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An Epidemiological Study on Obesity and Its Determinants among Urban Slum Women of Rajkot City, Gujarat

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ABSTRACT

Background: Every year at least 2.8 million adults die due to overweight or obesity. Most of the world's population lives in countries where overweight and obesity kills more people than underweight. In informal settlements like slums, NCDs are at particular risk of going undetected by formal health registries until presentation in a late stage of disease or death. NCDs among women have major health challenges.

Objectives: To assess prevalence, determine factors responsible for Obesity.

Methods: This is a cross sectional study conducted among 405 slum women of age 35 years or more in Rajkot city. Interview and anthropometric measurements like Height and weight were measured for all participants.

Results: Total 93 (22.96%) women were diagnosed to be obese and 119 (29.38%) women were pre obese in present study. There was a statistically significant association between socio-economic classification (p=0.050), eating fat rich diet (p=0.004), walking (p=0.000), stress (p=0.033), parental history (p=0.000), sibling history (p=0.002) and obesity.

Conclusions: Studied population has high prevalence of overweight and Obesity.

Keywords: Obesity, Slum, Women

INTRODUCTION

The epidemiological transition has shown the shift of diseases from communicable to non-communicable diseases, such as cardiovascular disease, hypertension, diabetes, cancer and obesity. [1]

In 2014, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 600 million adults were obese. Overall, about 13% of the world's adult population (11% of men and 15% of women) were obese in 2014. In 2014, 39% of adults aged 18 years and over (38% of men and 40% of women) were overweight. The worldwide prevalence of obesity more than doubled between 1980 and 2014. Every year at least 2.8 million adults die due to overweight or obesity. In addition to this fact, 44% of the diabetes burden, 23 % of the ischemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity. [2]

WHO have identified that most NCDs are the result of four particular lifestyle related behavioural risk factors like tobacco use, physical inactivity, unhealthy diet, and the harmful use of alcohol that lead to four key metabolic/physiological changes e.g., raised blood pressure (BP), overweight/obesity, raised blood glucose and raised cholesterol levels. [3]

Slums are characterized by urbanization, a lack of urban planning, overcrowding, and exclusion from social, health, and other services. In informal settlements, chronic non- communicable diseases are at particular risk of going undetected by formal health registries until presentation in a late stage of

disease or death; this has been attributed to a lack of access to health services and inadequate or inappropriate care when services are sought. [4] This pattern of health-seeking behaviour typically results in an undue human cost and financial burden on existing health systems, underscoring the need for non-communicable disease (NCD) data to advise health interventions targeting the urban poor. [5]

NCDs are the leading cause of death for women worldwide. They cause 65% of all female deaths, amounting to 18 million deaths each year. In many low- and middle-income countries, the low socioeconomic, legal and political status of girls and women is increasing their exposure and vulnerability to the risk factors of NCDs. Women living with NCDs experience specific challenges in accessing cost-effective prevention, early detection, diagnosis, treatment and care of NCDs, particularly in developing countries. Women slum dwellers are particularly vulnerable to negative health outcomes. [2] As the life expectancy of females in India has increased from 23.96 years in1901 to 66.90 in 2011, that has led to increase in health problems of aging and rise of non-communicable diseases amongst women which represents one of the major health challenges. [6] Hence this study was carried out to assess the prevalence of Obesity and their determinants among urban slum women.

MATERIAL AND METHODS

This study was conducted in Rajkot city which is divided into 3 zones, central, east and west in which there are total 18 wards. Study was conducted during June 2016 to March 2017. Assuming 50% of slum women to be having Obesity, thus considering prevalence to be 50%, with 95% confidence interval and 10% allowable error, sample size of 400 was obtained with the formula of $N= 4pq/l^2$. So it was decided to study 405 slum women covering 135 from each of the three zones.

The study was conducted in one slum area from each zone making a total of three slum areas. One slum area was randomly selected from each of the three zones from the list given by Corporation authority. After surveying the boundaries of the slum area, each slum area was divided into three subareas and 45 women from each of these subareas, making 135 from each slum, were included in the study. For each subarea, first household was selected randomly from the centre of that area. Nearest door to the first house was taken as second house till the desired sample for that area was achieved. An enquiry regarding an eligible participant was made and included as designated participant in the study.

