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Original Research Article

An epidemiological cross-sectional study to assess the socio-demographic profile and to study the prevalence of overweight and obesity among adults in an urban slum of Mumbai

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ABSTRACT

Background: Obesity is perhaps the most prevalent form of malnutrition. As a chronic disease, prevalent in both developed and developing countries, and affecting both children and adults. In India due urbanization and modernization people are moving into urban centres and along with increasing wealth, concerns about an obesity epidemic in India are growing. The present study was carried out to assess the demographic distribution and prevalence of overweight and obesity in adults in an urban slum.
Methods: The cross sectional study includes 350 adult populations from the Shivaji Nagar (Govandi) urban slum of the Mumbai city in India and study was carried out over a period of one year from August 2014 to July 2015.
Results: Our study showed that most of subjects are in the age group of 38-57. Sex distribution was relatively equal with 44% males and 56% females. Majority of the population were Muslims. Majority of the subjects (50.6%) belong to class III, (26.9%). 32.3% subjects were obese and 8.6% were overweight according to BMI (basal metabolic index) while merely 6.6% were overweight according to WHR (waist to hip ratio). Thus BMI was found to be a better indicator than WHR for measuring obesity.
Conclusions: From the present study it was seen that age group of the subjects, socio economic class, and level of education had a significant relationship with BMI, whereas sex of the subjects had non-significant relationship with BMI.

Keywords: BMI, WHR, Demography, Prevalence

INTRODUCTION

The World Health Organization (WHO) defines overweight and obesity as "an abnormal or excessive accumulation of body fat, which may impair health".[1]

"Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems."

Obese individuals differ not only in the amount of excess fat that they store, but also in the regional distribution of fat within the body. The distribution of fat induced by the weight gain affects the risk associated with obesity, and the kind of disease that results. It is therefore useful to be able to distinguish between those at increased risk as a result of "abdominal fat distribution" or "android obesity" from those with the less serious "gynoid" fat distribution in which fat is more evenly distributed around the body.[2]

Obesity is perhaps the most prevalent form of malnutrition. As a chronic disease, prevalent in both developed and developing countries, and affecting both children and adults, it is so common that nowadays, it is replacing the more traditional public health concerns including under-nutrition. It is one of the most significant contributors of ill health. For industrialized countries, it has been suggested that such increase in body weight have been caused primarily by reduced levels of physical activity, rather than by the changes in food intake or other factors.[3]

It is a bitter irony that as developing countries continue their efforts to reduce hunger, some are also facing the opposing problem of obesity. It is extremely difficult to assess the size of the problem and compare the prevalence rates in different countries as no exact figures are available and also because the definitions of obesity are not standardized. However it has been estimated to affect 20-40% of the adults and 10-20% of children and adolescents in developed countries.[3]

WHO Global Health Advisory (GHO) data on overweight and obesity states that:[4]

1. In 2014, 39% of women and 38% of men aged 18 and over were overweight.
2. In 2014, 15% of women and 11% of men aged 18 and over were obese.
3. Mean BMI has risen in both men and women from 1975 through 2014.

Situation in India

As per NFHS 4 (2015-2016), Women who are overweight or obese (BMI ≥ 25.0 kg/m2) are 20.7% as compared to 12.6% in NFHS 3 (2005-2006) likewise Men who are overweight or obese (BMI≥25.0 kg/m2) are 18.6% as compared to 14.3% in NFHS 3 (2005-2006).[5]

In India urbanization and modernization has been associated with obesity.[6] With people moving into urban centers and increasing wealth, concerns about an obesity epidemic in India are growing. India is currently facing a "double burden" of disease, while we continue to deal with the problems of infectious disease and under-nutrition.[6]

Obesity has been traditionally considered as diseases of affluence. A wealth of data indicates that in Asian-Indian people abdominal obesity, insulin resistance, and glucose intolerance develop more often.[7] The obesity indices among migrant Asian Indians are significantly greater when compared with the native population and those living in India, particularly among women.[8]

Objectives

1. To assess the socio-demographic profile of adults in an urban slum.
2. To determine the prevalence of overweight and obesity among them.

