IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 6 Ver. 13 (June. 2018), PP 10-14
www.iosrjournals.org

A Study on Overweight and Obesity among Rural Adult Populationin West Bengal

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Abstract:
Background: *Overweight and Obesity is a major public health problem in recent times across the globe. It is related to an increased risk of morbidity and mortality as well as reduced life expectancy.*
Objectives:*1) To study the prevalence of overweight and obesity among rural adult population.2) To find-out the correlates of overweight and obesity among them.*
Methods:*A community-based, cross-sectional study was carried out in a block of West Bengal. Data were collected from 945 adult people(>18 years) with the help of a pre-designed,pre-tested, semi-structured questionnaire during one year. Study subjects were selected by Simple Random Sampling method from the available voter-list.*
Results: *Out of 945 study subjects, overall prevalence of overweight was 11.6%(male-9.6%, female-14.3%) and obesity was 9.3%(male-8.1%, female-10.9%). Logistic regression revealedfemale gender [adjusted Odds ratio(OR)=1.764,95% Confidence interval(CI)=1.267- 2.456,P=0.005] and associated morbidities like hypertension,diabetes,osteoarthritis,IHD,stroke[adjusted OR=2.014,95% CI=1.433-2.830,P=0.000] were found to be risk factors for overweight and obesity. On the contrary, physical activity[adjusted OR=0.508, 95% CI=0.365-0.706, P=0.000] was a protective factor.*
Conclusion: *It is obvious from this study that prevalence of overweight and obesity was more among females than males, and it is possible to decrease this proportion by increasing physical activity and decreasing co-morbidities.*

Keywords:*Cross-sectional study, Correlates,Overweight and Obesity, Prevalence, Rural adult*

Date of Submission: 12-06-2018 Date Of Acceptance: 27-06-2018

I. Introduction

Overweight and obesity is a major public health problem worldwide today. It is related to an increased risk of morbidity and mortality as well as reduced life expectancy. Over the last two decades of previous century, disease profile are rapidly transforming throughout the world drawing the attention to medical profession and policy makers alike. It is particularly true in low and middle income countries that form the major bulk of global population[1]. The emerging epidemics of chronic diseases like overweight and obesity, cardiovascular disease and diabetes stand on the brink of a global crisis. Among these entities obesity has become a serious public health concern because of its morbidity, mortality and dramatic increase in health care cost related to it[2]. Overweight or obesity increases the risk of diseases like coronary heart disease, ischemic stroke, type 2 diabetes mellitus, breast and other common cancers. Obesity is increasing at a rapid pace throughout the world. It is estimated that at present, more than 300 million people are obese and over 1.5 billion are overweight worldwide[3]. Between 1980 and 2014, prevalence of obesity has become more than double worldwide. About 13% of world's adult population were obese, and 39% were overweight in 2014[4]. According to World Health Organization(WHO), severely overweight adults are expected to be doubled by 2025[5].Prevalence of obesity has increased in few years in both urban and rural India. According to National Family Health Survey (NFHS)-III data, overweight and obesity prevalence is 8-12% among rural adults in India[6]. In West Bengal, its prevalence is 6.1% in males and 12.5% in females[7].

Although overweight and obesity is a major public health concern in developing countries in recent period, there is still lack of information regarding prevalence, influence of dietary factors, physical activity and assessment of obesity among rural population. In this context, the present study was conducted to determine the

prevalence of overweight and obesity among rural population and to find out correlates of overweight and obesity among them.

II. Materials and Methods

2.1 Study Design and Population

A community based cross-sectional study was carried out in Amdanga Community Development (CD) Block in North 24 Parganas district of West Bengal, the rural field practice area of Department of Community Medicine, R.G.Kar Medical College and Hospital, Kolkata in India. People 18 years and above residing in the CD Block were eligible for the study. Those who were bed ridden sick persons, diagnosed cases of psychiatric illness, having endocrinal morbidity except diabetes mellitus, pregnant or lactating women in the first 6 months, and were not found in their residences even after 3 consecutive visits during the study period or not willing to take part in the study were excluded. Data were collected using a pre-designed, pre-tested, semi structured schedule after obtaining written informed consent from each of the study participants. The study period extended from September 2015 to August 2016.

