Original Article

The Prevalence of Overweight and Obesity among Women in an Urban Slum of Chennai

ANURADHA R., RAVIVARMAN G., TIMSI JAIN

ABSTRACT

Context: Obesity and overweight are creating a global epidemic. They are the risk factors for many non-communicable diseases. Once considered as a problem which was related to affluence, obesity is now growing fast in many developing countries. The prevalence of obesity is on the rise among the slum population.

Aims: To find out the prevalence of overweight and obesity among women aged 20 years and above in an urban slum of Chennai. To identify the risk factors which were associated with overweight and obesity in the above study population.

Settings and Design: An urban slum in Chennai, a cross sectional study

Methods and Material: The present study was undertaken in an urban slum in Chennai city, among women aged 20 years and above. One slum was selected randomly and the households in the slum were sampled by a systematic random sampling method. A pre-designed and pre-tested questionnaire was used to collect information regarding the socio-demographic profile, the diet pattern , the intake of vegetables and fruits, the duration of television viewing in a day and the duration of sleep at night of the study subjects. Anthropometric data regarding height and weight was also taken. WHO Asian Classification of the body mass index (BMI) was used to classify the study population.

Statistical Analysis: The analysis was done using the Statistical Package For Social Sciences (SPSS), version 11.5. The prevalence was expressed in percentage and the Chi square test was used to find association with the factors.

Results: In the study population, the prevalence of overweight (BMI $\geq$ 23) was 27.7% (95% confidence interval [CI] 24.3–32.2) and the prevalence of obesity (BMI $\geq$ 25) was 19.8% (95% CI 16.5–23.6). A significant association was noted between overweight/obesity and higher educational level, higher socio-economic status, inadequate fruit intake, an increased duration of television viewing and a sleep duration of < 7 hours and >9 hours per night.

Conclusion: There is a rising prevalence of overweight and obesity among the urban slum women. The prevalence of overweight and obesity was found to be significantly higher among the slum women with inadequate fruit intake , increased duration of television viewing and a sleep duration of <7 hours and >9 hours per night. The prevention is economical and easy at an early stage, with the change occurring in the form of lifestyle modifications at an individual level with increasing awareness.

Key Words: Body mass index, Obesity, Overweight

KEY MESSAGE

- There is a rising prevalence of overweight and obesity among the urban slum women.
- The causes of obesity are complex and the response needs to be multi-faceted.
- Governments have a central role to create an environment that empowers and encourages behavioural changes by individuals, families and communities, to make positive, life-enhancing decisions on healthy diets and patterns of physical activity.

INTRODUCTION

Obesity and overweight are creating a global epidemic [1].They are the risk factors for many non-communicable diseases. Rapidly changing diets and lifestyles are fueling the global obesity epidemic. Once being considered as a problem related to affluence, obesity is now growing fast in many developing countries [2]. In Asian populations, the health risks which are associated with overweight and obesity occur at lower levels of BMI than in North America or Europe [3],and now lower cutoff points for BMI are used to categorize overweight and obese conditions for the Asian populations [4]. According to the National Family Health Survey-3 (NFHS-3) in India, overweight and obesity are three times higher in urban areas than in rural areas and are more common among women [5]. The burden of the slum population and the magnitude of their health problems are on the rise. There is a rising prevalence of obesity among the slum population [6].There are not many studies on the prevalence of overweight and obesity in the urban slums of South India and so, this present study was carried out in an urban slum in Chennai.

MATERIALS AND METHODS

The present study was a community based, cross sectional study carried out in an urban slum in Chennai among women aged 20 years and above from June 2009–August 2009. Ethical clearance was obtained. From 10 zones of Chennai, zone five was randomly chosen by a lottery method. There were 66 slums in zone five, from among which one slum was randomly chosen by a lottery method and the slum was located in division 67 in zone five.

The sample size of 520 was calculated on the basis of a 15.6% prevalence rate of obesity among the urban slum women in North India [6]. Antenatal women were excluded from the study .

The selected slum had a total population of 9089. The total number of women aged 20 yrs and above was 3125 and the total number of households was 1958 (source – updated family register of the selected slum).

