

Distribution and Determinants of Obesity among Adults Attending Health Facilities of a Medical College in Ujjain

Kirti Deshpande¹, Archit Khardenavis^{1*}

Introduction: Obesity is a significant risk factor for various serious health conditions, including hypertension, diabetes, cardiovascular diseases, and cancers. With increasing socio-economic status and life expectancy in India, the prevalence of obesity is on the rise, contributing to the burden of lifestyle-related disorders. This study aims to investigate the distribution and determinants of obesity among apparently healthy adults attending health facilities in a medical college located in a rural area adjoining Ujjain city.

Methods: A cross-sectional study was conducted within the field practice area of the Department of Community Medicine at R.D. Gardi Medical College. A sample size of 354 participants was determined and data was collected through structured interviews covering socio-demographic information, medical history, anthropometric measurements, and determinants of health. Body mass index (BMI) was computed and participants were classified based on established cut-off points for Asian Indians.

Results: Out of 310 fully completed questionnaires, 47.4% of participants were overweight or obese. Age was significantly associated with obesity, with prevalence increasing from 34.1% in the 18 to 30 age group to 75% in participants over 60 years. Urban residents had a higher prevalence of obesity compared to rural residents (53.8 vs 44.1%). Higher educational status, overeating between meals, and watching television while eating was significantly associated with obesity. Physical inactivity was more prevalent among overweight or obese participants (59.7 vs 26.3%).

Conclusion: The study finds the need for tailored interventions to combat obesity, especially among females, older individuals, urban residents, and those with higher education. Addressing lifestyle factors such as overeating and sedentary behavior is essential in the battle against obesity and associated chronic diseases.

Introduction

Obesity is a well-recognized risk factor for many serious health conditions like hypertension, diabetes mellitus, cancers, cardiovascular diseases, and stroke. In addition, overweight and obesity lead to many physical, mental, and social consequences. With improvements in the socio-economic condition of families and increased life expectancy, the burden of obesity is on rise in India and will add to the burden of lifestyle diseases.¹ The prevalence of obesity in India is in the range of 11.8 to 36.3%.^{2,3} It is estimated that the prevalence of overweight will be more than double and the prevalence of obesity will be more than triple by the year 2040.¹

The burden of overweight and obesity in India is variable according to gender, age, geographic area,

ethnicity, socioeconomic status, and cultural differences. The NFHS-5 data reveals that 23% of women and 22.1% of men are overweight as per BMI criterion and the prevalence of abdominal obesity is around 40% in women and 12% in men using waist circumference as a criterion. This indicates that abdominal obesity among women is quite high. Obesity is found to be more prevalent in urban areas and adults tend to be more obese than the younger ones. It is found to be less prevalent in states of Jharkhand (23.9%) and Madhya Pradesh (24.9%) which are relatively less developed.⁴ Even though Madhya Pradesh is a less developed state but within the state of Madhya Pradesh some areas are socio-economically well-developed such as Indore and Ujjain Districts in the Malwa region. This region is popular for its delicacies and people in this area are known for their food-loving nature as they

Access this article online

Website:

www.cijmr.com

DOI:

10.58999/cijmr.v2i03.146

Keywords:

Body mass index,
Obesity, Overweight

Department of Community Medicine, Ruxmaniben Deepchand Gardi Medical College, Ujjain, Madhya Pradesh, India.

Correspondence to: Archit Khardenavis, Department of Community Medicine, Ruxmaniben Deepchand Gardi Medical College, Ujjain, Madhya Pradesh, India. E-mail: sk.archit@gmail.com

Submitted: 07/11/2023

Revision: 14/11/2023

Accepted: 02/12/2023

Published: 21/12/2023

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How to cite this article: Deshpande K, Khardenavis A. Distribution and Determinants of Obesity among Adults Attending Health Facilities of a Medical College in Ujjain. Central India Journal of Medical Research. 2023;2(3):17-21.

enjoy frequent outings and eating. This behavior makes them more prone for gaining weight and obesity. Given the evolving landscape of obesity, a focused study into its distribution and determinants assumes paramount importance. The present study was planned to study distribution and factors determining obesity among apparently healthy adults attending health facilities of a medical college located in a rural area adjoining Ujjain city. By elucidating the intricate interplay of socio-demographic, lifestyle, and regional influences on obesity, this study seeks to furnish a robust foundation for targeted interventions, policy formulation, and the advancement of public health strategies.

Materials and Methods

Study design

The current study employed a cross-sectional design

Study area

The study was conducted within the field practice area of the Department of Community Medicine at R.D. Gardi Medical College, encompassing both urban and rural populations served by the Urban Health Training Centre (UHTC), Rural Health Training Centre (RHTC), and Health Communication Centre of C.R. Gardi Hospital.

