Research Article

Prevalence of central obesity and its association with sociodemographic profile among young adults attending Outdoor Patient Department of Community Health Centre in Madurai, Tamil Nadu

Muthu Rajesh Easwaran, Priya Sivasubramanian, Giridhar Kannan

Institute of Community Medicine, Madurai Medical College, Madurai, Tamil Nadu, India

Correspondence to: Priya Sivasubramanian, E-mail: drpriyagsh@gmail.com

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ABSTRACT

Background: Obesity is an emerging public health problem in Indian population in young adults and its prevalence has risen to epidemic proportions. The most commonly used indicator is body mass index (BMI). However, this indicator takes into account only height and weight but not fat distribution. Measures of abdominal obesity are better than BMI as predictors of cardiovascular disease risk. **Objectives:** The objectives of the study were to estimate the prevalence of central obesity among young adults attending Outdoor Patient in a Community Health Centre (CHC) of Madurai and to find the association between central obesity and certain sociodemographic factors among the study subjects. **Materials and Methods:** A cross-sectional study was conducted among young adults in the age group of 18–25 who were attending Kallandhiri CHC. Using consecutive convenient sampling, 506 individuals were selected and a structured questionnaire was used to collect data about sociodemographic variables and obesity. The study was conducted between August and October 2018. Data were analyzed using SPSS, version 16.0. Simple proportions were calculated and Chi-square test was applied for statistical significance. $P < 0.05$ was considered as statistically significant. **Results:** The prevalence of central obesity among young adults was found as 20.9%. Female gender and higher socioeconomic status were found to be associated with central obesity. **Conclusion:** Around one-fifth young adults were found to be having central obesity. Early identification and proper intervention can reduce the burden of non-communicable diseases in future.

KEY WORDS: Prevalence; Young Adults; Central Obesity; Waist Circumference

INTRODUCTION

Obesity is an emerging public health problem in Indian population in young adults and its prevalence has risen to epidemic proportions. Obesity increases morbidity and mortality due to many chronic health ailments such as cardiovascular disease (CVD), type 2 diabetes, dyslipidemia, and fatty liver disease.[1]

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Visceral fat, also known as organ fat or intra-abdominal fat, is located inside the peritoneal cavity, packed in between internal organs and torso, as opposed to subcutaneous fat, which is found underneath the skin and intramuscular fat, which is found interspersed in skeletal muscle. Visceral fat is composed of several adipose depots including mesenteric, epididymal white adipose tissue, and perirenal fat. An excess of visceral fat is known as central obesity, the "pot belly" or "beer belly" effect, in which the abdomen protrudes excessively.[2]

Due to rapid urbanization and change in lifestyle habits from diet to physical activity, even developing countries like India have a lot of centrally obese young adults. According to recent study, the percentage of centrally obese urban young adults in Chandigarh, Tamil Nadu, Jharkhand, and Maharashtra

is 26.6%, 19.3%, 9.8%, and 13%, respectively.[3] Another international survey also says the percentage of central obesity in young adults is about 16%.[4] A recent study reveals that India has the third-highest obese children in the world.[5]

The main causes for central obesity include excessive carbohydrate and fat intake and sedentary lifestyle. Other causes include hypothyroidism and hypercortisolism such as Cushing's syndrome. Prolonged intake of estrogenic drugs, oral contraceptives, and steroids such as dexamethasone also leads to central obesity. Loos proved that the gene fat mass and obesity contribute to common forms of human obesity.[6] Bobak proved that the incidence of central obesity is greater in men indulged in smoking and consuming beer.[7]

Obesity leads to a lot of serious health conditions such as heart disease, diabetes mellitus, certain types of cancer, asthma, obstructive sleep apnea, and certain musculoskeletal problems. It ultimately leads to mortality.[8] Gray *et al*. demonstrated the strong correlation between central obesity and CVD.[9] Alzheimer's disease and abdominal obesity have a strong correlation and with metabolic factors added in, the risk of developing Alzheimer's disease was even higher. Based on logistic regression analyses, it was found that obesity was associated with an almost 10-fold increase risk of Alzheimer's disease.[10] Insulin resistance is a major feature of diabetes mellitus type 2 (T2DM), and central obesity is correlated with both insulin resistance and T2DM.[11,12] Increased adiposity (obesity) raises serum resistin levels which, in turn, directly correlate to insulin resistance.[13]