In order to select the 520 women who were aged 20 years and above, the number of households which had to be surveyed in the selected slum was =1958 × 520/3125 = 326 .

The households were sampled by a systematic random sampling method. The sampling interval was calculated as follows:

$$\text{Sampling interval} = \frac{\text{total number of households in selected slum}}{\text{number of households to be surveyed in the selected slum}} = 1958/326 = 6.$$

The houses in the slum were numbered. The first sample household was selected randomly by choosing a number (by a lottery method) within the sample interval. The next household was identified by adding the sampling interval with the first randomly chosen number. In the present study, the first randomly chosen number was 4, and the first household which was surveyed was house number 4. The second household was 4 + 6 = 10 i.e., the 10th household. The subsequent households were selected by the same method till the expected sample size was reached. Informed consent was obtained from the study subjects. A pre-designed and pre-tested questionnaire was used to record the information regarding the socio-demographic profile, diet pattern, frequency of weekly intake of vegetables and fruits, the duration of television viewing in a day and the duration of sleep at night of the study subjects. Socio-economic status was determined by the Modified Kuppusamy Classification Scale [7].

Anthropometric data regarding height and weight was also taken. The weight of the respondents was measured by using a portable weighing machine. The individual was requested to stand still on the platform of the weighing machine, with the body weight evenly distributed between both the feet. Light indoor clothing was allowed to be worn, but the footwear was removed when the weight was measured. The scale was zeroed before weighing and it was also calibrated regularly during the study. The height was measured by using a portable stadiometer. The persons whose height had to be measured, stood in an erect position without any footwear and they were also asked to put their feet together and to look straight. The measuring tip was lowered to the head and the height was measured .

The body mass index was calculated as weight (in kilograms) ÷ [height (in meters)]^2. The World Health Organisation (WHO) Asian Classification of BMI [4] [Table/Fig-1] was used to classify the study population.

The data entry was made in excel software in codes and the analysis was done by using the Statistical Package For Social Sciences (SPSS), version 11.5. The prevalence was expressed in percentage and the Chi square test was used to find the association with the factors.

RESULTS

In this study population, the prevalence of overweight (BMI ≥ 23) was 27.7% (95% CI 24.3–32.2) and the prevalence of obesity (BMI ≥ 25) was 19.8% (95% CI 16.5-23.6) [Table/Fig-2] .

Most of the overweight / obese women (42.7%) belonged to the age group of 30 to 39 years [Table /Fig-3]. 42.2% of the women with a higher secondary level of education and above and 29.3% of the illiterate women were overweight/obese. A highly significant difference was noted between educational status and overweight/obesity (p< 0.001) [Table/Fig-4] . As the socio-economic status increased, the prevalence of overweight/obesity was also found to increase and the difference was found to be statistically highly significant (p <0.001) [Table/Fig-5]. There was no significant association between overweight/obesity and factors like occupation, religion, marital status and the type of family [Table/Fig-6].

No significant association was noted between the prevalence of overweight/obesity and the dietary pattern of the participant as far as a vegetarian and a mixed diet was concerned (*p* > 0.05), but

Nutritional status	BMI (kg/m²)
Underweight	<18.5
Normal range	18.5–22.9
Overweight :	≥ 23
At risk	23–24.9
Obese I	25–29.9
Obese II	≥30

[Table/Fig-1]: WHO Asian classification

Nutritional status (BMI)	Number of Individuals	Percentage %
Underweight (<18.5)	98	18.8%
Normal range (18.5–22.9)	278	53.5%
Overweight: (≥ 23):		
At risk (23–24.9)	41	7.9%
Obese I (25–29.9)	65	12.5%
Obese II (≥30)	38	7.3%
Total	520	100%

[Table/Fig-2]: Prevalence of Overweight and Obesity

Age group	BMI (kg/m²) <23 n (%)	BMI (kg/m²) ≥23 (Over weight/ Obese) n (%)	Trend Chi-square value	p value
20 – 29 years	211 (77.3%)	62 (22.7%)	0.641	0.423
30 – 39 years	59 (57.3%)	44 (42.7%)		
40 – 49 years	65 (73.0%)	24 (26.9%)		
50 – 59 years	24 (72.7%)	9 (27.3%)		
60 years & above	17 (77.3%)	5 (22.7%)		
Total	376 (72.3%)	144 (27.7%)		