Women of age 35 years or more were included in the study while pregnant women, women unable to give satisfactory interview and/or unfit for examination were excluded from the study.

Data collection

Pre-tested and semi-structured questionnaire was used. The questionnaire was filled by personal interview in local language after taking written consent. Privacy was ensured and individual results were kept confidential.

Questionnaire included information regarding participant's socio-demographic profile like age, occupation, income and questions regarding risk factors. Anthropometric measurements like Height and weight were done.

Height was measured in centimetres by non-stretchable measuring tape with 0.5 cm accuracy. Weight was recorded in kilograms on digital weighing machine (Omron). Throughout the study same weighing machine was used. BMI was calculated from the height and weight measurement. WHO classification is used to classify subjects into Normal, Pre-obese and Obese categories. [7] .It is defined as the weight in kilograms divided by the square of the height in meters (kg/m2). Modified Prasad classification was used to categorise participants from class I to V based on their socioeconomic status.

The data entry was done in Microsoft Office Excel 2007 and analysis was done by using Microsoft Office Excel 2007 and & Epi info Software (Version 7.1.5.2) from CDC, Atlanta, U.S.A. Chi square test was used to know the association of Obesity with various factors. Ethical clearance was taken from the Institutional Ethical Committee (IEC), P.D.U. Government Medical College, Rajkot to conduct the study.

RESULT

It is found from Table 1 that 163 (40.25%) women were having normal BMI while 119 (29.38%) women were pre obese. Total 93 (22.96%) women were obese. According to obesity class, 66 (16.29%) women were obese class I; 19 (4.69%) women were obese class II and 8 (1.98%) women were obese class III. The paradox of obesity in the poverty of slums can be explained by the various associated factors like unhealthy nutritional practices, lack of physical exercise and unemployment. Table 2 shows that mean age of study participants was 49 years and mean BMI was 26.09.

It is evident from Table 3 that Proportion of obesity is highest, 38 (26.76%) among women having belonging to class III followed by 15 (23.07%) who

belonged to class I and II socio-economic classification. The relationship between socio-economic classification and obesity is found to be statistically significant (p = 0.050). A very high proportion of women, 23 (39.65%) were found to be obese among those who were eating fat rich diet and the relationship between eating fat rich diet and obesity is statistically highly significant (p = 0.004).

Among women who walked one kilometer or less, a very high proportion, 84 (25.30%) were found to be obese. There is statistically high significant association between walking and obesity (p = 0.000). Among women who had perceived stress, a very high proportion, 36 (26.28%) were found to be obese. So, there is statistically significant association between stress and obesity (p = 0.033).

Proportion of obesity was highest, 18 (60%) among women having positive parental history indicating statistically high significant association between parental history and obesity (p= 0.000). Among women having positive sibling history,6 (66.67%) women were obese. So, there is statistically high significant association between sibling history and obesity (p = 0.002).

There is no relationship between other variables like age group (p = 0.982) and occupation (p = 0.720) with obesity in present study.

Table 1: Distribution of participants according to their nutritional status (Body Mass Index)

Nutritional status (BMI)*	Partcipants (n=405) (%)
Underweight (<18.5)	30 (7.41)
Normal (18.5-24.9)	163 (40.25)
Pre-obese (25.0-29.9)	119 (29.38)
Obese class-I (30.0-34.9)	66 (16.29)
Obese class-II (35.0-39.9)	19 (4.69)
Obese class-III (≥40.0)	8 (1.98)

Table 2: Descriptive statistics of various variables (N=405)

Variable	Mean	SD	Minimum	Maximum
Age (in years)	49	12.55	35	90
BMI	26.09	5.59	13.27	35.21

Table 3: Association of obesity with various variables on applying chi square test