Sample selection

To determine the sample size, calculations were based on a prevalence of 30%.⁴ With a precision of 5 at a 95% confidence level, the estimated sample size was 354. All the adults visiting the health facility centers of the medical college were approached as per convenience and data collection was continued until the predetermined sample size was achieved.

Data collection and analysis

The data was collected by interns assigned to the field practice area of the Department of Community Medicine during their rotations at various health centers affiliated with the medical college. Data collection was carried out through structured interviews utilizing a pre-designed questionnaire. This questionnaire encompassed a wide array of variables, including socio-demographic information (age, gender, education, occupation, income, etc.), medical history (diabetes, hypertension, cardiac ailments, other illnesses), anthropometric measurements (height, weight, waist circumference, hip circumference), and determinants of health (dietary habits, physical activity levels, substance use, fasting practices).

Upon collection, the data underwent meticulous scrutiny to ensure completeness, address any missing values, and rectify discrepancies. Subsequently, it was digitally entered into a computer system to establish a final database for subsequent analysis. A total of 310 questionnaires that were fully and accurately completed were selected for inclusion in the final analysis.

For the assessment of overweight and obesity, Body Mass Index (BMI) was computed using the formula: weight in kilograms divided by the square of height in meters. BMI values were classified using established cut-off points of ≥ 23 for overweight and ≥ 25 for obesity, in accordance with revised consensus guidelines tailored for Asian Indians.

Ethical considerations

Informed consent was obtained from all participants prior to their inclusion in the study. Furthermore, ethical approval for the study was secured from the Institutional Ethics Committee of R.D. Gardi Medical College, Ujjain vide letter no. 05/2023 dated 06/07/23 affirming the adherence to ethical standards in research conduct.

Results

The mean age of study participants was 37.24 ± 14.8 years. Table 1 shows the distribution of the study participants. Out of the total 310 study participants 140 (45.2%) were males and 170 (54.8%) were females. The majority 204 (65.8%) were from rural areas. 135 (43.5%) belonged to the lower and lower middle class, 105 (33.9%) from the middle class and 70 (22.6%) from the upper and upper middle class according to the modified B.G Prasad classification. The majority 227 (73.2%) were educated below high school. The study found that 76 (24.5%) subjects were sedentary workers, 71 (22.9%) were heavy physical workers and the rest 163 (52.6%) were doing moderate physical work. As per the BMI values 147 (47.4%) subjects were overweight or obese. More than half 181 (58.4%) admitted eating between regular meals, 150 (48.4%) reported watching Television while eating. The majority 214 (69%) participants were never or occasionally practiced fasting. The study found that only 114 (36.8%) were doing regular physical exercise.

Table 2 shows the distribution of obesity according to various determinants. The proportion of obesity was slightly higher among females than males (48.8 vs 45.7%; $X^2 = 0.298$, $p = 0.585$) however the difference was not significant. Distribution of obesity according to age shows that obesity rises in proportion to the rising age, 34.1% in the age group 18 to 30 years, 47.6% in the age group 30 to

Table 1: Distribution of study participants according to characteristics

Characteristics	Number	Percentage
Gender		
Female	170	54.8
Male	140	45.2
Age Group		
18-30 years	132	42.6
30-45 years	103	33.2
45-60 years	55	17.7
>60 years	20	6.5
Locality		
Rural	204	65.8
Urban	106	34.2
Socio-Economic Status		
Lower/lower middle	135	43.5
Middle	105	33.9
Upper/upper middle	70	22.6
Education		
<High school	227	73.2
≥High school	83	26.8
Eating between meals		
No	129	41.6
Yes	181	58.4
Watching TV while eating		
No	160	51.6
Yes	150	48.4
Regular physical activity		
No	196	63.2
Yes	114	36.8

45, 69.1% in the age group 45 to 60, and 75% among the participants more than 60 years of age. This difference was found statistically significant ($X^2=25.868$, $p=0.000$). Obesity was prevalent more among urban residents as compared to rural residents but the difference was insignificant (53.8 vs 44.1%; $X^2=2.608$, $p=0.106$). According to the socioeconomic status, obesity was less prevalent in lower and lower middle class as compared to the middle class and upper class (40 vs 52.4% and 54.3%; $X^2=5.341$, $p=0.069$) and the difference was not statistically significant. A significant association was found between educational status and obesity. Participants with higher educational status were more obese as compared to less educated (61.4% vs 42.3%, $x^2=8.944$, $p=0.003$). As anticipated, those eating between meals were more likely to be overweight and obese (61.9% vs 27.1%, $X^2=36.471$, $p=0.000$) and this was highly significant statistically. Watching TV while eating was identified as a significant determinant of obesity in the study participants as 56% of those watching TV while eating were obese as compared to others and

this was significantly associated ($X^2=8.582$, $p=0.003$). Overweight and obesity were more common among those not doing regular physical exercise (59.7 vs 26.3%, $X^2=32.206$, $p=0.000$). Fasting was not found associated with obesity in the present study as obesity was equally distributed among those doing regular fasting and those who never or occasionally fast.