[Table/Fig-3]: Age and Overweight/Obesity

Educational status	BMI (kg/m²) <23 n (%)	BMI (kg/m²) ≥ 23 (Overweight/ Obese) n (%)	Trend Chi-square value	p value
Illiterate	87 (70.7%)	36 (29.3%)	41.56	<0.001
Primary school	71 (73.2%)	26 (26.8%)		
Middle school	85 (66.4%)	43 (33.6%)		
High school	107 (84.3%)	20 (15.7%)		
Higher secondary and above	26 (57.8%)	19 (42.2%)		
Total	376 (72.3%)	144 (27.7%)		

[Table/Fig-4]: Educational Status and Overweight/Obesity a significant difference was noted between the fruits intake and overweight/obesity (p = 0.005) [Table/Fig-7].

There was an increase in the prevalence of overweight/obesity with an increase in the duration of television viewing and the difference was found to be highly significant (p < 0.001) [Table/Fig-8]. The prevalence of overweight/obesity was 51.7%, 23.8% and 50% among those who had <7 hours, 7 to 9 hours and >9 hours of sleep per night respectively and the difference was found to be statistically significant (p=0.006) [Table/Fig-9].

Socio Economic Status	BMI (kg/m²)		Trend Chi-square value	p value
	<23 n (%)	≥23 (Over weight/ Obese) n (%)		
Upper Middle Lowermiddle Upperlower Lower	3 (42.9%) 79 (59.8%) 286 (76.9%) 8 (88.9%)	4 (57.1%) 53 (40.2%) 86 (23.1%) 1 (11.1%)	18.25	<0.001
Total	376 (72.3%)	144 (27.7%)		

[Table/Fig-5]: Socio Economic Status And Overweight/Obesity

Variable	BMI (kg/m²)		Chi-square	p value
	<23 n (%)	≥23 (Over weight/ Obese) n (%)		
Occupation				
Un skilled worker Semiskilled worker Skilled worker Homemaker Retired/old age dependant	90 (76.3%) 16 (66.7%) 13 (52%) 253 (73.3%) 4 (50.0%)	28 (23.7%) 8 (33.3%) 12 (48%) 92 (26.7%) 4 (50.0%)	8.62	0.071
Religion				
Hindu Muslim Christian	310 (70.8%) 22 (73.3%) 44 (84.6%)	128 (29.2%) 8 (26.7%) 8 (15.4%)	4.46	0.107
Marital status				
Married Unmarried Widow/Separated	311 (71.8%) 31 (77.5%) 34 (72.3%)	122 (28.2%) 9 (22.5%) 13 (27.7%)	0.589	0.745
Family type				
Nuclear Joint Living alone	294 (70.8%) 77 (77.8%) 5 (83.3%)	121 (29.2%) 22 (22.2%) 1 (16.7%)	2.288	0.319

[Table/Fig-6]: Occupation, Religion, Maritalstatus,Family Type and Overweight/Obesity

Characteristics	BMI (kg/m²)		Chi-square value	p value
	<23 n (%)	>23 (Overweight/ Obese) n (%)		
Diet pattern				
Vegetarian Mixed diet	68 (76.4%) 308 (71.5%)	21 (23.6%) 123 (28.5%)	0.900	0.343
Frequency of vegetables intake				
≥ 3 times / week <3 times / week	337 (72.2%) 39 (73.6%)	130 (27.8%) 14 (26.4%)	0.048	0.826
Frequency of fruits intake				
≥ 3 times / week < 3 times / week	55 (87.3%) 321 (70.2%)	8 (12.7%) 136 (29.8%)	8.05	0.005
Total	376 (72.3%)	144 (27.7%)		

[Table/Fig-7]: Diet and Overweight/Obesity

Hours of television viewing/ day	BMI (kg/m²)		Trend Chi-square value	p value
	<23 n (%)	≥23 (Over weight/ Obese) n (%)		
>4 2 – 4 <2	21 (44.7%) 183 (68.8%) 172 (83.1%)	26 (55.3%) 83 (31.2%) 35 (16.9%)	30.35	<0.001
Total	376 (72.3%)	144 (27.7%)		