2.2 Sample size estimation and Sampling technique

The sample size was estimated using the formula $n=z^2pq/l^2$. Considering the prevalence of overweight and obesity among males in West Bengal as 6.1%based on the data from National Family Health Survey (NFHS) III[7] and with a relative precision of 25% of prevalence within 95% confidence interval, the effective sample size was estimated to be 940. Considering feasibility, 10% of total 81 villages of the CD block i.e 8.1 ~ 9 villages were selected by simple random sampling (SRS) method. Selection of study participants from each village was done using probability proportionate to size (PPS) method following which the final sample size became 945 after adjusting the decimals found in the calculations. The individuals from each village were then selected by SRS method with the help of voter list of the respective village.

2.3 Ethical consideration

The study protocol was submitted to the Institutional Ethics Committee of R.G.Kar Medical College and Hospital, Kolkata, West Bengal after attaining clearance from Institutional Review Board of the same institution. The study was commenced only after getting approval from the Institutional Ethics Committee.

2.4 Statistical Analysis

All the data were inserted in the Microsoft Excel and the analysis was done using SPSS version 16 (SPSS Inc, Chicago, IL). Univariate analysis was done using means and proportions for continuous and categorical variables respectively. Multivariate analysis was done using logistic regression and adjusted odds ratio (AOR) was calculated.

III. Results

3.1 Socio-demographic data

In the present study, out of the total 945 study subjects, 56.4% were males and 43.6% were females. Mean age of the sampled population was 42 (±14.62) years. The proportion of studied population who were unmarried/widow was 20.9% and 79.1% were married. Majority of study subjects belong to lower middle (56%) and lower (25.8%) class. Most of them (81.8%) were literates and engaged in agriculture works. Nearly one-third of the sampled population was in the category of sedentary workers.

3.2 Prevalence of overweight and obesity

Out of 945 respondents, overall prevalence of overweight was 110 (11.6%) and obesity was 88 (9.3%). The prevalence for both overweight and obesity was higher in females than males (25.2% vs. 17.7%, [p=0.005]) [Table1]. It was highest among 18-35 years age group (35.4%)and then gradually decreased with theadvancement ofage[Fig.1]. Among all obese subjects, centrally obese were 13.4% (males-10.9%, females-16.7%, [p=0.01]).

Table 1: Distribution of study subjects according to BMI (WHO Asia- pacific guideline).

BMI	Male(%)	Female(%)	Total(%)
Underweight(<18.5)	54(10.1)	50(12.1)	104(11)
Normal(18.5-22.99)	385(72.2)	258(62.6)	643(68)
Overweight(23-24.99)	51(9.6)	59(14.3)	110(11.6)

Obese(≥25)	**43(8.1)**	**45(10.9)**	**88(9.3)**
Total	**533(100)**	**412(100)**	**945(100)**

χ^2 =10.545, df=3, p=0.014

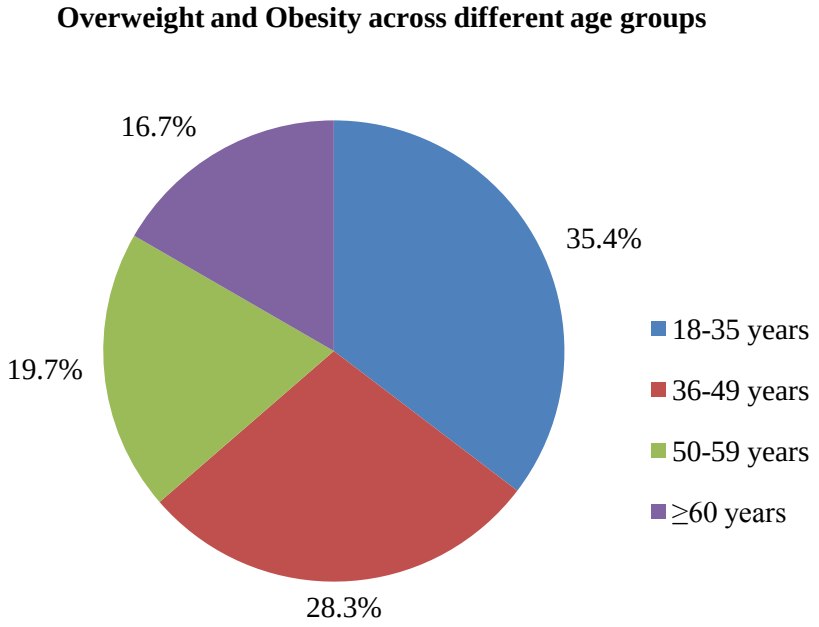

Figure 1: Pie Diagram showing prevalence of overweight and obesity among various age groups

