Journal of Pioneering Medical Sciences
Received: October 02, 2025 | Accepted: January 12, 2026 | Published: March 05, 2026
Volume 15, Issue 02, Pages 56-61

DOI https://doi.org/10.47310/jpms2026150207

A Cross-Sectional Study to Determine the Prevalence of Obesity and Associated Health Problems Among Adults in Selected Urban Areas of Thiruvallur District, India

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Abstract: **Background:** Obesity is a complex multifactorial chronic disease characterized by excessive accumulation of body fat leading to increased risk of multiple health conditions. **Aim:** This study aims to determine the prevalence of obesity and associated health problems among adults residing in selected urban areas of Thiruvallur District, India, considering the lifestyle and cultural context of urban Indian populations. **Methods:** This cross-sectional study included 150 adults selected through simple random sampling. Ethical approval was obtained prior to the study. BMI was calculated using standard procedures, and associated health problems were assessed using structured tools. **Results:** Among the participants, 40.0% had normal BMI, 26.7% were overweight, and 23.3% were obese. Only 10.0% were underweight. Diabetes (13.3%), hypertension (16.7%), joint pain/osteoarthritis (10.0%), high cholesterol (8.0%), and sleep apnea (3.3%) were reported, with significantly higher prevalence among obese individuals. **Conclusion:** Adult obesity can be effectively reduced through structured lifestyle interventions, dietary modification, and community-based health education programs implemented by public health nurses and primary care providers.

Key Words: Obesity, Prevalence, Health problems, Urban Adults

INTRODUCTION

Obesity is an important public health problem in its weight implications. According to the World Health Organization (WHO), obesity is a BMI of 30 or greater, a widely used means of measuring body weight in relation to body height. However, throughout various demographics, obesity has been increasing at an alarming rate and has been associated with increased morbidity and mortality triggered by non-communicable diseases (NCD's) like type 2 diabetes, cardiovascular diseases, and certain cancers [1, 2]. Out of the urban population of the North India nearly 70 percent exhibited abdominal obesity which as strong correlate on metabolic syndrome and cardiovascular risks [2]. Obesity is an extremely serious, disease and its consequences to health are many and complex. Many health conditions linked to excessive fatness, such as hypertension, type 2 diabetes and cardiovascular diseases are risk factors [3]. Like in Tamil Nadu, urban populations are increasing in obesity related health issues too, and require urgent public health response [4]. Dietary and lifestyle factors aren't the only aspects of obesity, though. Body image and perceptions of health are influenced culture in urban environments which help determine individual behavior related to diet and exercise [5]. Additionally, changes in social perception of body image and health can affect antecedently described individual attempts at regulating diet and exercise, making it important to pay attention the cultural aspects in obesity prevention. But there are essential components for addressing the obesity epidemic too: educational programs designed to change perceptions of body weight, encourage healthier lifestyle choices [6]. Obesity is a complex public health problem for which prevention and management must be multifaceted [7]. To develop effective public health strategies in order to understand the epidemiology of obesity

is important through its prevalence, associated health risks, and socioeconomics determinants. This study aims to determine the prevalence of obesity and the associated health problems among adults in selected urban areas.

METHODS

This cross-sectional descriptive study was conducted in selected urban areas of Thiruvallur district, Tamil Nadu, India, over a period from April 2024 to June 2024. A total of 150 adults aged 18 years to 59 years were selected using a simple random sampling technique. Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study (002/03/2024/IEC/SMCH).

Inclusion Criteria

- Adults aged 18–59 years
- Permanent residents of the selected area
- Individuals willing to participate and who provided written informed consent

Exclusion Criteria

- Pregnant women
- Individuals with deformities preventing accurate height/weight measurement
- Critically ill patients

Sample Size Calculation

The sample size was calculated using the formula. n= (Zα/2+Zβ) 2. p. (1-p) d2. Where Zα/2=1.96 (corresponding to a 95% confidence level), Zβ = 0.84 (for 80% statistical power), p = 0.15 (assumed prevalence of obesity), and d = 0.082 (margin of error). Using these values, the required sample size was calculated to be 150.