[Table/Fig-8]: Television Viewing and Overweight/Obesity

Hours of sleep/ night	BMI (kg/m²)		Trend Chi square value	p value
	<23 n (%)	≥23 (Over weight/ Obese) n (%)		
<7 7–9 >9	28 (48.3%) 340 (76.2%) 8 (50.0%)	30 (51.7%) 106 (23.8%) 8 (50.0%)	7.59	0.006
Total	376 (72.3%)	144 (27.7%)		

[Table/Fig-9]: Duration of Sleep at Night and Overweight/Obesity

DISCUSSION

The study was carried out in an urban slum of Chennai, to find out the prevalence of overweight and obesity among women aged 20 years and above. The prevalence of overweight was 27.7% (95% CI 24.3–32.2) and the prevalence of obesity was 19.8% (95% CI 16.5–23.6) . This was higher than the prevalence of obesity which was estimated by Misra et al [6] in females in an urban slum population in North India, which was 15.6% .

The prevalence of overweight/obesity was highest (42.7%) in the age group between 30-39 years and there was no significant association between the prevalence of overweight/obesity and age. Misra et al [6] found that there was a significant increasing trend in the prevalence of obesity with advancing age.

42.2% of the women with a higher secondary level of education and above and 29.3% of the illiterate women were overweight// obese. This was similar to the NFHS-3 [5] where the prevalence of overweight/obesity was higher among women with 12 or more years of schooling than among those with no education. A highly significant difference was noted between educational status and overweight/obesity. Shukla et al [8] also found a positive association between education and BMI.

In the present study, as the socio-economic status of the women increased, the prevalence of overweight/obesity was also found to increase and the difference was found to be statistically highly significant. Similarly, in urban Chennai, Mohan et al [9] reported a 20% prevalence of overweight/obesity among men and women who were aged 20 years and above and those who belonged to the low socio-economic group, while the middle socio economic group had a higher prevalence of overweight/obesity (35%) during the 1996-97 study.

No significant association was found between overweight/obesity and factors like occupation, religion, marital status and the type of family.

In the present study, no significant association was noted between the prevalence of overweight/obesity and the dietary pattern. Vadera et al [10] also reported that though overweight people were more in the group which consumed a mixed diet than in one which was strictly vegetarian, the difference was not statistically significant.

It was observed that overweight/obesity was more prevalent among those who consumed fruits less frequently and the difference was found to be statistically significant, but no significant association was found between vegetable intake and overweight/obesity. Many studies have shown the inverse association between fruit intake and overweight [11]. In a study, the dietary patterns associated with a high intake of fruits and vegetables among Spanish adults were found to reduce the long-term risk of subsequent weight gain and obesity [12]. Ledikwe *et al.* (2006), in their study on US adults, found that persons with a high fruit and vegetable intake had the lowest prevalence of obesity [13]. Fruit consumption was found to have a significant negative relationship with the body weight status in all the age groups in men and women [14].

There was an increase in the prevalence of overweight/obesity with an increase in the duration of television viewing and the difference was found to be statistically highly significant . In a study conducted in North India, women who regularly watched television were found to be much more likely to be overweight and obese [15].

The prevalence of overweight/obesity was 51.7%, 23.8% and 50% among those who had <7 hours, 7 to 9 hours, and >9 hours of sleep per night respectively and the difference was found to statistically significant. Chronically reduced sleep times are associated with obesity [16]. Patel et al found that compared to those who slept for an average of 7–8 hours per night, a sleep duration of less than 5 hours was associated with a higher body mass index (BMI) [17].

CONCLUSION

There is a rising prevalence of overweight and obesity among the urban slum women. The prevalence of overweight and obesity was found to be higher among the slum women with inadequate fruit intake, increased duration of television viewing and a sleep duration of <7 hours and >9 hours per night. The prevention is economical and easy at an early stage with the change occurring in the form of lifestyle modifications at an individual level with increasing awareness.

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