3.3 Correlates of overweight and obesity

Almost half of total overweight and obese subjects had sedentary lifestyle. Most of the overweight and obese subjects were literate (80.8%) with a habit of junk food consumption for <2 per week (75.8%). Difference in the prevalence of overweight and obesity for religion was found to be statistically significant (among Hindu-25.8% and Muslim-18.8% [*p*=0.025]). Majority of overweight and obese (77.3%) were married and belong to the lower middle class (50.5%). Among the associated morbidities like hypertension,diabetesosteoarthritis,IHD,Stroke, prevalence of hypertension was highest (29.3%) among those overweight and obese subjects. Univariate analysis revealed that the significant risk factors associated with overweight and obesity were female gender with crude Odds ratio(OR) of 1.577 (95% Confidence Interval(CI): 1.151-2.160), sedentary lifestyle with crude OR of 1.835 (95% CI: 1.437-2.343), presence of associated morbidities with crude OR of 2.084 (95% CI: 1.518-2.860), lower middle and lower socio-economic class with crude OR of 1.492 (95% CI: 1.019-2.184)[Table 2].However, after doing multiple logistic regression, female gender [adjusted OR=1.764, 95% CI: 1.267- 2.456, *p*=0.005] and associated morbidities [adjusted OR=2.014,95% CI: 1.433-2.830, *p*=0.000] were found to be risk factors for overweight and obesity. On the contrary, physical activity [adjusted OR=0.508, 95% CI: 0.365-0.706, *p*=0.000] was a protective factor [Table 3].

Table 2: Univariate analysis of risk factors associated with overweight and obesity

Risk factors		**Present (%)**	**Absent (%)**	**OR#**	**95% CI$**	p **value**
Age	**<50 yrs**	**126(63.6)**	**524(70.1)**	**1.343**	**0.966-1.866**	**0.079**
	>50 yrs	**72(36.4)**	**223(29.9)**			
Gender	**Male**	**94(47.5)**	**439(58.8)**	**1.577**	**1.151-2.160**	**0.004**
	Female	**104(52.5)**	**308(41.2)**			
Literacy	**Literate**	**160(80.8)**	**613(82.1)**	**1.086**	**0.617-1.373**	**0.165**
	Illiterate	**38(19.2)**	**134(17.9)**			
Junk Food consumption	**Yes**	**48(24.2)**	**205(27.4)**	**0.818**	**0.589-1.216**	**0.500**
	No	**150(75.8)**	**542(72.6)**			

Type of Diet	**Vegetarian**	**11(5.6)**	**30(4)**	**1.406**	**0.692-2.858**	**0.344**
	Non-vegetarian	**187(94.4)**	**717(96)**			
Religion	**Hindu**	**74(37.4)**	**213(28.5)**	**1.368**	**1.063-0.929**	**1.761**
	Muslim	**124(62.6)**	**534(71.5)**			
Physical Activity	**Sedentary**	**98(49.5)**	**231(30.9)**	**1.835**	**1.437-2.343**	**0.000**
	Non-sedentary	**100(50.5)**	**516(69.1)**			
Associated Morbidity*	**Present**	**108(54.5)**	**273(36.5)**	**2.084**	**1.518-2.860**	**0.000**
	Absent	**90(45.5)**	**474(63.5)**			
Socio-Economic status**	**Class I,II & III**	**46(23.2)**	**126(16.9)**	**1.492**	**1.019-2.184**	**0.039**
	Class IV & V	**152(76.8)**	**621(83.1)**			

#OR = Odds Ratio; $CI = Confidence Interval

*Associated Morbidity —Presence of Hypertension, Diabetes, Osteoarthritis, IHD, Stroke.

**Socioeconomic status — Class I= Upper, Class II= Upper middle, Class III= Middle, Class IV=Lower middle, Class V= Lower (According to modified B.G. Prasad's classification).

