration in elderly is negatively associated with dietary habits. In another study (Patel *et al.*, 2008) it was found that compared to those sleeping an average of 7–8 hours per night, sleep duration of less than 5 hours was associated with high BMI. In the present study it was found that those who sleep 9-10 hours are more likely to be obese than those who sleep 6–8 hours. Women who sleep 9–10 hours, majority (70%) of them are overweight and obese when compared to those who sleep 6-8 hours (44%). In the present study most of the elderly person will go early to bed and late waking since they are leading a relaxed life and didn't have any responsible work to do.

In a study it was found that cross-sectional TV viewing was associated with BMI among women but not among men (Crawford *et al.*, 1999). In another study BMI did not differ with the Television viewing groups (Tucker and Tucker, 2011). No influence was found on the relationships between television viewing and body fat percentage or TV viewing and BMI. In the present study also duration

of watching TV was not found to be the significant factor for obesity.

In a study it is said that modes of genetic inheritance of obesity are unknown, but it is likely that there are multiple genetic and non genetic causes for variation in body fat (Price and Price, 1987). In our study we found no significance between family history of obesity and occurrence of obesity.

Table.1 Age wise distribution of BMI

Age	Body Mass Index		
	18-24.9	25-29.9	30 and above
60-64	21(46)	20(43)	5(11)
65-69	8(40)	9(45)	3(15)
70-74	11(65)	5(29)	1(6)
75-79	1(17)	5(83)	0(0)

It is seen that 11% of persons were obese in the age group of 60-64 years and 15 % were obese in the age group of 65-69 years.

Table.2 Relationship of frequency of meals with BMI

Frequency of meals Daily	Body Mass Index			Chi-Square Value	Degrees of Freedom	P value
	18-24.9	25-29.9	30 and above			
4-5 times daily	8(22)	23(64)	5(14)	14.241	4	0.007
3 times daily	32(63)	15(29)	4(8)			
Less than 3 times	1(50)	1(50)	0(0)			

The BMI is found to have high significant relationship with frequency of Meals.

Table.3 Relationship of regular exercise with BMI

Exercise	Body Mass Index			Chi-Square Value	Degrees of Freedom	P value
	18-24.9	25-29.9	30 and above			
Yes	7(88)	1(12)	0(0)	6.132	2	0.047
No	34(42)	38(47)	9(11)			

There is significant relationship between BMI and Exercise.

Table.4 Relationship of duration of sleep with BMI

Sleep Duration	Body Mass Index			Chi-Square Value	Degrees of Freedom	P value
	18-24.9	25-29.9	30 and above			
9–10 hours	9(29)	16(52)	6(19)	15.727	4	.003<0.01
6–8 hours	30(63)	15(31)	3(6)			
Less than 6 hours	2(20)	8(80)	0(0)			

The relationship between BMI and sleep duration is highly significant

Table.5 Relationship of duration of watching tv with BMI

Duration of watching TV	Body Mass Index			Chi-Square Value	Degrees of Freedom	P value
	18-24.9	25-29.9	30 and above			
3–4 hours	18(38)	23(48)	7(15)	4.534	4	0.339
1–2 hours	20(57)	13(37)	2(6)			
Less than 2 hours	3(50)	3(50)	0(0)			

There exist no significant relationship between BMI and duration of TV watching

Table.6 Relationship of occupation with BMI

Occupation	Body Mass Index			Chi-Square Value	Degrees of Freedom	P value
	18-24.9	25-29.9	30 and above			
House Wife	18(44)	20(49)	3(7)	5.729	8	0.678
Cashew worker	4(31)	7(54)	2(15)			
Retired	9(56)	6(38)	1(6)			
Farmer	2(50)	2(50)	0(0)			
Not Working	8(53)	4(27)	3(20)			

The relationship between BMI and occupation is not found to be significant

Table.7 Relationship of family history of obesity with BMI

Family History of Obesity	Body Mass Index			Chi-Square Value	Degrees of Freedom	P value
	18-24.9	25-29.9	30 and above			
Yes	16(38)	19(45)	7(17)	4.512	2	0.105
No	25(53)	20(43)	2(4)			