Developing asthma due to abdominal obesity is also a main concern. As a result of breathing at low lung volume, the muscles are tighter and the airway is narrower. It is commonly seen that people who are obese breathe quickly and often, while inhaling small volumes of air. People with obesity are also more likely to be hospitalized for asthma. A study has stated that 75% of patients treated for asthma in the emergency room were either overweight or obese.[14]

There are many indicators of obesity such as body mass index (BMI), waist circumference (WC), waist-hip ratio, and skinfold thickness. The most commonly used indicator is BMI. However, this indicator takes into account only height and weight but not fat distribution. Obese individuals differ not only in the amount of excess fat they store but also in the regional distribution of fat. The distribution of fat affects the risk associated with obesity and the severity of diseases caused by obesity. It is useful, therefore, to be able to distinguish between those at increased risk as a result of abdominal fat distribution or android obesity from those with the less serious gynoid fat distribution, in which fat is more evenly and peripherally distributed.[15]

Based on an extensive review, Huxley *et al*. concluded that measures of abdominal obesity are better than BMI as predictors of CVD risk, although combining BMI with these measures may improve their discriminatory capability and universal cutoff points for BMI are not appropriate to use worldwide.[16] The National Health Programme for Prevention and Control of Cancer, Diabetes, CVD, and Stroke was functioning in India for the past 10 years. The cutoff age for screening under this program is 30 years of age. However, non-communicable diseases (NCDs) develop over a long duration and the risk factors begin at very young age. Central obesity which is one of the most important risk factors for NCDs, if detected at young age can be corrected which may prevent the development of diseases. Hence, we planned to conduct this study among young adults in our field practice area.

Objectives

The objectives of the study were as follows:

1. To estimate the prevalence of central obesity among young adults attending Outdoor Patient (OP) in a Community Health Centre (CHC) of Madurai.
2. To find the association between central obesity and certain sociodemographic factors among the study subjects.

MATERIALS AND METHODS

This hospital-based cross-sectional study was done at Kallandhiri CHC, Madurai district, Tamil Nadu. It serves a population of around 1 lakh and attached with the Department of Community Medicine, Madurai Medical College. CHC is located at Kallandhiri village at a distance of around 15 km from Madurai Medical College. It is functional 24 × 7 and receives around 300 OP daily. Young adults in the age group of 18–25 years who are attending the OP in Kallandhiri CHC were selected as study participants. This study was conducted for the duration of 3 months from August to October 2018.

Sample size was calculated as 506, based on 16.1% prevalence of central obesity among young adults from the previous study,[17] by the formula $n = Z_a^2 pq / d^2$

n-Sample size, Z_a^2 -3.84 for 5% alpha error, p-16.1%, q-100-p, d-20% of p.

Sampling Technique

Consecutive convenient sampling was used. On an average, 300 patients attend the Outdoor Patient Department in Kallandhiri CHC daily. Out of this, around 15% were in the age group of 18–25 years based on the past 3 months census. First 10 young adults attending the OP were included in the study during the study period. If the same person comes to OP during the study period for further reviews, they were excluded.

Selection Criteria

Inclusion criteria

An 18–25-year-old males and females were included in the study.

Exclusion Criteria

The following criteria were excluded from the study:

1. Persons not willing to participate
2. Conditions hindering with measurement of WC such as pregnancy, ascites, malignancy, abdominal hernia, and any other conditions causing abdominal distension.

Data Collection

Study participants were interviewed to collect sociodemographic details using structured questionnaire. Then, anthropometric parameters such as height, weight, and WC were measured using the WHO guidelines.[18]

Sociodemographic data collected from the participants were age, gender, religion, educational status, occupational status, and socioeconomic status (based on modified BG Prasad's scale, 2018[19]).

BMI

It was calculated as weight in kilograms/height in meter^2.

Operational Definitions

Central obesity is defined as WC ≥90 cm for men and 80 cm for women.[20] Overweight is defined as BMI ≥25 kg/m^2 but <29.9 kg/m^2 for both genders. Generalized obesity is defined as BMI ≥30 kg/m^2 for both genders.

Statistical Analysis

Data were analyzed using statistical software SPSS 16.0. The prevalence of central obesity was expressed in percentage. Association between sociodemographic factors and central obesity was tested using Chi-square test. $P < 0.05$ was considered statistically significant.

Ethical Consideration

This study was done as the Indian Council of Medical Research (ICMR) short-term student's project and followed the guidelines of ethical principles given by ICMR. Ethical approval was obtained from the Institutional Ethical Review Committee, Madurai Medical College, before the data collection. An informed written consent was taken from each participant before data collection. Before obtaining the informed consent, an information sheet indicating the purpose of the study, benefits of participating, procedure of maintaining confidentiality, and right to not participate was given. The individuals who were found to have morbid conditions needing further management were given guidance and counseling before referring to hospitals. After the completion of the study, report was submitted to ICMR and got approved.