Table 3: Risk factors of overweight and obesity by multiple logistic regression analysis

Risk factors	**Adjusted OR#**	**95% CI$**	**p value**
Gender	**1.764**	**1.267 - 2.456**	**0.005**
Type of Family	**1.149**	**0.776 – 1.701**	**0.489**
Socio-economic status	**0.724**	**0.939 – 2.120**	**0.120**
Physical activity	**0.508**	**0.365 – 0.706**	**0.000**
Associated Morbidity	**2.014**	**1.433 – 2.830**	**0.000**

#OR = Odds Ratio; $CI = Confidence Interval

IV. Discussion

The present cross-sectional study was carried out in a rural area of Amdanga CD Block, among 945 adults aged 48 years and above to determine the prevalence of overweight and obesity, and its correlates amongst rural adults. In this study, we found the prevalence of overweight and obesity among rural adults were 9.3% and 11.6% respectively. Overweight and obesity were measured according to Asia-Pacific guidelines. A study conducted by Deshmukh PR et al[8] following the same Asia-Pacific guidelines for overweight and obesity, found the prevalence of overweight and obesity as 6.5% and 5.13% respectively which is lesser than our study. Also a study conducted by Rao CR et al[9] (according to WHO BMI classification) reported that prevalence of overweight was 21.4% and obesity was 6.6%. In some studies like study conducted by Anita P Naidu et al[10] and N Gopinath et al[11] , the prevalence rate was more in females compared to males which supports the findings of our study. N Gopinath et al in their study observed that, the prevalence of obesity was 33.4% in females and 21.3% in males. Also Anita P Naidu et al found that there were 60% obese female and 40% obese male in their study. But the same study by N Gopinath et al, and the study conducted by SunithaAsthana et al[12] contradict with our findings of decreasing trend in prevalence of obesity after the age of 35 years. Both the study found a direct relationship between age and prevalence of obesity. In this present study, it was observed that prevalence of central/abdominal obesity was higher among females compared to males. Similar observation was found by the study conducted by Rao CR et al, Kaur P et al[13]. In our study, we also found overweight and obesity is directly related to sedentary lifestyle and decreased physical activity. Study by N Gopinath et al and Anita P Naidu et al also observed high prevalence of obesity among sedentary activity group. A similar cross-sectional study conducted by Chow C, Cardona M et al[14](2007) in two villages of Andhra Pradesh reported high prevalence of obesity among physically inactive group. In our study majority of overweight and obese (77.3%) were married and belong to the lower middle class.. This findings are similar to the studies conducted by JaydipSen et al[15] in the district of Jalpaiguri, West Bengal and by Rao CR et al in coastal Southern Karnataka respectively. In a study conducted by Zhang X et al[16], multivariable logistic regression revealed female gender as one of the risk factor of obesity and moderate physical activity as a protective factor. The similar findings we have got from our study by doing multiple logistic regression.. In this present study, dietary survey was excluded due to the practical problems of acceptability and feasibility of conducting diet survey in the community although there is a relationship between the dietary practices of the population and overweight & obesity.

V. Conclusion

It can be concluded that obesity has no longer remained a problem of only upper socio-economic class but lower middle class also has dragged into the so called "problem of affluent". It is obvious from this study that prevalence of overweight and obesity was more among females than males. Overweight and obesity is commonly seen as a complex multifactorial condition resulting from a lifestyle that promotes a positive energy balance, and it is possible to decrease this proportion by increasing physical activity and decreasing co-morbidities. It can be seen as the first wave of a defined cluster of non-communicable diseases now observed in both developed and developing countries. This has been called the "New world syndrome" and is responsible for disproportionately high levels of morbidity and mortality in newly industrialized countries like India. Thus, obesity is viewed by health professionals from a medical perspective. It also needs to be organized as symptoms of a much larger global social problem.

VI. Acknowledgements

The authors would like to thank Prof.(Dr.) Saibendu Kumar Lahiri, Dr. Abhisek Paul. The authors also express their deep thanks to all the persons who participated in the study.

Financial support and Sponsorship
Nil

Conflicts of Interest
There are no conflicts of interest.

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Jadab Chandra Sardar "A Study on Overweight and Obesity among Rural Adult Population in West Bengal."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 3, 2018, pp 10-14.