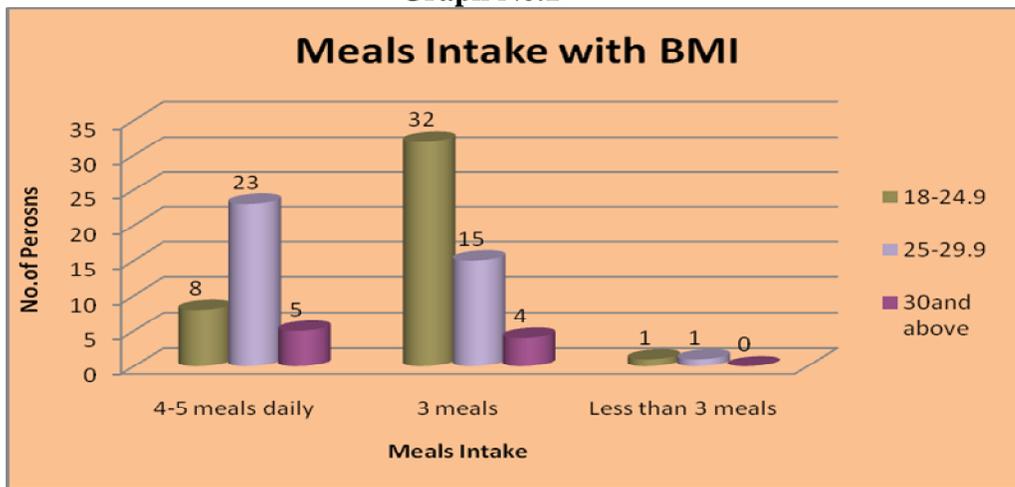
No significant relationship was found between BMI and Family history of obesity

Table.8 Relationship of alcohol consumption with BMI

Alcohol Consumption	Body Mass Index			Chi-Square Value	Degrees of Freedom	P value
	18-24.9	25-29.9	30 and above			
Regularly	0(0)	4(100)	0(0)	7.175	6	0.305
Occasionally	5(50)	3(30)	2(20)			
Rarely	3(50)	2(33)	1(17)			
None	33(48)	30(43)	6(9)			

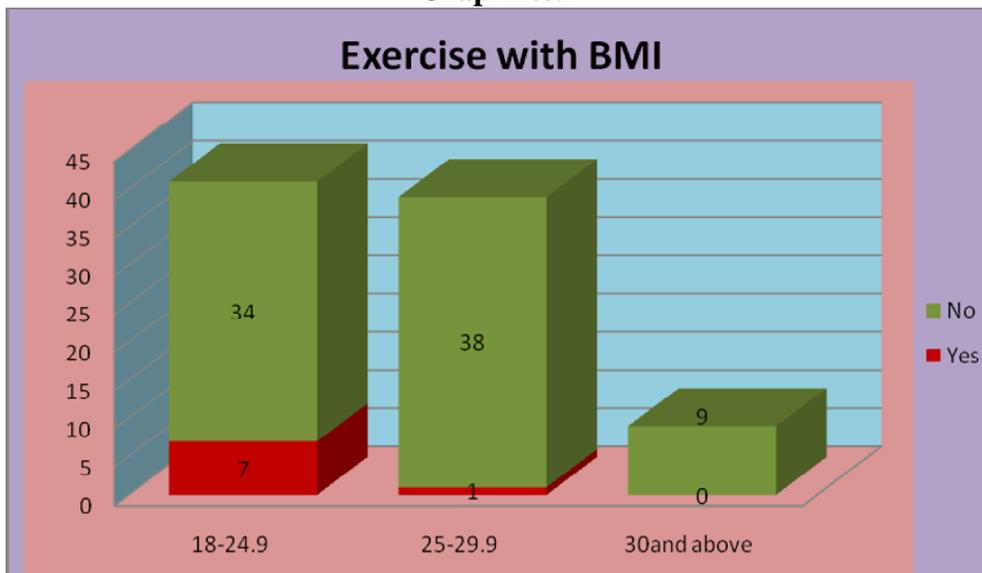
There is no significant relationship between BMI and Alcohol consumption.

Graph No.1



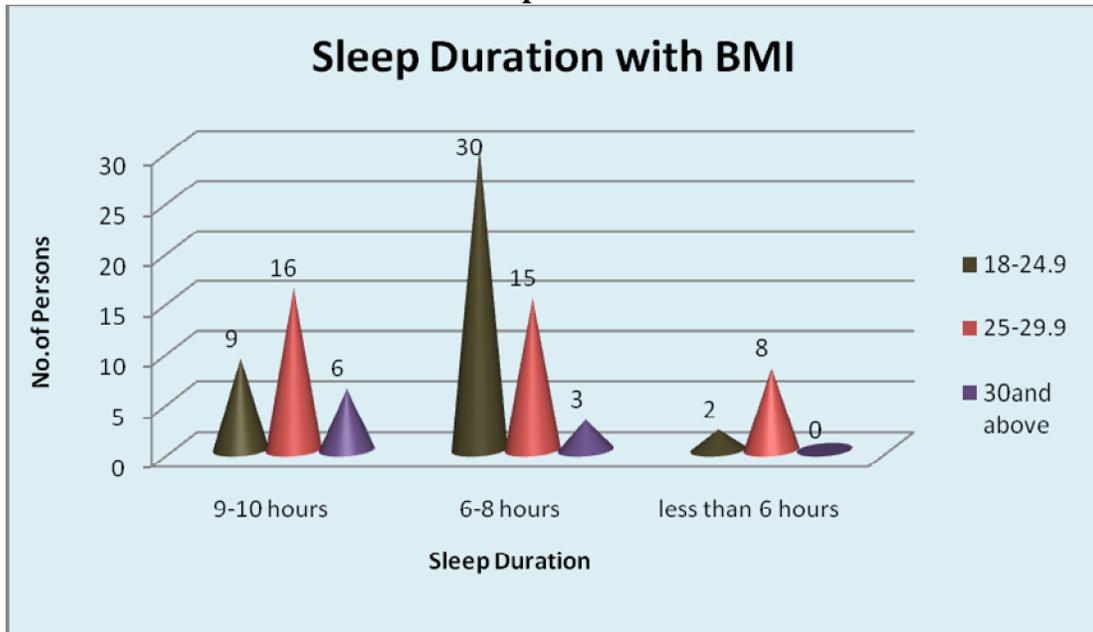
Those who take 4–5 meals daily are found to be more overweight and obese than compared to those who take 3 meals per day

Graph No.2



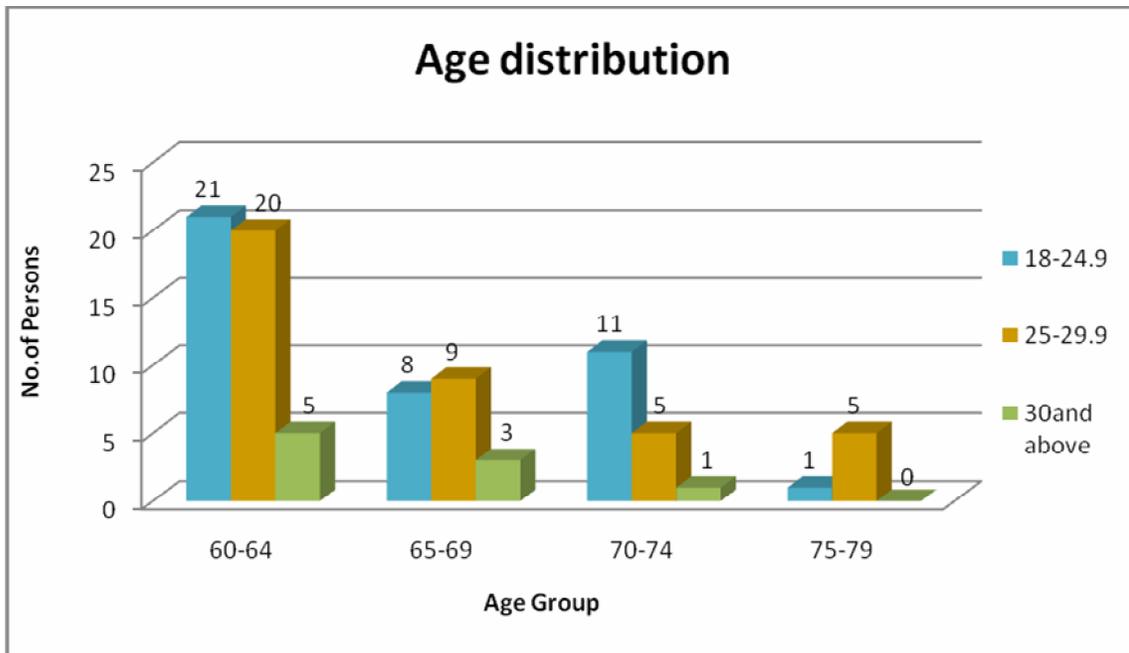
The obesity is nil for those who exercise regularly.