Discussion

The continuous rise in the prevalence of overweight and obesity in Indians is reported by various national-level studies.^{2,3} Within the country variation in the burden of obesity has shown that obesity is determined by a wide range of risk factors including age, gender, ethnicity, genetic risk factors, underlying diseases, medications, socio-economic status, dietary habits, urbanization and mechanization, excessive exposure to social media, excessive use of electronic gadgets, sedentary lifestyle and lack of regular physical activity. The present study was carried out to find out the distribution and determinants of obesity among the apparently healthy individuals visiting the health facilities of a medical college in Ujjain. The study found that 47.4% of the study participants were either overweight or obese with slightly higher prevalence among women (48 vs 45%). Most of the studies have reported a higher prevalence of obesity among women in India.^{2,4} Evidence suggests that gender is an important risk factor for developing obesity and female gender is associated with twice the risk of being obese and thus a gender-sensitive approach is required to explore obesity.⁵

Distribution of obesity according to age shows that obesity rises in proportion to the rising age, 34.1% in age group 18 to 30 years, 47.6% in the age group 30 to 45, 69.1% in the age group 45 to 60 and 75% among the participants more than 60 years of age. This difference was found highly significant statistically in the present study. Analysis of NFHS-5 survey data has also reported a rising prevalence of obesity with age for both males and females and a study on a nationally representative sample in India has also found that obesity increases with age.^{4,5} With increasing age, fat consumption and metabolism change due to a complex interaction of multiple biological, environmental and lifestyle risk factors and this leads to excessive deposition of fats causing obesity in older age. Age and gender are non-modifiable risk factors for obesity. Women and those with older age should be targeted for awareness campaigns to limit the burden of obesity.^{6,7}

Table 2: Determinants of overweight and obesity

Determinants	N	Overweight/obese		X ² value	p-value
		N	%		
Gender					
Female	170	83	48.8	0.298	0.585
Male	140	64	45.7		
Age Group			34.1		
18–30 years	132	45	34.1	25.868	0.000*
30–45 years	103	49	47.6		
45–60 years	55	38	69.1		
>60 years	20	15	75.0		
Locality					
Rural	204	90	44.1	2.608	0.106
Urban	106	57	53.8		
SES					
Lower/lower middle	135	54	40	5.341	0.069
Middle	105	55	52.4		
Upper/upper middle	70	38	54.3		
Education					
Less than high school	227	96	42.3	8.944	0.003*
More than high school	83	51	61.4		
Eating between meals					
No	129	35	27.1	36.471	0.000*
Yes	181	112	61.9		
Watching TV while eating					
No	160	63	39.4	8.582	0.003*
Yes	150	84	56.0		
Regular physical activity					
No	196	117	59.7	32.206	0.000*
Yes	114	30	26.3		

*Statistically significant at $p < 0.05$

In the present study majority of those from urban areas were overweight or obese (53.8 vs 44.1%). The prevalence of obesity in India ranges from 8 to 38% in the rural population and from 13 to 50% in the urban population.^{4,6,8} Obesity is more prevalent in urban areas as the urban lifestyle makes people more sedentary and consume a high-fat or high-calorie diet. The present study found a significant association of educational status and obesity those with higher educational status were more overweight or obese. A study of secondary data comparing NFHS-3 and 4 data reported an association of higher educational status with obesity.⁹ The present study identified a significant association of those eating regular meals being overweight or obese and watching television while eating is also a lifestyle risk factor for obesity. Nearly 90% of Indians who are not doing

regular exercise and watching television for long hours is common in all age groups and thus physical inactivity is a well-identified risk factor for obesity.¹⁰ The present study found that overall, 36.8% of participants reported regular physical activity. This study found a significant association of physical inactivity with overweight and obesity, as a higher proportion of participants not doing regular physical exercise were overweight or obese (59.7 vs 26.3%).

Conclusion

The present study revealed that obesity is more prevalent among females, older age, urban residents, those educated above high school, affluent class, over-eating, watching television while eating and those not doing regular physical exercise. Obesity was significantly

associated with age, education, eating between regular meals, watching television while eating and not doing regular physical exercise. Preventing obesity is essential for the prevention of chronic health conditions including life-threatening non-communicable diseases. With multifactorial etiology, a complex interaction of determinants and multiple health consequences, obesity continues to rise in rural and urban areas of the country. Determinants of obesity may be modifiable or non-modifiable and both need to be explored in local populations and controlled through specifically designed interventions.

Limitations

While the study provides valuable insights into the distribution and determinants of obesity among apparently healthy adults in a specific region, it is important to acknowledge some limitations. The present study was conducted in a specific region, which may not be fully representative of the population. Apart from that, the study used convenient sampling, which may introduce selection bias.

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