METHODS

Study area

The present study was carried out in Shivaji Nagar (Govandi) urban slum area of Mumbai city. The study area is subdivided into 50 plots, each plot contains 180 houses.

Study population

The population consists of people who have migrated from different parts of India, mainly from Uttar Pradesh, Bihar, West Bengal, Madhya Pradesh, Andhra Pradesh and Tamil Nadu. They have migrated here in search of jobs and are now engaged in small scale industries like Zari work, Bag making, Mat weaving, Carpentry, tailoring etc. Most of the men are self-employed and women are house wives, maid servants or vegetable vendors. The study population was selected from all adults above 18 years of age.

Study design and study period

It was an epidemiological community-based cross-sectional study conducted during the period from August 2014 to July 2015.

Sample size calculation

Sample size was calculated by considering the prevalence of obesity and overweight in adult population. According to NFHS-3 data (2007) the prevalence of obesity and overweight in adult population in India was 34%, and the sample size has been calculated by formula $n=4pq/l^2$.[9] Where

n=sample size, p=prevalence of obesity (34%), q=100-p (66%), l= admissible error (15% of p)

So, n=4x34x66/5.1x5.1 = 345

So the sample size will be 350.

In the given urban slum there were 50 plots, each plot contains 180 houses. The plots were chosen by selecting every alternate plot i.e. 25 plots. So for the sample size of 350, 14 houses per plot were included in the study (350/25) and thus every 13th house with a random start was selected for enrolling the subjects. In case there was no eligible subject available in the selected house, the next consecutive house was surveyed for eligible subject. However, the next house was surveyed as per the pre-scheduled number. When there were more than one adult in the house, the youngest one was selected.

1. The subjects were interviewed by visiting house to house and study proforma was filled at their home.
2. Anthropometric and clinical examination like height, weight, hip and waist circumference, general and systemic examination was done at their house by portable equipments like weighing machine, BP apparatus, measuring tape etc. When there was no adequate privacy, they were asked to come to urban health center (hospital) for examination.
3. Approximately 45 minutes were required for examination; counselling and health education was provided to them.

Study method

Systematic Sampling with a random start

Inclusion criteria

Inclusion criteria were adults living in the study area; those residing in the study-area for more than 1 year; adults consenting to be a part of the study.

Exclusion criteria

Exclusion criteria were adults not present at the selected household at the time of visit for at least three visits.

Plan of analysis

The collected data was organized, tabulated and statistically analysed. For qualitative data, the number and percent distribution was calculated and chi-square ($\chi 2$) was used as a test of significance. For interpretation of results of tests of significance, significance was adopted at $p \leq 0.05$.

Stratification of data was done according to age i.e. 18-27, 28-37, 38-47, 48-57 and 58 and above.

RESULTS

In present study 44% subjects were male whereas 56% were female. 81.1% were from Muslims community and only 66 (18.9%) were from Hindu community. 69.7% subjects belonged to nuclear families whereas 30.3% belonged to joint families.

According to modified B.G. Prasad classification (2014) for socio economic status roughly half of them i.e. 50.6% belonged to class III, 19.7% belonged to class II, 26.8% subjects belonged to class IV and only 2.9% subjects belonged to class V, and there was no subject from class I (Table 1).[10]

Table 1: Distribution of socio demographic variables among subjects.

Socio demographic variables		n=350	Percentage (%)
Age in years	18-27	33	9.4
	28-37	37	10.6
	38-47	120	34.3
	48-57	102	29.1
	>57	58	16.6
Sex	M	154	44
	F	196	56
Education	Illiterate	67	19.2
	Primary	160	45.7
	Secondary	104	29.7
	Higher secondary	13	3.7
	Graduate	6	1.7
Religion	Hindu	66	18.9
	Muslim	284	81.1
Type of family	Nuclear	244	69.7
	Joint	106	30.3
Socio economic status (modified B.G. Prasad classification)	II	69	19.7
	III	177	50.6
	IV	94	26.8
	V	10	2.9

Of the 350 subjects enrolled in study 30 (8.6%) were obese, 113 (32.3%) were overweight according to BMI and 23 (6.6%) were found to be obese according to waist to hip ratio. (Table 2)

For assessing association with risk factors only BMI was utilized as it picked up more obese and overweight subjects. WHR had only two groups of obese and normal, thus masking the overweight subjects.