Study Tools and Data Collection

This cross-sectional study, data was collected at a single point in time using two primary tools: a demographic questionnaire and a BMI assessment tool. The demographic questionnaire included variables such as age group, gender, education level, income level, marital status, employment status, physical activity level, smoking status, and alcohol consumption. The BMI tool involved measuring height and weight to calculate Body Mass Index (BMI), which was then used to classify participants according to WHO obesity categories. Data collection procedure: Data for this cross-sectional study was collected using a demographic questionnaire and a BMI assessment tool. Trained investigators conducted face-to-face interviews to record participants' details on variables such as age group, gender, education level, income, marital and employment status, physical activity, smoking, and alcohol use. Height and weight were measured using a stadiometer and digital scale, respectively, and BMI was calculated using the formula: BMI = weight (kg) / height² (m²). Participants were then classified according to WHO BMI categories.

Statistical Analysis

The data were analyzed using SPSS version 26, and the results were presented in terms of frequency and percentage. Descriptive statistics were calculated for categorical variables, and the distributions of the variables were summarized to understand the socio-demographic profile and health status of the study participants.

RESULTS

Demographic Variables

A total of 56.7 percent of the sample were between 30-49 years, of which the majority of participants in the study. There were more females (53.3%) than males. Regarding education, most people had attained secondary (33.3%) or higher secondary education (30%) and almost half fell in the middle-income group (₹10,000-₹50,000/month). Most were married (60%) and full time employed (53.3%). Over one third of participants reported a sedentary lifestyle (40%), and 60% of them had never smoked (60%) or consumed alcohol (46.7%). This overview describes the socio demographic profile of study population and may help to understand health behaviors and risks (Table, Figure- 1).

Prevalence of Obesity

The prevalence of obesity among the participants is shown in Table 2 according to their Body Mass Index (BMI). 40.0% of participants had BMI within the normal weight range (18.5–24.9 kg/m²), whereas 26.7% of participants were considered to be at an overweight (BMI 25.0–29.9 kg/m²). Of these subjects, 13.3 % were as Obese Class I (BMI 30.0 - 34.9 kg/m²), 6.7 % were as Obese Class II (BMI 35.0 - 39.9 kg/m²), and 3.3 % were as Obese Class III (BMI ≥40.0 kg/m²). Only 10.0% of the participants were underweight according to BMI < 18.5 kg/m². These findings support a finding on the prevalence of excess body weight in the sample, for nearly half of the sample (49.7%) is recorded as overweight or obese in Figure 2.

Associated Health Problems with Obesity

The prevalence of health problems associated with obesity among study participants is shown in Table 3. A total sample prevalence of 34.3% for obesity, and 13.3% diabetes. Overall, 16.7% presented with hypertension and 42.9% among the obese. The participants had joint pain (10.0%), or osteoarthritis (28.6%) among them was obese. Overall, rates for cardiovascular disease, sleep apnea, high cholesterol and respiratory issues were less than 3.3 to 8.0%. However, these health issues were more common among obese individuals: 22.9 percent had cardiovascular disease, 11.4 percent had sleep apnea, 25.7 percent had high cholesterol and 14.3 percent had respiratory problems in Figure 3. This finding whether obesity is a disease deserves to be taken very seriously and address through obesity because of the increased risk of various health problems among obese persons.

The pie chart illustrates the percentage distribution of key variables collected in the study, including age groups, gender, education level, income level, marital status,

Table 1: Frequency and Percentage of Socio-Demographic Variables

Demographic Variable	Categories	Frequency (n)	Percentage
Age Group	18-29 years	30	20.0
	30-39 years	45	30.0
	40-49 years	40	26.7
	50-59 years	35	23.3
Gender	Male	70	46.7
	Female	80	53.3
Education Level	No formal education	10	6.7
	Primary school	25	16.7
	Secondary school	50	33.3
	Higher secondary	45	30.0
	Graduate and above	20	13.3
Income Level	Low (< ₹10,000/month)	40	26.7
	Middle (₹10,000-₹50,000)	70	46.7
	High (> ₹50,000/month)	40	26.7
Marital Status	Single	40	26.7
	Married	90	60.0
	Widowed/Divorced	20	13.3
Employment Status	Unemployed	30	20.0
	Employed (Full-time)	80	53.3
	Employed (Part-time)	20	13.3
	Retired	15	10.0
	Student	5	3.3
Physical Activity Level	Sedentary	60	40.0
	Moderate activity	55	36.7
	Active	35	23.3
Smoking Status	Never smoked	90	60.0
	Former smoker	20	13.3
	Current smoker	40	26.7
Alcohol Consumption	Non-drinker	70	46.7
	Occasional drinker	50	33.3
	Regular drinker	30	20.0

Table 2: Prevalence of Obesity among the Adults

BMI Category	BMI Range (kg/m²)	Frequency (n)	Percentage
Underweight	< 18.5	15	10.0
Normal Weight	18.5 - 24.9	60	40.0
Overweight	25.0 - 29.9	40	26.7
Obese (Class I)	30.0 - 34.9	20	13.3
Obese (Class II)	35.0 - 39.9	10	6.7
Obese (Class III)	≥ 40.0	5	3.3

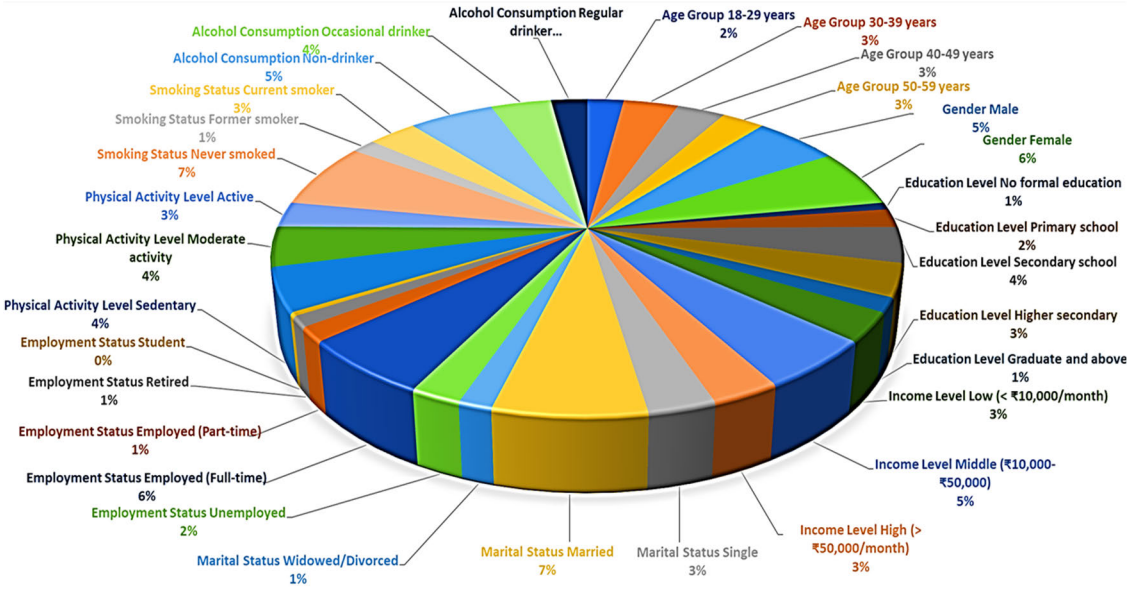

Figure 1: Distribution of Socio-Demographic and Lifestyle Characteristics of Study Participants

Table 3: Associated Health Problems with Obesity among the Adults

Health Problem	Frequency (n)	Percentage	Among Obese Individuals (n = 35)	Percentage Among Obese
Diabetes	20	13.3	12	34.3
Hypertension	25	16.7	15	42.9
Cardiovascular Disease	10	6.7	8	22.9
Joint Pain/Osteoarthritis	15	10.0	10	28.6
Sleep Apnea	5	3.3	4	11.4
High Cholesterol	12	8.0	9	25.7
Respiratory Issues	7	4.7	5	14.3

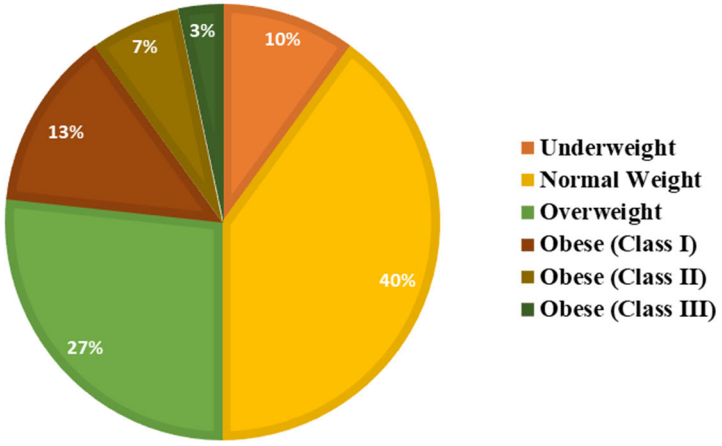

Figure 2: BMI Classification of Study Participants

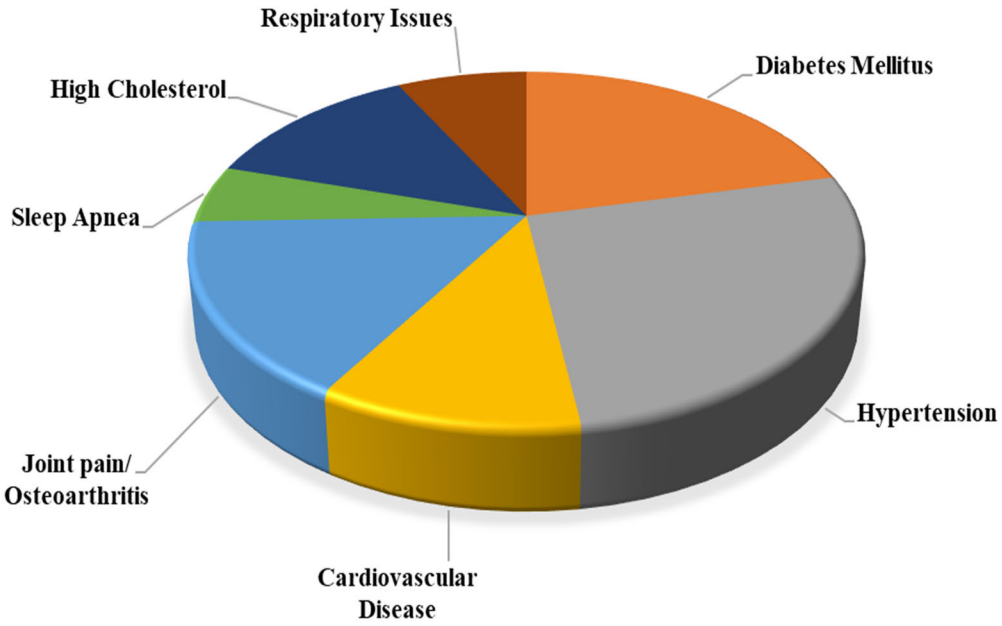

Figure 3: Distribution of Obesity-Related Comorbidities among Study Participants

employment status, physical activity level, smoking status, and alcohol consumption patterns. Each segment represents the proportion of participants within each category, providing an overview of the demographic and behavioral profile of the study population (Figure 1).

The pie chart shows the proportion of participants across different BMI categories, including underweight (10%), normal weight (40%), overweight (27%), obese class I (13%), obese class II (7%), and obese class III (3%). This distribution provides an overview of the weight status profile within the study population (Figure 2).

The pie chart illustrates the prevalence of major health conditions associated with obesity, including diabetes mellitus, hypertension, cardiovascular disease, joint pain/osteoarthritis, sleep apnea, high cholesterol, and respiratory issues. Each segment represents the proportion of

participants reporting these comorbidities, providing an overview of the burden of obesity-linked health complications in the study population (Figure 3).

DISCUSSION

This study's findings are aligned with national and South Asian research, including the ICMR-INDIAB data and studies from North and South India, which report rising trends in urban obesity. The prevalence of overweight and obesity (49.7%) in this study highlights the nutrition transition occurring in urban Tamil Nadu due to sedentary lifestyles and high-calorie diets [8]. The classification of obesity among participants, with 26.7% categorized as overweight and 23.3% as obese, underscores the urgent need for public health interventions aimed at weight management and obesity prevention [9]. The breakdown of obesity classes reveals that 13.3% were classified as Class I, 6.7% as Class II, and 3.3% as Class III, indicating a spectrum of obesity severity that is associated with increased health risks [10]. Health problems associated with obesity were prevalent among participants, with 34.3% reporting obesity-related issues. Specifically, 13.3% were diagnosed with diabetes, and 16.7% with hypertension, with a significant proportion of these individuals being obese. This correlation is well-documented in the literature, which consistently shows that obesity is a major risk factor for the development of type 2 diabetes and hypertension [11]. The presence of osteoarthritis in 28.6% of participants further illustrates the musculoskeletal complications that can arise from excessive body weight, emphasizing the multifaceted health challenges posed by obesity [12]. Interestingly, while rates of cardiovascular disease, sleep apnea, high cholesterol, and respiratory issues were reported to be low overall, these conditions were significantly more prevalent in obese participants. For instance, 22.9% of obese individuals reported cardiovascular disease, and 25.7% had high cholesterol, which is consistent with findings from other studies that link obesity to increased cardiovascular morbidity [13]. The relationship between obesity and respiratory problems, with 14.3% of obese participants affected, highlights the respiratory complications that can arise from excess weight, including obstructive sleep apnea and chronic obstructive pulmonary disease (COPD) [14]. These findings collectively underscore the serious health risks associated with obesity, necessitating comprehensive public health strategies to address this growing epidemic. The evidence suggests that obesity is not merely a personal health issue but a significant public health challenge that requires coordinated efforts across various sectors, including healthcare, education, and community planning. [15] The recognition of obesity as a chronic disease by health organizations further emphasizes the need for sustained interventions aimed at prevention and management [16].

Recommendations

According to the study findings, the body should inquire from nearby healthcare professionals to include lifestyle interventions in their practice to assist in weight management and improve lipid profile. The growing public health concern of obesity should be addressed by the priority of interventions directed at obesity prevention and management. Future work should also investigate the longer-term effects on weight management and lipid profiles of lifestyle interventions as a means to identify additional sustainable approaches to obesity prevention.

CONCLUSION

This study concluded a substantial prevalence of overweight and obesity among adults in selected urban areas of Thiruvallur District, with nearly half of the population exhibiting excess body weight and a significant proportion experiencing associated health problems such as diabetes, hypertension, joint pain, high cholesterol, sleep apnea, and respiratory issues. The strong link between obesity and these comorbidities underscores the urgent need for targeted community-based interventions that promote healthier lifestyles, regular physical activity, and improved nutritional awareness. The findings emphasize obesity as a growing public health concern that demands coordinated efforts from healthcare providers, public health nurses, and policymakers to implement effective prevention and management strategies. Future longitudinal studies are warranted to better understand causal relationships and to develop sustainable, evidence-based approaches for obesity reduction and health promotion in urban populations.

Limitations

This study is limited by its cross-sectional design, which restricts the ability to determine causal relationships between obesity and associated health problems. The use of self-reported data introduces potential recall and response biases.

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