

**Original Research Article**

An epidemiological cross-sectional study to determine the prevalence of overweight and obesity and its association with factors such as the hours spent in physical activity, dietary habits in an adults of Urban Slum of Mumbai

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Mobile: 09820480709, Email: ag_shenoy@yahoo.com**Abstract**

Background: Obesity is a complex health issue to address. Obesity results from a combination of causes and contributing factors, including individual factors such as behavior and genetics. Behaviors can include dietary patterns, physical activity, inactivity, medication use, and other exposures. Additional contributing factors in our society include the food and physical activity environment, education and skills, and food marketing and promotion.

Objective: To determine the prevalence of overweight and obesity and association of obesity and overweight with factors such as the hours spent in physical activity, dietary habits.

Methods: The cross sectional study includes 350 adult population from the urban slum of the Metropolitan 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 out of 350 subjects, 32.3 % subjects were overweight and 8.6 % were obese according to BMI. Majority i.e. 273 were non- vegetarian. Only 90 (25.7 %) subjects consume salads and 82 (23.4 %) excess calorie intake in meals. It also showed only 138 (39.4 %) are manual workers, 173 (49.4 %) used to do moderate work and only 39 (11.2 %) had sedentary working style. Only 34 (9.7 %) intentionally physically exercise.

Conclusion: the present study showed that there is a significant association between total calorie intake and BMI also significant association between total fat intake as well as total protein intake with BMI.

Keywords: BMI (Basal metabolic index).

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.”

Overweight and obesity are associated with increased risk of non-communicable diseases such as metabolic syndrome, high cholesterol, type 2 diabetes mellitus, high blood pressure, and cardiovascular disease.

Even as India battles malnutrition, the country has developed another nutritional problem—obesity. In past 10 years, the number of obese people has doubled in the country^[2]

India is following a trend of other developing countries that are steadily becoming more obese. In India urbanization and modernization has been associated with obesity.^[3]

Many of the obese individuals are asymptomatic. So, it is very important to detect such cases as soon as possible. This will immensely help in reducing the morbidity and mortality rate among the obese individuals. Since we do not know the extent of this problem, and nothing is being done to educate the masses about the correct dietary habits and the importance of living a physically active life, the popular saying, “the longer the belt, the shorter the life”^[4] could prove to be far too true. This study thus assessed the association of various dietary habits and physical activity with that of obesity and overweight.

Objectives

1. To determine the prevalence of overweight and obesity among adults in an urban slum.
2. To study the association of obesity and overweight with factors such as the hours spent in physical activity, dietary habits.

Methods

Study Area: The present study was carried out in an urban slum area of a Metropolitan city. The study area is subdivided into 50 plots, each plot contains 180 houses. The sanitation of the area is poor, with most families belonging to low socioeconomic status, residing in kutchha house. Health related issues are the most challenged situations in the community. There are various problems that have come up due to poor sanitation, water supply, sanitation and hygiene. Poverty, poor hygiene, unhealthy habits and lack of proper health education is also adding up to the cause of health problems. Men in this community are engaged mostly in the small scale unorganized

sectors which they inherit from their ancestors. Women are basically engaged in household work and very few in other works contributing economically towards their families. Poor status of women is the major cause of economic backwardness. The individuals in this area are engaged in various activities and business trades, important among which are zari-work and bag-making. The area has one urban health center, one health post under Municipal Corporation and about 30 general practitioners to address these issues.

Study Population: The population consists of people who have migrated from different parts of India. 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%,^[5] and the sample size has been calculated by formula $n=4pq/l^2$. Where

n = sample size, p =prevalence of obesity (34%)

q = 100- p (66%), l = admissible error (15% of p)

So, $n= 4 \times 34 \times 66 / 5.1 \times 5.1 = 345$

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.

Methodology

1. The subjects were interviewed by visiting house to house and study proforma was filled at their home.
2. 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

1. Adults living in the study area.
2. Those residing in the study-area for more than 1 year.
3. Adults consenting to be a part of the study.

