



Obesity among Reproductive Age Women in Rural Kerala: A Hidden Threat

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ABSTRACT

Background: Obesity is the most prevalent form of malnutrition. According to National Family Health Survey-3, Kerala ranks second among Indian states next to Punjab for overweight or obese. The research was conducted to study the prevalence of obesity among reproductive age women and its association with socio-demographic variables.

Methodology: It was a cross sectional study. A sample of 650 reproductive age women (15-49 yrs) was selected through Cluster sampling method.

Results: Mean age of the study population was 33.47 yrs with Standard Deviation (SD) of 8.11yrs. The prevalence of obesity based on BMI WHO classification for adult Asians was 47.5%. Factors like age, family history, type of physical activity, walking hours, menstrual pattern and number of children were significantly associated with obesity.

Conclusions: Obesity is a major nutritional problem among reproductive age women in Kerala. Higher prevalence of obesity was seen among higher age group, low socio-economic group, housewives. Menstrual irregularities, normal delivery and higher parity were significantly associated with obesity.

Key words: Obesity, Reproductive age, Women, Kerala

INTRODUCTION

Overweight and obesity are emerging problems in India. Kerala ranks second among Indian states next to Punjab with 34% prevalence of overweight and obesity¹. Obesity is the first of the "diseases of civilization" to appear². Obesity is the most prevalent form of malnutrition and it is a global nutritional concern³. Most of the developing countries at present experience a dual burden of disease with over nutrition and under nutrition occurring simultaneously⁴.

Obesity may develop at any age in either sex. Due to certain social and biological reasons, women of the reproductive age are amongst the most vulnerable to malnutrition. The overall incidence of obesity is higher among women than men in general.

The aetiology of obesity is multi factorial. Obesity is a consequence of epidemiological and nutritional transitions due to increased urbanization, mechanization of jobs and transportation, availability of processed and "energy-dense, nutrient-poor" diets, seduction of sedentary pastimes like television and adopting less physical active life styles⁵

Obesity is a major contributor to the global burden of many chronic diseases. Obesity is associated with five out of ten leading causes of death and disability such as heart disease, Type 2 diabetes, cancer, hypertension and stroke. Women with obesity experience problems with special focus on reproductive health.

Many nutrition based studies conducted in India focus on under nutrition rather than overweight and obesity. As of now there are only limited stu-

dies among females on obesity. Most of the studies are based on the BMI classification of western population and no study has been done based on adult Asians classification.

This study can provide baseline data on magnitude of the problem and identifies the factors to be focused by policy makers in setting priorities in implementing programs and to increase awareness among people.

METHODS

A cross sectional study was conducted from January to December 2015 in rural field practice area of Government medical college Kottayam which includes an entire Panchayat block.

Sample size: Sample size was calculated based on previous studies. Misra et al.⁶ study among females in reproductive age group (15-49 yrs) showed prevalence of 16%. Assuming this prevalence of 16%, acceptable error of 4% at 95% confidence limits, sample size was calculated as 323 using stat calc function of EPI INFO software version 3.4.1. Since it was cluster sampling, design effect of 2 was taken to make total sample size of 650

Sampling Method: Sample was selected through cluster sampling method. Each ward of the panchayat was considered as one cluster. Panchayat was having 15 wards. 2 wards were selected randomly by lottery method and entire populations of reproductive aged women from these 2 wards were included in the study.

Women who were willing to participate in the study were considered. Pregnant mothers and mothers who delivered within two months before the study period were excluded as it might bias our result.

A pre-tested semi structured interview schedule was used for data collection. The proforma was designed based on WHO STEPS instrument Step 1 and 2. Data was collected by house to house survey. Each study subject was interviewed for collecting information regarding demographic details like age, marital status, religion, occupation, education, family history of obesity, details on physical activity, dietary habit & reproductive health factors. Physical activity was assessed using **Global Physical Activity Questionnaire**. Physical examination was carried out to measure height, weight, waist circumference, and hip circumference. Three attempts were made to contact eligible subjects prior to labelling them as non-responders by the investigator.

Body Mass Index (BMI) was classified based on BMI WHO Classification and adult Asians classifi-

cation. Other measures were waist circumference, hip circumference and waist hip ratio. Global Physical Activity Questionnaire (GPAQ) was used to collect information regarding heavy work, moderate work, sports, fitness, and recreational activities. Physical activity was classified into high, moderate and low categories and analysis was done

Data was entered in Microsoft excel 2007 and analysis was done using SPSS16.0. Prevalence will be expressed in percentage and association with factors will be tested for significance using Chi square test. P value < 0.05 was taken as significant.

