Research Article

A study of the prevalence of overweight, obesity, and their associations with socioeconomic status among young men residing in a rural area, Kancheepuram District, Tamil Nadu, India

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ABSTRACT

Background: Non-communicable diseases such as diabetes and hypertension are increasing worldwide. Overweight and obesity may be assessed using internationally accepted criteria developed by the World Health Organization and centers for disease control and prevention. Worldwide, over 1.9 billion adults aged 18 years and older are overweight. Around 600 million individuals are having general obesity which is defined as excessive generalized deposition and storage of fat with body mass index more than 25. Abdominal obesity defined as excessive abdominal fat around stomach and abdomen with the waist circumference (WC) more than 90 cm. **Objectives:** The objectives of this study are to estimate the prevalence of overweight, general obesity, and abdominal obesity and to examine their associations with socioeconomic status among young men residing in a rural field practice area of SRM Medical College Hospital, Kancheepuram. **Materials and Methods:** This cross-sectional study was done in the rural area of SRM Medical College Hospital involving 150 young adults (men) selected by simple random sampling method. The sample size was calculated based on the prevalence of 32% using the formula Z2αxPxQ/L2. Written informed consent was obtained from all the study participants. Each demographic and socioeconomic data were collected using questionnaires. A structured peer-reviewed questionnaire has been used to collect data regarding demographic characteristics and socioeconomic data. Anthropometric measurements including participant's weight, height, and WC were assessed. **Results:** About 39% of the study participants were found to be overweight and obese. Around 40% of study participants had WC more than 90 cm and about 60% of the study participants with a WC <90 cm. Majority of the study participants among overweight (52.80%), obesity Class I (43.20%), and obesity Class II (56.30%) individuals belongs to the middle socioeconomic class. **Conclusion:** These results suggest a high prevalence of abdominal obesity which may be the key factor for metabolic disorders.

KEY WORDS: Obesity; Overweight; Socioeconomic Status; Rural Men

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INTRODUCTION

The non-communicable diseases (NCDs) are becoming more prevalent, and deaths due to it are becoming quotidian. The most common types of NCDs are cardiovascular diseases (CVDs) (such as heart attacks and stroke), cancers, chronic respiratory diseases, and diabetes. NCDs

are already disproportionately affecting low- and middle-income countries. In 2014, 39% of adults aged 18 years and over (38% of men and 40% of women) were found to be overweight.[1] Universally, the prevalence of obesity has doubled since 1980-2014 due to increased intake of energy-dense foods and sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization.[1] The Global Action Plan for the Prevention and Control of NCDs 2013-2020 is aiming to achieve the commitments of the UN political declaration on NCDs which was endorsed by the Heads of State and Government in September 2011.[2] Worldwide, over 1.9 billion adults aged 18 years and older are overweight. A person weighs more than what is considered normal for that height, age, and sex.[3] Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults.[1] BMI around 23-24.9 is found to have a high risk of depression and high blood pressure.[3] Around 600 million individuals are having general obesity which is defined as excessive generalized deposition and storage of fat with BMI more than 25.[1] They are at higher risk of metabolic syndrome (MetS), CVDs. The MetS, globally, is a major health problem associated with increased morbidity and mortality from CVD. MetS is a conglomerate of various risk factors which are known to increase the risk for development of CVD. Various terms which have been ascribed for this constellation of findings are syndrome X, insulin resistance syndrome, "deadly quartet," and obesity dyslipidemia syndrome.[4,5] MetS represents a group of cardiovascular risk factors, including hyperglycemia, elevated blood pressure, elevated triglyceride levels, central obesity, and decreased high-density lipoprotein cholesterol.[6] It will exacerbate the progression of CVD if left untreated. The estimates of the prevalence of MetS ranged from 21.3% to 32.8% among the participants in the Framingham Offspring Study and San Antonio Heart Study.[7] Abdominal obesity defined as excessive abdominal fat around the stomach and abdomen with a waist circumference (WC) more than 90 cm. They are also at higher risk of CVDs.[1] The rural prevalence of MetS is found to be reasonably low compared to the urban prevalence. A recent survey in Central India observed an overall MetS prevalence as per the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria to be 5.0% in the adult rural population. When NCEP ATP III criteria were modified using WC cutoffs recommended by Asia-Pacific guidelines, MetS was seen in 9.3% (8.2% in males and 10.7% in females).[8]

Scanty information is available about the magnitude of obesity in the rural areas, especially young adult males in India including Tamil Nadu. Hence, the present study was undertaken in the rural area of Kancheepuram district with a primary objective to estimate the prevalence of overweight, general obesity, and abdominal obesity and to examine their associations with socioeconomic status among those young men.