Exclusion criteria

1. Adults not present at the selected household at the time of visit for at least three visits.

Plan of analysis

Data was analyzed by using appropriate statistical tests. Chi-square (χ^2) was used as a test of

significance. 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)^[6] 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. showed, of the 350 subjects enrolled in study 30 (8.6 %) were obese, 113 (32.3 %) were overweight according to BMI.

Table no. 1: Prevalence of obesity and overweight in the study group

Indicators of obesity	n=350	Percentage
BMI	≥ 30 (Obese)	30 8.6 %
	25.0-29.9 (Overweight)	113 32.3 %
	18.5-24.9 (Not overweight)	207 59.1 %

Table 2 showed that out of 350 subjects, majority i.e. 273 (78.0) were non- vegetarian. Most of them i.e. 274 (78.3 %) use palm oil for cooking purpose.

Table 2: Dietary habits among subjects

Dietary habits	n=350	Percentage
Eating habits	Non vegetarian	273 78.0 %
	Vegetarian	77 22.0 %
Type of cooking oil used at home	Mustard oil	20 5.7 %
	Groundnut oil	16 4.6 %
	Soya bean oil	40 11.4 %
	Palm oil	274 78.3 %
Salads in meals	Yes	90 25.7
	No	260 74.3
How often do you visit restaurant in a week?	At least one time	42 12.0 %
	Never	308 88.0 %

Figure 1 showed that only 82 (23.4 %) subjects show excess calorie intake whereas 54 (15.4%)

Only 90 (25.7 %) subjects used to consume salads in meals. 42 (12.0 %) subjects used to visit restaurant at least once in a week, rest i.e. 308 (88 %) never did.

and 74 (21.1 %) subjects show excess fat and protein intake respectively.