Variables	Status of Obesity				Test of significance
	Normal (n=193) %)	Pre-Obese (n=119) (%)	Obese (n=93) (%)	Total (n=405) (%)	
Age groups					
35-50	102 (47.22)	64 (29.63)	50 (23.15)	216 (53.33)	$\chi2 = 0.035$; df = 2; p = 0.982
≥50	91 (48.15)	55 (29.10)	43 (22.75)	189 (46.67)	
Occupation					
Housewife	122 (49.39)	68 (27.53)	57 (23.08)	247 (60.99)	$\chi2 = 2.081$; df = 4; p = 0.720
Working	33 (41.25)	28 (35.00)	19 (23.75)	80 (19.75)	
Retired	38 (48.72)	23 (29.49)	17 (21.79)	78 (19.26)	
Socio economic class					
I/II	24 (36.92)	26 (40.00)	15 (23.07)	65 (16.05)	$\chi2 = 9.07$; df = 4; p = 0.050
III	73 (51.41)	31 (21.83)	38 (26.76)	142 (35.06)	
IV/V	96 (48.48)	62 (31.31)	40 (20.21)	198 (48.89)	
Eating fat rich diet					
Yes	21 (36.20)	14 (24.14)	23 (39.65)	58 (14.32)	$\chi2 = 10.709$; df = 2; p = 0.004
No	172 (49.57)	105 (30.26)	70 (20.17)	347 (85.68)	
Walking (In kilometers)					
≤1	144 (43.37)	104 (31.33)	84 (25.30)	332 (81.98)	$\chi2 = 13.834$; df = 2; p = 0.000
>1	49 (67.12)	15 (20.55)	9 (12.33)	73 (18.02)	
Stress (Subjective)					
Yes	72 (52.55)	29 (21.17)	36 (26.28)	137 (33.83)	$\chi2 = 6.789$; df = 2; p = 0.033
No	121 (45.15)	90 (33.58)	57 (21.27)	268 (66.17)	
Parental history (N=385)					
Yes	7 (23.33)	5 (16.67)	18 (60.00)	30 (14.03)	$\chi2 = 24.378$; df = 2; p = 0.000
No	172 (48.45)	111 (31.27)	72 (20.28)	355 (85.97)	
Total	179 (46.49)	116 (30.13)	90 (23.38)	385 (100.00)	
Sibling history (N=387)					
Yes	0 (0.00)	3 (33.33)	6 (66.67)	9 (2.33)	$\chi2 = 11.782$; df = 2; p = 0.002
No	180 (47.62)	114 (30.16)	84 (22.22)	378 (97.67)	
Total	180 (46.51)	117 (30.23)	90 (23.26)	387 (100.00)	

DISCUSSION

The present cross sectional study was conducted to know the prevalence and association between Obesity and various risk factors.

In a study which was done by Dr. Tage Taka et al (2014) [1] among women in a slum of Mumbai showed that 32.5% had a BMI within the range 25.0 – 29.9 and were classified as overweight. While

20.6%, 6.3% and 0.8% of the respondents had a higher BMI and were classified as obese class I, obese class II, and obese class III respectively. The overall prevalence of overweight and obesity was found to be 59.4%. Only 32.5% respondents belonged to normal BMI category.

Another study conducted by Anuradha R (2011) [8] among women in urban slums of Chennai showed the prevalence of overweight (BMI > 23) 27.7% and the prevalence of obesity (BMI > 25) to be 19.8% according to WHO Asian classification. These findings are in line with those of present study.

Patel ML, Deonandan R. [9] studied factors associated with body mass index among slum dwelling women in India and showed in an analysis of the 2005–06 Indian National Family Health Survey that the increasing BMI of slum dwelling women is most significantly and positively associated with frequency of watching television; having diabetes; increasing age and higher wealth index which basically points to sedentary lifestyle in Obesity.

In a study by Nagarkar AM et al (2018) [10] among middle aged slum women, about 60% had body mass index above normal, 39% were overweight, and 21.3% obese which is in line with the present study. The percentage of obesity increased with increasing age as contrast to present study may be because of higher age group of 45-64 in the study. Obesity was significantly associated with working status (P = 0.042) and walking (P = 0.001). In this study, walking was found to be associated with Obesity but not with occupation.

Girdhar S et al (2016) [11] showed the prevalence of overweight and obesity to be 12.7% and 29.6% respectively. Obesity was found to be more common among upper socio-economic strata. The difference in findings with respect to our study is likely due to inclusion of non slum women also in the study.