As the emphasis of the present study was on obesity, thus all the subjects having BMI in normal range were combined and considered as a single entity i.e. non-overweight.

Table 2: Prevalence of obesity and overweight in the study group.

Indicators of obesity		n=350	Percentage (%)
BMI	≥30 (Obese)	30	8.60
	25.0-29.9 (Overweight)	113	32.30
	18.5-24.9 (Not overweight)	207	59.10
Waist to hip ratio (WHR)	>0.9 in men and >0.8 in women (Obese)	23	6.60
	Normal	327	93.40

Table 3: Association between age and BMI.

Age in years		BMI			Total	P value and association
		≥30 (Obese)	25-29.9 (overweight)	18.5-24.9 (Not overweight)		
18-27	No.	02	13	18	33	0.005 Significant
	%	6	39.4	54.6	100	
28-37	No.	05	18	14	37	
	%	13.5	48.7	37.8	100	
38-47	No.	14	42	64	120	
	%	11.7	35.0	53.3	100	
48-57	No.	08	20	74	102	
	%	7.8	19.6	72.6	100	
>57	No.	01	20	37	58	
	%	1.7	34.5	63.8	100	
Total	No.	30	113	207	350	
	%	8.6	32.3	59.1	100	

Table 4: Association between sex and BMI.

Sex		BMI			Total	P value and association
		≥30 (obese)	25 - 29.9 (overweight)	18.5 - 24.9 (Not overweight)		
Male	No.	10	45	99	154	0.181 Not significant
	%	6.5	29.2	64.3	100	
Female	No.	20	68	108	196	
	%	10.2	34.7	55.1	100	
Total	No.	30	113	207	350	
	%	8.6	32.3	59.1	100	

Table 5: Association between their education and BMI.

Education		BMI			Total	P value and association
		≥30 (obese)	25-29.9 (overweight)	18.5-24.9 (Not overweight)		
Illiterate	No.	4	32	31	67	0.023 Significant
	%	6	47.8	46.2	100	
Primary	No.	18	43	99	160	
	%	11.2	26.9	61.9	100	
Secondary and above	No.	8	38	77	123	
	%	6.5	30.9	62.6	100	
Total	No.	30	113	207	350	
	%	8.6	32.3 1	59.1	100	

Table 6: Association between socio-economic class and BMI.

Socio-economic class		BMI			Total	P value and association
		≥30 (obese)	25-29.9 (overweight)	18.5-24.9 (Not overweight)		
Class II	**No.**	8	57	4	69	<0.001 Significant
	%	11.6	82.6	5.8	100	
Class III	**No.**	19	42	116	177	
	%	10.8	23.7	65.5	100	
Class IV	**No.**	3	13	78	94	
	%	3.2	13.8	83	100	
Class V	**No.**	0	1	9	10	
	%	0	10	90	100	
Total	**No.**	30	113	207	350	
	%	8.6	32.3	59.1	100	

Table 7: Association among subjects between waist to Hip ratio and BMI.

Waist to Hip ratio		BMI			Total	P value and association
		≥30 (obese)	25-29.9 (overweight)	18.5-24.9 (Not overweight)		
>0.9 for male and >0.8 for female (obese)	No.	18	5	0	23	<0.001 Significant
	%	78.3	21.7	0	100	
Normal	No.	12	108	207	327	
	%	3.7	33	63.3	100	
Total	No.	30	113	207	350	
	%	8.6	32.3	59.1	100	

As per the Table 3, obesity and overweight was more common in age group 28-37 and 38-47 and most of the obese and overweight subjects are in the age group 38-57 years i.e. 84. It shows there is a significant association between age of the subject and BMI.

As per Table 4, obesity and overweight is more or less equally distributed in males and females. There is no significant relationship between sex of the subject and BMI.

As per Table 5, most of the subjects have studied up to primary level and most of the obese and overweight subjects have studied up to primary level as well.

Association between level of education and BMI is significant.