MATERIALS AND METHODS

A cross-sectional study conducted for 2 months from February to March 2016 in a rural population served by SRM Rural Health Center, Kancheepuram district, about 84 km away from Chennai city. The present study was conducted among the population from 4 villages (Sirupinayur, Thiruvathavur, Natarajapuram, and Samathuvapuram) among 20-40-year-old age group. Around 150 participants who were available in their households at the time of data collection were included and who all were not willing to participate in the study were excluded. Taking the prevalence as 30.7%[9] with a limit of accuracy 5% and considering attrition the total sample size were worked out to be 150.

The men in the age group of 20-40 years were listed out from the family folder list which was maintained in the SRM Rural Health Center, Kancheepuram District, for the year 2014. They were serially numbered. Using this as the sampling frame, 150 men were selected by probability proportional to size from 4 villages. From each village, subjects were selected by simple random sampling using computer random number generator.

Ethical Approval

The Institutional Ethical Committee approval was obtained before the start of the study, and informed consent was obtained from all the study subjects.

Data Collection

Pre-designed, pre-tested, semi-structured questionnaire with few modifications for the present study was further validated, and detailed information regarding demographic, socioeconomic, and behavioral and health status was collected from each study subject. Anthropometric measurements such as WC, weight, and height were assessed according to the International Association for the Study of Obesity and the International Obesity Task Force in Asian population. Privacy of each participant was strictly considered when taking the measurements.

Statistical Analysis

The collected data were analyzed using relevant descriptive and inferential statistical techniques using the Statistical Package for the Social Sciences (SPSS) for Windows 20.0 (SPSS Inc.,) Illinois, Chicago. The magnitude of overweight and obesity was expressed in percentage. Chi-square test was used to study associations between categorical variables. All statistical tests were considered statistically significant when two-sided $P < 0.05$.

RESULTS

The overall mean and standard deviation of anthropometric measurements are provided in Table 1. The prevalence of

overweight and general obesity is shown in Figure 1. The association of overweight and obesity with age was analyzed and shown in Table 2. Abdominal obesity was classified into two categories. Around 40% of study participants had a WC more than 90 cm and about 60% of the study participants with WC <90 cm. The socioeconomic status was examined using the per capita income, and its association with BMI was assessed. Information regarding per capita income in (rupees/month) was collected, and socioeconomic status was classified using Modified BG Prasad classification[10] for the study period 2015 (average consumer price index-237.017), and it was calculated by multiplication factor with 1961 Prasad's classification values. Around 60% and 20% of study participants who were underweight belong to the middle socioeconomic class and upper middle socioeconomic class respectively. Majority of the study participants among overweight (52.80%), obesity Class I (43.20%), and obesity Class II (56.30%) individuals belonged to middle socioeconomic class. Around 20% of study participants among overweight, 16.20% among obesity Class I, and 12.50% among obesity Class II belong to an upper socioeconomic class.

Table 1: Overall mean and SD of anthropometric measurements (*n*=150)

Variables	Mean±SD
Age (years)	31.04±7.091
BMI (kg/m^2)	24.03±4.90
WC (cm)	82.14±10.29
Height (cm)	161.50±7.44
Weight (kg)	62.45±12.50

SD: Standard deviation, BMI: Body mass index, WC: Waist circumference

Table 2: Association of overweight and obesity with age (*n*=59)

Age (years)	*n* (%)			Chi-square *P* value
	Overweight	Obesity Class I	Obesity Class II	
20-30	10 (27.8)	17 (45.9)	6 (37.5)	14.731=0.005
31-40	26 (72.2)	20 (54.2)	10 (62.5)	

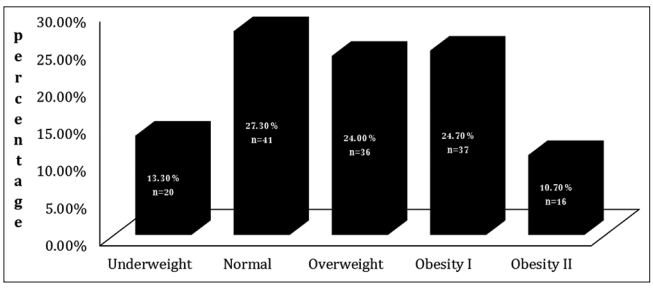

Figure 1: Body mass index categories among the study population (*n*=150)

DISCUSSION

About 39% of the study participants were found to be overweight and obese. Around 40% of study participants had WC more than 90 cm and about 60% of the study participants with a WC <90 cm. Majority of the study participants among overweight (52.80%), obesity Class I (43.20%), and obesity Class II (56.30%) individuals belongs to the middle socioeconomic class.