Kadarkar KS et al (2016) [12] conducted a study in urban slum of Mumbai by using WHO STEP wise approach among people in age group of 25-64 years. The prevalence of overweight or obesity was found to be 41.8%. The higher prevalence is likely as the study subjects includes wider age group range and also includes both men and women.

Raj JP et al (2015) [13] showed Prevalence of overweight 36.5% which is quite higher and prevalence of obesity 12.4% is lower compared to present study. The study was conducted among individuals above 18 years which may be the likely cause for the difference in findings.

A study conducted by Gouda J et al (2014) [14] showed that prevalence of overweight and obesity is higher among urban women than their rural counterparts in India. More than 23% of women in the urban area are either overweight or obese compared to only 7% of women in rural areas. It was observed that women at later age (35+ years) were more overweight or obese than the reference group in 15-24 years. This study equally opined that fraction of overweight and obesity increases with age, education, and parity of the women.

Study done by Dr. Tage Taka et al [1] showed a relationship between employment status and obesity that was statistically significant (p=0.027). The unemployed respondents had a higher incidence of obesity. The relationship between obesity and the physical exercise statistically was also significant (p=0.027). In our study, there is no relationship found between type of occupation and Obesity.

A Misra et al [15] showed a significantly increasing trend in the prevalence of obesity in females as defined by BMI, with advancing age (P<0.05); the highest being in the 51 years and above age group (22.2%). The subjects were stratified according to the age groups: 18–30, 31–50 and 51 years and above. BMI is significantly associated with age in present study but increasing trend is not seen which may be due to different categorization of age groups i.e. 35-50, 51-75 and >75.

Study done by Anuradha R [7] showed highly significant difference between educational status and overweight/obesity (p< 0.001). As the socioeconomic status increased the prevalence of overweight/obesity was also increased and the difference was found to be statistically highly significant (p <0.001). There was no significant association between overweight/obesity and factors like occupation, religion, marital status and the type of family. Though the figures may vary in various studies conducted in different parts of India but the prevalence is strikingly high. This attributes to considerable shift in diet, like eating fat rich diet including junk food, lack of physical activity, sedentary and stressful lifestyle. Such condition is likely in economically deprived population in slums. Unfortunately, only few comparable studies are available in literature conducted on Obesity in urban slums.

Slum dwelling is considered to be a predictor of poor social and health outcomes. Slum environments have recently been shown to increase the risk for morbidities such as diabetes or obesity which are characteristic risk factors of developing non-infectious diseases .They can be slow to develop but they typically require long-term care which creates a large health care burden. [16]

Alone Asia accounts for about 60 percent of urban slum residents in the world. Globally, the slum population is set to grow at the rate of 27 million per year during the period 2000-2020.[17] Cities will account for virtually all future world population

growth, which is expected to peak at about ten billion in 2050. By 2030, the developing world will be 56% urban.[18]

The urban poor is more likely than their rich counterparts to live in poor physical environments with substandard, overcrowded housing, inadequate water supply, sanitation and waste disposal and higher levels of air pollution and other hazardous substances. Their incomes are generally low and insecure, they own few assets, lack access to resources and are thus less able to cope with adverse events, including ill health. [19]

Little is known about the spectrum and burden of disease morbidity in urban slums of the world. The lack of such data hampers adequate health care resource allocation and provision of appropriate disease prevention services. Concerted effort is urgently needed to assess health burden and determinants of disease morbidity among slum residents at the community level. [20]

CONCLUSION

The findings of present study contrast with the earlier belief that Obesity is the disease of affluent. A high prevalence of Obesity is found in women residing in slum areas. A significant association between Obesity and socio-economic classification (p=0.050), eating fat rich diet (p=0.004), walking (p=0.000), stress (p=0.033), parental history (p=0.000), sibling history (p=0.002) has been found. There is an urgent need to conduct similar researches in other cities and states to find the exact burden of this silent disease so that required measures can be adopted. Regular screening programme with an objective of early identification of Obesity among these women should be conducted. Health education and regular follow up of such cases can prevent disease development.

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