The Table 6, shows most of the subjects belongs to class II, III and IV and there were no subjects belongs to class I.

Distribution of obesity and overweight was seen more in class II and III. The association between socio economic class and BMI was found to be significant.

As per Table 7, it was revealed that out of 23 subjects found to be obese according to waist hip ratio, 18 (78.3%) were found to be obese and 5 (21.7%) were overweight according to BMI. However, 12 (3.7%), classified as normal on waist hip ratio, were classified as obese based on BMI. Similarly 108 (33%), classified as normal based on waist hip ratio, were classified as overweight on BMI. This suggest BMI was a better indicator in picking up overweight subjects as these subjects were masked in the classification based on waist to hip ratio.

DISCUSSION

Socio-demographic distribution for our study shows that, out of 350 subjects who took part in the study, 154 (44%) were male and 196 (56%) were female. Thus, there was more or less equal representation of both sexes. Most of the respondents were Muslim i.e. 284 (81.1%) whereas only 66 (18.9%) were Hindu. NFHS III (National Family Health Survey) data is contrary to the study findings which mentioned that the given metropolitan slum has 70.6% of Hindus and 18.1% of Muslim population. Most of the subjects i.e. 244 (69.7%) belonged to nuclear families whereas 106 (30.3%) belonged to joint families. By modified B.G. Prasad classification (2014) for socio-economic status, roughly half of them i.e. 177 (50.6) belonged to class III, 69 (19.7%) belonged to class II, 94 (26.8%) subjects belonged to class IV, only 10 (2.9%) subjects belonged to class V, and there was no subject from class I.

Our study showed that, by using BMI, 8.6% and 32.3% subjects were obese and overweight respectively and

after using WHR, 6.6% and 93.4% were found to be obese and non –obese respectively. These numbers are similar to the findings in the study conducted on prevalence of overweight and obesity in 5 Indian cities, which showed that the overall prevalence of obesity was 6.8% and overweight 33.5%.[11] And also with a study on obesity and influence of dietary factors on the weight status of adult population in Jamnagar city of Gujarat which showed that the prevalence of overweight and obesity in the urban population was found to be 22.04% and 5.20% respectively.[12]

Our study showed that, obesity and overweight was more common in age group 38-47 and 48-57 years. Bulk of obesity i.e. 22 (73.3%) and overweight i.e. 62 (54.9%) subjects are in the age group of 38-57 years. There is a significant association between age of the subject and BMI. These figures had resemblance with one study conducted on adult population in Jamnagar city of Gujarat which showed that the prevalence of obesity rose with an increase in age up to 60 years.[12]

In our study obesity and overweight was more or less equally distributed in male and female. In all WHO regions women were more likely to be obese than men and the prevalence is more in female than males similar to the present study but the association here is statistically not significant.[13]

In our study most of the subjects had studied up to primary level and most of them were obese, whereas overweight prevalence was more in illiterate subjects. Association between level of education and BMI is significant**.** This association showed the resemblance with two studies, one is Association of educational level with risk of obesity and abdominal obesity in Iranian adults and second one, Educational inequality in the occurrence of abdominal obesity by Ronaldo.[14,15] Both the studies have shown that education level is inversely associated with general obesity in both sexes.

Our study also showed that the distribution of obesity and overweight was seen more in class II and III. The association between socio economic class and BMI was found to be significant. These findings are consistent with the study by Saurabh et al which also showed higher prevalence of obesity observed among individuals who were socioeconomically better off.[16]

In our study out of 23 subjects found to be obese according to waist hip ratio, 18 (78.3%) were obese and 5 (21.7%) were overweight as per BMI. However, 12 (3.7%) who were classified as normal on waist hip ratio were classified as obese based on BMI. Similarly 108 (33%) classified as normal based on waist hip ratio were classified as overweight on BMI. This suggests that BMI was a better indicator in picking up overweight subjects as these subjects were masked in the classification based on waist to hip ratio.

Limitations

There were some limitations encountered due to its being a cross-sectional study; the results we got here cannot be applied to the entire general population. As age and sex structure of the different urban slum areas were different thus it was difficult to apply these results to other urban slum areas.

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