RESULTS

The prevalence of obesity was 47.5 % with obese class I - 36.3% (32 - 39.5%) & class II - 11.2% (9.8 - 15%) based on WHO BMI classification for adult Asians. About 34% of the study population were of normal weight and 5.5% were underweight. (Table 1)

When the BMI cut off was taken as ≥ 25 based on WHO classification most of the study subjects fell under the category of overweight (36.3%). When the BMI cut off was reduced to ≥ 23 based on adult Asian classification the proportion of obese individuals was characteristically high (47.5%). The number of normal weight individuals also differed with 47% and 34% in former & latter classification. (Figure 1)

The maximum prevalence of overweight and obesity was observed among women above 40 years of age group. 79.5 % of those in the age group of above 40 years were overweight and obese. The prevalence of overweight and obesity was 17%, 53.7% 67.6% in the age groups less than 20 years, 20 - 30 years, and 30-40 years respectively. It was evident from the present study that as age progresses the prevalence of obesity increases.

Prevalence of overweight and obesity among married women in the study population was 70.9% and among single or unmarried females it was 21.7%. Obesity was common among females from high socio economic status but it was not statistically significant. 73.4% of females who had a positive family history of obesity presented with overweight and obesity by themselves. (Table 2)

Most of the females (62.8%) who sleep for less than 8 hours in the night were prone for overweight and obesity. In 2002, a study of 1.1 million people in United States found that increasing BMI occurred when habitual sleep amounts fell below 7 to 8 hours⁸.

Table- 1: Distribution of study population based on BMI Classification for adult Asians⁷ (n=650)

Category (BMI)	Frequency	Percent (95% CI)
Underweight (<18.5)	36	5.5 (4 -7.7)
Normal weight (18.5-22.99)	221	34.1 (30.4 -37.8)
Pre obese (23-24.99)	84	12.9 (10.2 -15.5)
Obese class -I (25-29.9)	236	36.3 (32 - 39.5)
Obese class -II (≥30)	73	11.2 (9.8 - 15)

Post lunch sleep was also an important factor for developing obesity as 75% who were in the habit of sleeping after lunch for a minimum of 1 hour were obese. Surprisingly watching television for more than 2 hours did not show association.

About 66.4% of females who were involved in moderate physical activity were overweight and obese compared to 53% who involve in mild and 48% who involve in high physical activity per day. This difference was statistically significant. Majority of our study population were housewives who involved in moderate activity and only 28% and 12% were involved in low and high physical activity based on metabolic equivalents. (Table 3)

Women who had irregular menstrual cycle (77%) were obese & overweight compared to those who had regular cycle. Women (88%) who delivered through caesarean section had higher prevalence of obesity compared to those who had normal vaginal delivery. 82% of women with >2 children were overweight and obese compared to 69% of females with ≤ 2 children. (Table 4)

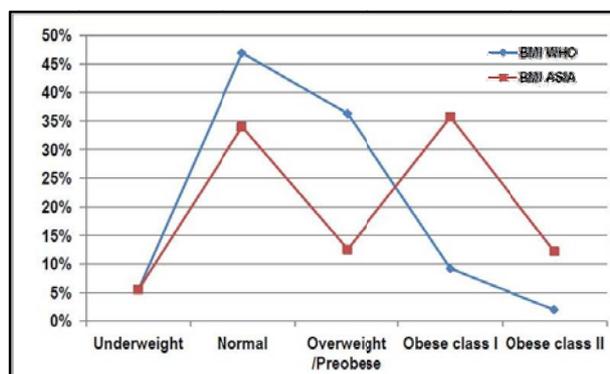


Fig 1: Line diagram showing the comparison between BMI based on WHO classification and adult Asian classification

Table 2: Association between socio-demographic factors and obesity

Socio-demographic factor	Underweight & Normal (n=257) (%)	Overweight & Obese (n=393) (%)	Total (n=650)	Odds ratio (p-value)
Age group in years				
<20	73 (28)	15 (4)	88	Ref
20 - 30	76 (30)	88 (22)	164	5.6 (P<0.001)
30 - 40	72 (28)	150 (38)	222	10.1 (P<0.001)
>40	36 (14)	140 (36)	176	18.9 (P<0.001)
Marital status				
Married	149 (58)	363 (92)	512	Ref
Unmarried	108 (42)	30 (8)	138	8.7(P<0.001)
Socio-Economic Status				
Upper (I)	1 (0.3)	4 (1)	5	Ref
Upper middle (II)	12 (5)	17 (4)	29	0.35 (P<0.73)
Lower middle (III)	91(35)	132 (33)	223	0.36 (P<0.75)
Upper lower (IV)	153 (59.7)	240 (62)	393	0.39 (P<0.8)
Family history				
Present	90 (35)	248 (63)	338	Ref
Absent	167 (65)	145 (37)	312	3.17 (P<0.001)

Table 3: Association between physical activity and obesity

Physical Activity	Underweight & Normal (n=257) (%)	Overweight & Obese (n=393) (%)	Total (n=650)	Odds ratio (p-value)
Sleeping hours				
<8 hrs	207(80%)	350 (89%)	557	Ref
>8 hrs	50 (20%)	43 (11%)	93	1.9(P<0.002)
Post lunch sleeping				
<1 hr	63(24%)	185 (47%)	248	Ref
>1 hr	194(76%)	208 (53%)	402	2.7 (P<0.001)
Watching TV (hrs/day)				
<2 hrs	243(94%)	363 (91%)	606	Ref
>2 hrs	14(6%)	30 (9%)	44	1.4 (P<0.270)
Physical activity				
High	41 (15%)	38 (10%)	79	Ref
Moderate	131 (51%)	259 (66%)	390	2.1 (P<0.001)
Low	85 (34%)	96 (24%)	181	1.2 (P<0.001)