The international cutoffs recommended by the World Health Organization (WHO) are BMI 25.0-29.9 kg/m for overweight, BMI ≥30.0 kg/m for general obesity, and WC ≥102 or 88 cm for abdominal obesity in men and women, respectively.[11] The Asian cutoffs also recommended by the WHO are lower: BMI 23.0-27.4 kg/m for overweight, BMI ≥27.5 kg/m for general obesity, and WC ≥90 or 80 cm for abdominal obesity in men and women, respectively.[11,12] Majority of study participants were in middle socioeconomic class. Similar findings were observed in the study conducted by Kinra et al.,[13] 63% belonged to high socioeconomic class, followed by 26% medium socioeconomic class and 11% belonged to low socioeconomic class. The prevalence of obesity was 20.8% among men with a high standard of living and 15.9% among low and medium standard of living. Similar findings of an association of BMI for prediction of MetS were reported by Peixoto and Shah,[14] Matto et al.,[15] and Kamble et al.[16] In this study, 40% of the study participants had high WC more than 90 cm, according to NCEP ATP III criteria modified for Asian Indians.[17] In a study by Kamble et al.,[16] 16% of the study participants were with high WC. In contrast, higher proportion of participants with high WC was reported by Peixoto and Shah[14] and Basu et al.[18] with 51.7% and 45.5%, respectively. Adiposity of the participants was assessed in terms of WC, and the prevalence of MetS was found to be higher for those who had higher WC with 60.8% as per the NCEP ATPIII (mod).[17] Similar findings were reported by Arthi et al.,[19] with 54% of the participants with high WC had MetS. Abdominal obesity can be assessed by the various means, among which WC is considered to be simple, inexpensive, and sensitive tool.[20,21]

In this study, there could be underreporting of data due to social stigma.

These results suggest a high prevalence of abdominal obesity which may be the key factor for metabolic disorders. There is no significant association between BMI and socioeconomic factors. However, overweight could be a significant risk factor among all the classes of the society due to urbanization. A mass health campaign is required to increase the knowledge regarding the prevention and control of obesity.

CONCLUSION

These results suggest a high prevalence of abdominal obesity which may be the key factor for metabolic disorders.

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REFERENCES

1. WHO. Obesity and Overweight, WHO Fact Sheet. Available from: http://www.who.int/mediacentre/factsheets/fs311/en. [Last accessed on 2017 Mar 28].
2. Kishore J. National Health Programs of India: National Policies and Legislations Related to Health. New Delhi: Century Publications; 2005.
3. Park K. Park's Textbook of Preventive and Social Medicine. 21st ed. Jabalpur, India: Banarasidas Bhanot; 2011.
4. Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. Lancet. 2005;365(9468):1415-28.
5. Grundy SM, Brewer HB Jr, Cleeman JI, Smith SC Jr, Lenfant C. Definition of metabolic syndrome: Report of the National Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. Circulation. 2004;109(3):433-8.
6. Zimmet P, Magliano D, Matsuzawa Y, Alberti G, Shaw J. The metabolic syndrome: A global public health problem and a new definition. J Atheroscler Thromb. 2005;12(6):295-300.
7. Meigs JB, Wilson PW, Nathan DM, D'Agostino RB Sr, Williams K, Haffner SM. Prevalence and characteristics of the metabolic syndrome in the San Antonio heart and Framingham offspring studies. Diabetes. 2003;52(8):2160-7.
8. Singh R, Bhansali A, Sialy R, Aggarwal A. Prevalence of metabolic syndrome in adolescents from a north Indian population. Diabet Med. 2007;24(2):195-9.
9. Selvaraj I, Gopalakrishnan S, Logaraj M. Prevalence of metabolic syndrome among rural women in a primary health Centre area in Tamil Nadu. Indian J Public Health. 2012;56(4):314-7.
10. Sharma R. Revision of Prasad's social classification and provision of an online tool for real-time updating. South Asian J Cancer. 2013;2(3):157.
11. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;363(9403):157-63.
12. Obesity: Preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser. 2000;894:i-xii, 1-253.
13. Kinra S, Bowen LJ, Lyngdoh T, Prabhakaran D, Reddy KS, Ramakrishnan L, et al. Sociodemographic patterning of non-communicable disease risk factors in rural India: A cross sectional study. BMJ. 2010;341:c4974.
14. Peixoto C, Shah HK. Prevalence of metabolic syndrome among adult population in a rural area of Goa. J Publ Health Med Res. 2014;2(1):34-7.
15. Mattoo SK, Nebhinani N, Aggarwal M, Basu D, Kulhara P. Metabolic syndrome among substance dependent men: A study from north India. Ind Psychiatry J. 2013;22(1):60-4.
16. Kamble P, Deshmukh PR, Garg N. Metabolic syndrome in adult population of rural Wardha, central India. Indian J Med Res. 2010;132(6):701-5.
17. Ramachandran A, Snehalatha C, Satyavani K, Sivasankari S, Vijay V. Metabolic syndrome in urban Asian Indian adults-a population study using modified ATP III criteria. Diabetes Res Clin Pract. 2003;60(3):199-204.
18. Basu S, Rani PU. Dyslipidemia and impaired glucose levels in apparently healthy semi urban population in Pondicherry. Biomed Res. 2015;26(3):443-6.
19. Arthi R, Vinodhini VM, William WE, Swaminathan S. Prevalence of metabolic syndrome in impaired fasting glycemic subjects. Asian J Pharm Clin Res. 2014;7(4):169-72.
20. