Prevalence of Obesity and Overweight among Adults in a Rural Area in Trivandrum - A Cross Sectional Study

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ABSTRACT

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Background: Obesity is an important modifiable risk factor for most chronic non-communicable diseases. The objective of the study was to determine the prevalence of overweight/ obesity among adults in Nellanadu Panchayath, a rural area in Trivandrum, Kerala.

Materials and Methods: This was a cross sectional study conducted among 300 adults in Nellanadu panchayath, a rural area in Trivandrum, Kerala. Adults≥18 years are interviewed from the consecutive houses with the help of a pre-tested structured questionnaire. Height, weight, waist circumference and hip circumference were measured using standard anthropometric methodology.

Results: Mean age of the study population was 47.58 years. Mean BMI among women was significantly higher (24.28), compared to men (23.2) with p = 0.012. The prevalence of overweight and obesity in the population was 24% and 40.7% respectively, as per WHO BMI guidelines for Asians. About 51% of women and 35% of men had high waist circumference. Higher proportion of women (77.7%) had high waist-hip-ratio compared to men (48.5%).

Conclusion: The prevalence of overweight and obesity is high among adults in rural areas in Trivandrum.

Keywords: Obesity, Overweight, Prevalence, Rural, Kerala

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BACKGROUND

Obesity is defined as an excessively high amount of body fat or adipose tissue in relation to lean body mass. It is a type of nutritional disorder due to imbalance between energy intake and energy expenditure resulting in positive energy balance, characterized by the abnormal growth of adipose tissue resulting in an increase in the body weight to the extent of 20 % or more of the standard weight. Obesity can be estimated by measuring anthropometric measures such as body mass index (BMI), waist-to-hip circumference ratios (WHR), Waist circumference or by radiological techniques. Global epidemic of overweight and obesity is rapidly becoming a major public health problem in many parts of the world. Obesity epidemic results in substantial decrease in the quality of life, life expectancy and it accounts for heavy expenditure in provision of health care. There is a progression of nutritional transition in developing countries, characterized by a reduction of prevalence of nutritional deficiency and more occurrence of overweight and obesity.

As per NFHS 3 reports,[1] Punjab, Kerala, and Delhi are the states with the highest level of overweight and obesity. The percentage of women who are overweight or obese (BMI≥ 25) is highest in Punjab (30 percent), followed by Kerala (28 percent) and Delhi (26 percent). Even with lower BMI, Asians have higher visceral adiposity than Caucasian populations. For this reason, the international task force of World Health Organization (WHO) has set lower cut-off BMI values for Asians to define overweight and obesity.

Overweight and obesity is on an increase in urban as well as rural area. The problem of obesity has been particularly increasing in Kerala, as there is a drastic change in living standards and life style of people over the recent years. Objective of this study was to determine the prevalence of overweight/ obesity among adults in Nellanadu Panchayath, a rural area in Trivandrum, Kerala.

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MATERIALS AND METHODS

Cross sectional study was conducted in Nellanadu Panchayath, a rural area in Trivandrum district in Kerala among adults. Study population included all adults >/=18 years in Nellanadu Panchyath. Exclusion criteria included pregnant women. Sample size is calculated with 5% alpha error, 20% relative precision and anticipated prevalence of obesity as 30 % and sample size is 224. One ward is randomly selected from this panchayath. Adults are interviewed from the consecutive houses with the help of a pre-tested structured questionnaire. Information about age, sex, alcohol use, fast food consumption, exercise and smoking history was collected. Height and weight, waist and hip circumference were measured using standard anthropometric methodology. Weight was measured without shoes and with light clothing. The weighing scale was regularly checked with known standard weights. A portable anthropometric rod was used for measuring height. Waist circumference (WC) is measured with subject standing with feet 25-30 cm apart. Measurement is taken midway between inferior margin of the last rib and the crest of ilium in horizontal plane to nearest 0.1cm. The hip circumference is measured around pelvis at the point of maximal protrusion of the buttocks. Both WC and hip circumference were measured to the nearest 0.1cm. Body mass index (BMI) was calculated as weight (kg) divided by the square of height (m²). WHR was calculated as WC (cm) divided by hip circumference (cm).

The classification of BMI for Asian populations, according to the World Health Organization (WHO) 2000 guideline, was used in this study. International Association for the Study of Obesity and the International Obesity Task Force have suggested lower BMI cutoff values for the definitions of overweight and obesity in Asian populations. Body Mass Index (BMI): Obesity: BMI ≥ 25.00 kg/m², Overweight: BMI 23.00–24.99 kg/m2, Normal BMI: 18.50–22.99 kg/m2 and Underweight: <18.50 kg/m2.[2] For men Waist circumference≥ 90 cm and for women≥ 80 cm, were considered as cut off points for defining abdominal obesity. Waist Hip Ratio >0.90 in men and >0.80 in women are taken as high. The data is entered in SPSS and analyzed. All quantitative variables were analyzed using mean and standard deviation, and all qualitative variables were analyzed for proportions. Unpaired t- test and Chi-square Test were used to test significance. For all statistical tests, *p* < 0.05 was taken as the significant.

RESULTS

Mean age of the study population was 47.58 with SD=15.32. For detailed analysis, age was grouped into categories <40 years, 41-60 and >60 years Intraoperative Trans Esophageal Echocardiography (TEE) of LA myxoma **(Table 2)**. Mean BMI among women was significantly higher (24.28 SD=4.18), compared to men (23.2, SD=3.05) with p=0.012 **(Table 1)**. Mean waist-circumference (WC) among men was 85.67cm (95% CI: 84.1-87.2) and mean WC among women was 81.6 cm (95% CI: 80.2-83.09). Mean WHR among men was 0.903 (95% CI: 0.88-0.92) and among women mean was 0.854 (95% CI: 0.841-0.867). Mean waist to height ratio among men was 51.69(95% CI 50.7-52.6) with standard deviation 5.04 and among women 52.4 (95% CI: 51.4-53.4) with SD=7.2.

In the study population, 35% men and 0.5% women consumed alcohol. Also 41.7% of men and 2% of women were smokers. Only 30% of adults are involved in at least moderate physical activity.

For men waist-circumference ≥ 90 cm and for women ≥ 80 cm, were considered as high. Overall 45.3% adults in this area had high WC. About 51% of women and 35% of men had high WC (P=0.009).

Waist Hip Ratio (WHR) >0.9 in men and >0.8 in women are taken as high for Asians. In this study, 77.7% of women were with high WHR, compared to 48.5% men **(Table 3).**

No significant relation found between consumption of

BMI Categories	Gender		Total	95%CI
	Male	Female		
Obese	34 (33%)	88 (44.7%)	122 (40.7%)	35-46.3%
Overweight	26 (25.2%)	46 (23.4%)	72 (24.0%)	19.3-29%
Normal	38 (36.9%)	46 (23.4%)	84 (28.0%)	23-33%
Underweight	5 (4.9%)	17 (8.6%)	22 (7.3%)	4.7-10.3 %
Total	103	197	300	

Table 1. Prevalence of overweight and obesity

Pearson Chi-Square value=8.107, p=0.044

Overweight/ Obesity	Age group in years			Total
	<=40	41-60	>60	
BMI <23	45 (42.1%)	36 (27.1%)	25 (41.7%)	106 (35.3%)
BMI >/=23	62 (57.9%)	97 (72.9%)	35 (58.3%)	194 (64.7%)
Total	103	133	60	300

Table 2. Prevalence of obesity/overweight in different age groups

Chi square value=7.11, DF=2, P=0.028

Table 3. Prevalence of obesity/overweight in different age groups			
Waist Hip Ratio(WHR)	Sex		Total
	Male	Female	
Normal	53 (51.5%)	44 (22.3%)	97 (32.3%)
High	50 (48.5%)	153 (77.7%)	203 (67.7%)
Total	103	197	300
Pearson Chi-Square=26.2, P=0.001			

Table 4. Overweight/obesity and fast food intake			
Overweight/ Obesity	Fast food consumption		Total
	No	Yes	
BMI<23	56	50	106
	45.9%	28.1%	35.3%
BMI>=23	66	128	194
	54.1%	71.9%	64.7%
Total	122	178	300
P=0.002, Odds Ratio=2.17, 95% CI=1.34-3.5			

alcohol and overweight/obesity. Overall 8.7% of adults had grade II obesity (BMI>=30). The proportion of women (12.2%) having BMI>=30 was significantly high compared to men (1.9%) with p value 0.003. Among adults who are found to be having normal BMI (<23), 29.2% had high WC than recommended for Asians (>90cm in males and > 80 cm in women).

DISCUSSION

As per WHO BMI guidelines for Asians, overall prevalence of obesity was 40.7% among adults and prevalence of overweight was 24% as per the study population. Among those who are obese, 8.7% had grade II obesity. Varghese et al[3] in their study in Kerala found overall prevalence of obese and overweight as 5.5% & 24.8% respectively considering BMI values >=30 as obese and BMI 25-29.9 as overweight.

Prevalence of obesity was found to be 44.7% among women and 33 % among men in our study. Obesity was found to be more among females (33%) than males (17%) in the study by Sugathan et al.,[4] in Kerala. Prevalence of obesity was higher in females in a cross-sectional survey which was carried out on adults aged 25–60 years in Delhi, India.[5,6] In a study conducted by Venkatramana et al,[7] overall prevalence of obesity found was 1.91 %;(1.03% in males & 2.79% in females) & prevalence of overweight persons 11.48% (13.33%in males &9.74% in females). The obesity prevalence in women was higher than in men (P < 0.0001) among Iranian adults also.[8] As per NFHS-3, the percentage of women who are overweight or obese (BMI≥ 25) in Kerala was 28 % compared to 30% in Punjab and 26% in Delhi.[1] Among adults within the age group of 41-60 years around 72.9% were either overweight or obese in this study. In a study by Varghese et al., 41.7 % in 40 – 49 years and 41.9 % in 50 -59 years were obese or overweight in Kerala. Overall 45.3% adults in this area had high WC (For men ≥ 90 cm and for women≥ 80 cm). Higher proportion of women (50.8%) than men(35%) had high WC (P=0.009). For men Waist circumference≥ 90 cm and for women≥ 80 cm, were considered as high. Around 68% of adults had high

WHR. Higher proportion of women (77.7%) had high WHR compared to 48.5% among men(P<0.001). Women had 3.6 times more risk of central obesity (high WHR) compared to males. Vijayakumar et al[9] reported the prevalence of central obesity (WHR > or = 0.80 [women] and > or = 0.90 [men]) was 85.6 percent in a study conducted in middle Kerala. In a study by Singh et al.[10] the overall prevalence of obesity (BMI≥30) was 6.8% (7.8 vs. 6.2%, P < 0.05) and of overweight was 33.5% (35.0 vs.32.0%, P < 0.05) among women and men, respectively. The obesity prevalence was higher in Trivandrum (8.5%), Calcutta (7.1%) and Bombay (8.3%) compared to Moradabad (6.2%) among women, and among men it is higher in Trivandrum (7.4%) and Bombay (7.2%) compared to Nagpur (5.0%). The overall prevalence of subjects with BMI>23 kg/m2 was 50.8% and central obesity 52.6% in this five city study by Singh et al[10] Among those who consume fast food the risk of obesity /overweight is 2.17 times higher.

Among adults with normal BMI <23, 29.2% had high WC than recommended for Asians (>90cm in males and >80 cm in women). Despite having lean BMI adult Indian has more chances of having abdominal obesity. Among Asian population, abdominal or central obesity is more common than obesity defined by BMI and health risks associated with overweight and obesity occur at lower levels of BMI. Obesity increases the insulin resistance and or reduces the number of insulin receptors on target cells. Abdominal obesity and visceral adiposity are the key determinants of insulin resistance, an important component of metabolic syndrome, the major CVD risk factor in all populations. At any given BMI, Indians may have a higher proportion of body fat, due to difference in body frame sizes and body proportions and thus an elevated risk of long term consequences of obesity like diabetes and CVD.

CONCLUSION

Overall prevalence of obesity & overweight in a rural population of Trivandrum, Kerala was 40.7% and

24% respectively, as per new WHO BMI guidelines for Asians. Nearly three fourth (72.9%) of adults in the age group of 40-60 years were found to have BMI >/=23. Prevalence of central obesity is also very high. Even among those with normal BMI, central obesity is prevalent. Central obesity is a greater risk factor for development of type 2 DM and risk is related to both the degree and duration. The burden of obesity on health care system will be very high, due to its long term consequences. Primary prevention of obesity has to be recognized as a public health priority. Action must be taken to integrate physical activity into daily life, not just to increase leisure time exercise. Awareness to reduce fast food consumption should be given high priority. Yoga can be used to maintain optimal weight of our country men and women. In addition to improving physical activity, yoga can help in preventing stress.

END NOTE

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