Table 4: Association between reproductive health factors and obesity

Reproductive health factors	Underweight & Normal (n=257) (%)	Overweight & Obese (n=393) (%)	Total (n=650)	Odds ratio (p- value)
Menstrual pattern				
Regular	230 (89)	304 (77)	534	Ref
Irregular	27 (11)	89 (23)	116	2.5 (P<0.001)
Mode of Delivery				
Normal delivery	106(79)	207(62)	313	Ref
Caesarean section	28(21)	125 (38)	153	2.2 (P<0.001)
No of children				
No children	114(44)	44 (11)	158	Ref
<2 Children	130(50)	290 (74)	420	5.7 (P<0.001)
>2 children	13(6)	59(15)	72	11.7 (P<0.001)

DISCUSSION

Kerala is a coastal state of southern India with unique culture and dietary habits. Unlike most of the other states people consume non vegetarian foods as their staple diet and their habit of using coconut oil for cooking has made them more vulnerable to develop overweight and obesity. Kerala ranks second with the prevalence of overweight and obesity around 34% among ever married women between 15-49 years based on NFHS-3 data¹. A study conducted by C. R. Soman et al among female population in different districts of Kerala showed the prevalence of overweight and obesity as 33%⁹.

In our study we used both WHO classification and BMI for adult Asians classification. The associations of BMI and co morbidities vary among ethnic groups. WHO BMI classification is intended for international use. The body fat percentage and the risk for type 2 diabetes & cardio vascular diseases is considered to be higher in Asian populations as compared to European population at the same level of BMI and therefore different cut-off levels are recommended for Asians¹⁰. The provisional recommendations for Asia Pacific Region published in February 2000 by the WHO Regional Office for the Western Pacific, the International Association for the Study of Obesity and the International Obesity Task Force are overweight at BMI > 23 and obese at BMI > 25 kg/m²⁷.

If WHO classification is taken in to consideration for screening purposes there may be chances of overweight individuals who are at risk for developing diseases to be classified as normal. This in turn will result in health consequences which could have been prevented earlier by timely measures.

The prevalence of obesity was 47.6% based on BMI for adult Asian classification. Most of the Indian studies have used WHO classification. A Chinese study with same reference levels found the prevalence of obesity is 31.7%¹¹. Data from China indicate that the prevalence of hypertension, diabetes,

dyslipidaemia, and clustering of risk factors all increased with increasing BMIs even at indices below the current cut-off point for overweight (>25 kg/m²). Data from Hong Kong, Korea, Philippines, and Taiwan, analysed in preparation for the expert consultation, show that the relative risk of having at least one risk factor for cardiovascular disease is high at a low BMI in Asians¹².

The observations regarding age and its association with overweight and obesity in the current study is similar to the study conducted by Vijay Kumaret al¹³. Most of the study population were having moderate physical activity compared to mild and high physical activity. Present study showed higher prevalence of obesity among housewives who were involved in moderate physical activity. About 66.4% of females who were involved in moderate physical activity were overweight and obese compared to 48% who involve in high physical activity per day. A study conducted by Johnson et al revealed similar result where females who involved in moderate physical activity were 57% overweight and 46% obese¹⁴. Ranjana et al study on females highlighted a result of 94% overweight and obese among people who don't exercise or do mild physical activity¹⁵. Suganthan et al observed in his study that housewives involve in moderate physical activity and are of risk for being overweight¹⁶.

Married women were more obese and results were consistent with the studies conducted by Ramesh et al¹⁷ and Jyothi et al¹⁸ where almost 30% and 50% of the married women in the study sample were overweight and obese. Roger and Mitchell documented the relationship between obesity and menstrual dysfunction. They found higher incidence of obesity in women with amenorrhoea (48%) than women with normal menstrual pattern. It has also been documented that abdominal obesity may be the important risk for menstrual disorders. Having more number of children was significant factor for obesity and this type of relationship was observed by Jyoti et al in her study where women having

more than two children were obese compared to less than two children¹⁸.

Kerala is a state where most of the health indicators are on par with developed countries but it is a hub of many non-communicable diseases (NCD) especially cardiovascular diseases, stroke, cancer, suicide etc. Obesity being a major risk factor for NCD needs to be tackled to prevent its occurrence.

CONCLUSIONS

The prevalence of obesity was very high among married women in Kerala and it was most frequently associated with less physical activity, menstrual disorders and post lunch sleep habits. Obesity is a major risk factor for NCD and hence it is high time we focus on preventing it before it causes major damage to our working population.

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