Graph No. 3



Overweight and obesity is more for persons who take 9-10 hours sleep.

Graph No.4



As age increases the percentage of obesity decreases.

References

- Campbell, I, Haslam D, Text book on Obesity, Page No. 4
- Newman, A. (2009). Obesity in Older Adults, *OJIN*, Vol.14 No.1, Manuscript 3.
- Villareal, D.T., Apovian, C.M., Kushner, R.F., Klein, S. (2005). Obesity in older adults: Technical review and position statement of the American Society for Nutrition and NAASO, The Obesity Society 1,2,3,4,5. *Am. J. Clin. Nutr.*, 82(5): 923–934.
- Swami, H.M, Bhatia, V., Gupta, A.K., Bhatia, S.P.S. (2005). An epidemiological study of obesity among elderly in Chandigarh. *Indian J. Community Med.*, 30(1): 11–13.
- Baldrige, D. (2002). Behavioral risk factor surveillance system document, CDC.
- WHO. (2000). Obesity: Preventing and Managing the Global epidemic- Report of a WHO consultation, Geneva. WHO Consultation on Obesity (1999; Geneva, Switzerland)
- Ingle, G.K., Nath, A. (2008). Geriatric Health in India: Concern and Solutions. *Indian J. Community Med.*, 33(4).
- Singh, P. Kapil, U., Dey, A.B. (2004). Prevalence of overweight and obesity amongst elderly patients attending a geriatric clinic in a tertiary care hospital in Delhi, India, *Indian J. Med. Sci.*, 58:162–163.
- Carter, A.O., Hambleton, I.R., Broane, H.L., Fraser, H.S., Hennis, A.J. (2006). Prevalence and risk factors associated with obesity in the elderly in Barbados, *J. Aging Health.*, 18(2): 240–258.
- Gallagher Camden, S., Gates, J. (2006). Obesity: changing the face of geriatric care, *Ostomy Wound Manage.* 52(10): 36–38, 40–44.
- Healthy weight, Overweight and Obesity among U.S adult - National Health and Nutrition Examination Survey, CDC, <http://www.cdc.gov/nchs/nhanes.htm>.
- Ortega, R.M., et al. (1998). Relationship between the number of daily meals and the energy and nutrient intake in the elderly, Effect on various Cardio Vascular Risk factors, NCBI, *Nutr. Hosp.*, 13(4): 186–192.
- Jensen, G.L. (2005). Obesity and functional decline: Epidemiology and geriatric consequences. *Clin. Geriatr. Med.*, 21(4): 677–687.
- Kennedy, R.L., Chokkalingham, K., Srinivasan, R. (2004). Obesity in the elderly: Who should we be treating and why and how? *Curr. Opin. Clin. Nutr. Metab. Care*, 7(1): 3–9.
- Alice S Ryan, Exercise in aging- Its important role in mortality, obesity and insulin resistance. *Aging Health*, 6(5): 551–563.
- Kaplan, M.S., Huguet, N., Newsom, J.T., McFarland, B.H., Lindsay, J. (2003). Prevalence and correlates of overweight and obesity among older adults: Findings from the Canadian National Population Health Survey, *Gerontol. A Biol. Sci. Med. Sci.*, 58(11): 1018–1030.
- Santana, A.A., Pimentel, G.D., Romualdo, M., Oyama, L.M., Santos, R.V., Pinho, R.A., de Souza, C.T., Rodrigues, B., Caperuto, E.C., Lira, F.S. (2012). Sleep duration in elderly obese patients correlated negatively with intake fatty. *Lipids Health Dis.*, 7(11): 99.
- Patel, S.R., Blackwell, T., Redline, S., Ancoli-Isreal, S., et al, The Association between sleep duration and obesity in older adults. NIH Public Access Author Manuscript (NIHMSID) - NIHMS70681, 2008, October 21.
- Crawford, D.A., Jeffery, R.W., French, S.A. (1999). TV viewing, physical inactivity and obesity. *Int. J. Obes. Relat. Metab. Disord.*, 23(4): 437–440.
- Tucker, L.A., Tucker, J.M. (1956). TV viewing and obesity in 300 women: Evaluation of the pathways of energy intake and physical activity. *Obesity*, 19(10): 1950–1956.
- Price, R.A. (1987). Genetics of Human Obesity, *Ann. Behav. Med.*, 9(1): 9–14.