RESULTS

Of 504 study participants, 62.8% were in the age group of 18–20, 66% were male and 34% were female. Around 58.6% of them were educated up to higher secondary and 74.1% of the study subjects were students. Based on modified BG Prasad classification, 2018, around 32.4% was belonging to Class 2 and around one-fourth of them belong to Class 1 [Table 1].

The prevalence of central obesity among young adults in the age group of 18–24 years was found as 20.9% (95% confidence interval [CI] 14.5–27.3). Based on BMI, 17%

Table 1: Sociodemographic characteristics of the study participants (*n*=506)

Sociodemographic characteristics	Frequency (%)
Age	
18–20	318 (62.8)
21–23	128 (25.3)
24–25	60 (11.9)
Gender	
Male	334 (66)
Female	172 (34)
Educational status	
Illiterate	8 (1.6)
Primary	6 (1.2)
Middle school	13 (2.6)
High school	42 (8.3)
Higher secondary	297 (58.6)
Graduate and above	140 (27.7)
Occupational status	
Professional	31 (6.1)
Semi-professional	15 (2.9)
Clerk, shop owner, and farmer	13 (2.6)
Skilled	45 (8.9)
Semi-skilled	8 (1.6)
Unskilled	19 (3.7)
Student	375 (74.1)
Socioeconomic status	
Class 1	127 (25.1)
Class 2	164 (32.4)
Class 3	101 (20)
Class 4	73 (14.4)
Class 5	41 (8.1)

of the study participants were overweight and 5.5% of them were obese [Table 2].

We found a significant association between age group and central obesity. More than one-third (35%) of the participants in the age group of 24–25 years were found to be having central obesity. The prevalence of central obesity among females (30.2%) was significantly higher when compared with males (16.2%). Persons belonging to higher socioeconomic class were found to be having higher prevalence of central obesity when compared with other socioeconomic classes and this difference was statistically significant. We did not find any significant difference in the prevalence of central obesity based on educational and occupational status [Table 3]. Comparison of BMI and central obesity among the study participants showed that around 14.9% of persons with normal BMI were having central obesity [Table 4].

Table 2: Distribution of the study participants based on central obesity and BMI status (*n*=506)

Variables	Frequency (%)
Central obesity	
Yes	106 (20.9)
No	400 (79.1)
BMI status	
Underweight	104 (20.6)
Normal	288 (56.9)
Overweight	86 (17)
Obese	28 (5.5)

BMI: Body mass index

DISCUSSION

In our study, we included 506 study subjects in the age group of 18–25 years for finding the prevalence of central obesity based on WC. Of them, 66% were male and 34% were female. Around 58.6% of them were educated up to higher secondary and 74.1% of the study subjects were students. One-third of the study participants belong to socioeconomic Class 2.

Table 3: Association between central obesity and sociodemographic factors among the study participants (*n*=506)

Variables	Central obesity		Total (%)	Chi-square value	*P* value
	Present (%)	Absent (%)			
Age group					
18–20	61 (19.2)	257 (80.8)	318 (100)	8.126	0.017
21–23	24 (18.8)	104 (81.2)	128 (100)		
24–25	21 (35)	39 (65)	60 (100)		
Gender					
Male	54 (16.2)	280 (83.8)	334 (100)	13.562	0.000001
Female	52 (30.2)	120 (69.8)	172 (100)		
Educational status					
Illiterate	2 (25)	6 (75)	8 (100)		
Primary	2 (33.3)	4 (66.7)	6 (100)		
Middle school	2 (15.4)	11 (84.6)	13 (100)	2.051	0.852
High school	10 (23.8)	32 (76.2)	42 (100)		
Higher secondary/diploma	65 (21.9)	232 (78.1)	297 (100)		
Graduate and above	25 (17.9)	115 (82.1)	140 (100)		
Occupational status					
Professional	7 (22.6)	24 (77.4)	31 (100)		
Semi-professional	1 (16.7)	14 (93.3)	15 (100)		
Clerk, shop owner, and farmer	3 (23.1)	10 (76.9)	13 (100)	4.446	0.432
Skilled	12 (26.7)	33 (73.3)	45 (100)		
Semi-skilled	1 (12.5)	7 (87.5)	8 (100)		
Unskilled	2 (10.5)	17 (89.5)	19 (100)		
Student	80 (21.3)	295 (100)	375 (100)		
Socioeconomic status					
Class 1	39 (30.7)	88 (69.3)	427 (100)		
Class 2	38 (23.2)	126 (76.8)	29 (100)		
Class 3	14 (13.9)	87 (86.1)	50 (100)	15.629	0.004
Class 4	8 (11)	65 (89)	73 (100)		
Class 5	7 (17.1)	34 (82.9)	41 (100)		

Table 4: Association between central obesity and BMI among the study participants (*n*=506)

BMI	Central obesity (%)		Total (%)	Chi-square value	*P* value
	Yes	No			
Underweight	2 (1.9)	102 (98.1)	104 (100)	104.62	0.0000001
Normal	43 (14.9)	245 (85.1)	288 (100)		
Overweight	43 (50)	43 (50)	86 (100)		
Obese	18 (64.3)	10 (35.7)	28 (100)		
Total	106 (20.9)	400 (79.1)	506 (100)		

BMI: Body mass index

The prevalence of central obesity among young adults in the age group of 18–24 years was found as 20.9% (95% CI 14.5–27.3). Based on BMI, 17% of the study participants were overweight and 5.5% of them were obese. Significant association was found between central obesity and age group, gender, and socioeconomic status.

It was found that out of 506 study subjects, 106 were having central obesity. This gives the prevalence of central obesity among young adults as 20.9%.

Similarly, Pradeepa *et al*. found in a study in Tamil Nadu that the prevalence of central obesity among young adults was 19.6%.[3] Furthermore, Manjunath *et al*. found in a cross-sectional study among 473 young adults in Hyderabad that the prevalence of central obesity was 16.1%.[17] Zaciragic *et al*. found in a cross-sectional study among Bosnian young adults that 24.49% of males and 29.03% of females were centrally obese.[20]

In our study, we found a significant association between gender and central obesity. The prevalence of central obesity among females was 30% while among males, it was 16%. Similarly, Pradeepa *et al*. found in the ICMR-INDIAB study in Tamil Nadu that the prevalence of central obesity among females (32.3) was significantly higher compared to males (20.5).[3] Mishra *et al*. found in their study in southern part of India (Tamil Nadu), using Asian cutoffs, abdominal obesity was present in 17.6% of males and 23.7% of females.[21] Kaur *et al*. found in their study among rural people in Tamil Nadu, 17.6% of males and 23.7% of females were centrally obese.[22] A study done in primary health centers in and around Pondicherry by Prabahar *et al*. found that the percentage of central obesity in adult males and females is 24% and 28%, respectively.[23]

We did not find any significant association between educational status or occupational status and central obesity in our study. This may be due to the fact that around three-fourth of our study participants (74.1%) were students. Since other occupational groups did not have enough representation in our study population, we may not have got a significant association. However, Pradeepa *et al*. found that higher the educational status more is the prevalence of central obesity in their study.[3]

In our study, we found that the prevalence of central obesity was more among higher socioeconomic classes – Class 1 (30.7%) and Class 2 (23.2%) when compared to lower classes. Pradeepa *et al*.[3] found that as income increases the prevalence of central obesity also increases significantly.

Based on BMI, we found that 17% of the study subjects were overweight and 5.5% of them were obese. Hence, totally, 23.2% of our study participants were either overweight or obese. Furthermore, 20.6% of our study participants were underweight while 56.9% of them were normal. Pradeepa *et al*., similarly, found the prevalence of overweight/obese among young adults in Tamil Nadu as 24.6%.[3] Comparing BMI and central obesity, we found that around 15% of normal BMI participants to be having central obesity. Pradeepa *et al*. found in their study that 8.6% of young adults with normal BMI in urban area and 6.7% in rural area with normal BMI had central obesity.[3]

Strengths

Entire data were collected by single interviewer so no chance for interobserver variation. All anthropometric measurements were made following the WHO guidelines.

Limitations

This is a hospital-based study so we cannot interpolate this result for community.

CONCLUSION

From our study, we found that around one-fifth of the young adults in the age group of 18–25 years were having central obesity. Onset of central obesity at such young age will have long-term effects and complications. Furthermore, around 15% of the individuals having normal BMI were found to be having central obesity. Since weight and BMI are commonly used for assessing obesity persons with normal BMI but increased waist circumference may not be aware of their risk for developing NCDs in the future. In our National Health Programme for Adolescents, we are having health education and preventive component mainly for undernutrition and hygiene. A separate component for NCD should be introduced in this program to prevent the development of NCDs in the future.

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