Figure 1: Dietary intake among subjects based on 24 hour dietary recall

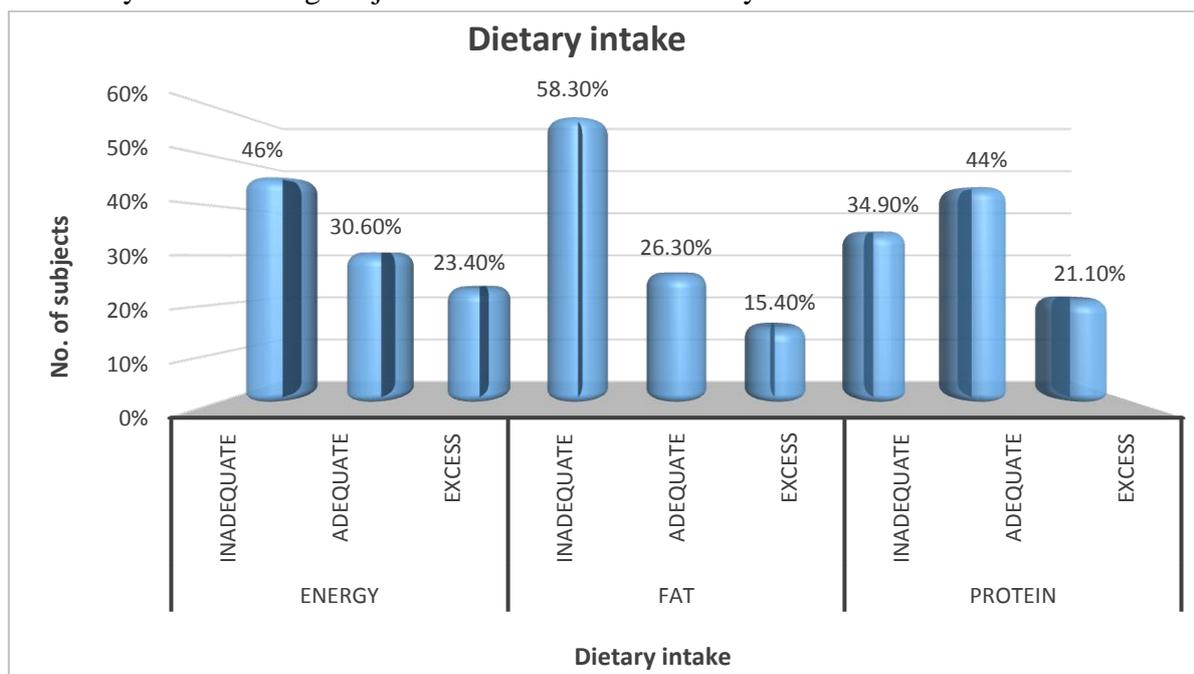


Table 3 showed that out of 350 subjects 138 (39.4 %) are manual workers, 173 (49.4 %) used to do moderate work and only 39 (11.2 %) have sedentary working style. Whereas only 34 (9.7 %) intentionally physically exercise and of them 19 (55.9 %) do brisk walking, 9 (26.9 %) subjects said that they do jogging as an exercise. Out of 34 subjects 25 (73.5 %) subjects regularly exercise

intentionally physically exercise and of them 19 (55.9 %) do brisk walking, 9 (26.9 %) subjects said that they do jogging as an exercise. Out of 34 subjects 25 (73.5 %) subjects regularly exercise

Table 3: Daily activities of subjects

Daily activities		Number	Percentage
Type of work	Manual	138	39.4 %
	Moderate	173	49.4 %
	Sedentary	39	11.2 %
	Total	350	100 %
Working hours	<8 hours	174	49.7 %
	>8 hours	176	50.3 %
	Total	350	100 %
Mode of transport	Walking	188	53.7 %
	Public transport	126	36.0 %
	Motorcycle	36	10.3 %
	Total	350	100 %
Intentionally physically exercise	Yes	34	9.7 %
	No	316	90.3 %
	Total	350	100 %
Form of exercise	Brisk walking	19	55.9 %
	Jogging	9	26.5 %
	Running	4	11.7 %
	Cycling	2	5.9 %
	Total	34	100 %
How often they exercise	Daily	25	73.5 %
	3 to 4 days a week	9	26.5 %
	Total	34	100 %

Table 4 showed 26 (9.5 %) non vegetarians were obese and 82 (30.1 %) were overweight, whereas 4 (5.2 %) and 31 (40.3 %) were obese and

overweight respectively among the vegetarians. There is no significant association between eating habit and BMI.

Table 4: Association between eating habit and BMI

Type of work		BMI			Total	P value and significance
		≥30 (obese)	25-29.9 (overweight)	18.5-24.9 (Not overweight)		
Manual	%	7.2 %	29.7 %	63.1 %	100 %	0.274 Not Significant
Moderate	%	9.2 %	31.2 %	59.6 %	100 %	
Sedentary	%	10.2 %	46.2 %	43.6 %	100 %	
Total	%	100 %	100 %	100 %	100 %	

Table 5 showed, out of 138 subject who do manual work, only 10 (7.2 %) were Obese and 41 (29.7 %) were overweight. Similarly out of 173 subjects who do moderate work, 16 (9.2 %) are obese and 54 (31.2 %) are overweight and

likewise out of 39 subjects who do sedentary work, 4 (10.2 %) were obese and 18 (46.2 %) were overweight. This association is not significant

Table 5: Association between types of work subjects do and BMI

Eating habits		BMI			Total	P value & Significance
		≥30 (obese)	25-29.9 (overweight)	18.5-24.9 (Not overweight)		
Non vegetarian	%	9.5	30.1	60.4	100	0.164 Not Significant
Vegetarian	%	5.2	40.3	54.5	100	
Total	%	8.6	32.3	59.1	100	

Table 6 showed that out of 34 subjects who exercise 3 (10 %) were obese and only 8 (7.8 %) were overweight. The association between the

physical exercise and the BMI was found to be non-significant.

Table 6: Association between Physical exercise and BMI

Physical exercise		BMI			Total	P value and significance
		≥30 (obese)	25-29.9 (overweight)	18.5-24.9 (Not overweight)		
Yes	%	10 %	7.1 %	11.1 %	9.7 %	0.507 Not Significant
No	%	90 %	92.9 %	88.9 %	90.3 %	
Total	%	100 %	100 %	100 %	100 %	

Table 7 showed that of 107 subject with adequate calorie intake 9 (8.4 %) were obese and 36 (33.6 %) were overweight whereas out of 82 subjects with excess calorie intake 17 (20.7 %) were obese and 54 (65.9 %) were overweight and only 4 (2.5 %) were obese and 23 (14.3 %) were overweight of 161 subjects with inadequate calorie intake. There is a significant association between total calorie intake and BMI.

were overweight. There is significant association between total fat intake and BMI.

Table also showed of 92 subjects with adequate fat intake, 12 (13 %) were obese and 53 (57.6 %) were overweight and of 54 subjects with excess fat intake 16 (29.6 %) were obese and 37 (68.5 %) were overweight.

It showed 122 people had inadequate protein intake, 17 (13.9 %) were obese and 69 (56.6 %) were overweight whereas out of 154 subjects with adequate protein intake, only 9 (5.9 %) are obese and 29 (18.8 %) are overweight .there is a significant association between protein intake and BMI.

Table 7: Association between dietary intake as per 24 hour recall and BMI

Dietary intake as per 24 hour recall			BMI			Total	Value p-value
			obese	overweight	Not overweight		
Calorie Intake	Inadequate	%	2.5	14.3 %	83.2 %	100 %	<0.001
	Adequate	%	8.4	33.6 %	58 %	100 %	
	Excess	%	20.7%	65.9 %	13.4 %	100 %	
Fats	Inadequate	%	1	11.3 %	87.7 %	100 %	<0.001
	Adequate	%	13	57.6 %	29.4 %	100 %	
	Excess	%	29.6 %	68.5 %	1.9 %	100 %	
Proteins	Inadequate	%	13.9 %	56.6 %	29.5 %	100 %	<0.001
	Adequate	%	5.9 %	18.8 %	75.3 %	100 %	
	Excess	%	5.4 %	20.3 %	74.3 %	100 %	

Discussion

In our study 30 (8.6 %) subjects were found to be obese, 113 (32.3 %) were found to be overweight as per BMI. These findings are consistent with the study conducted on prevalence of overweight and obesity in 5 Indian cities by Singh RB et al. which showed that the overall prevalence of obesity was 6.8% and overweight 33.5%.^[140]

In present study a vast majority i.e. 273 (78.0%) of the subjects were non-vegetarians, 274 (78.3 %) subjects used Palm oil for cooking purposes as it is very cheap but it has the disadvantage of having high amount of saturated fats. Only 90 (25.7 %) subjects used to consume salad in their meals, because according to them eating salad is just a loss of money as it does not provide any energy and nutrition.

In present study association among subjects between eating habits and BMI is not significant. This may be because majority of the subjects i.e. 78 % have non vegetarian dietary habits and most of them eat only red meat like beef and used to cook it with lot of oil, especially palm oil and only 22 % were vegetarian.

In this study it was seen that more of the sedentary workers had their BMI more than 25. According to American heart association sedentary jobs increases the risk of overweight and obesity^[8] but in present study this association is not significant, may be because less number of subjects had sedentary jobs.

Regular exercise appears crucial in the prevention of weight gain and successful maintenance of weight loss, and in the fostering of cardiovascular

health.^[9] Habitual moderate physical activity may be beneficial in preventing excess accumulation of fat. But the association between physical exercise and BMI in present the study was found to be non-significant, may be because very few subjects were doing exercise.

In this study, in spite of inadequate calorie intake 27 (16.8 %) subjects had their BMI 25 and above, this may be because majority of population consume red meat in their diet as it is very cheap and easily available and they usually cook it with lot of oil, secondly very few of them used to do physical exercise regularly and type of work they do and working hours may be the contributory factors, so there are multiple factors responsible for obesity to occur in addition to calorie intake and here there is a significant association between total calorie intake and BMI. About fat intake excess the fat intake more are the subjects obese and overweight, there is a significant association between total fat intake and BMI and about protein intake, inadequate protein intake is associated with obese and overweight and this association is also found to be significant.

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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Conflict of interest: None

Ethical approval: The study was approved by the Institutional Ethics Committee of T.N. Medical College, Mumbai

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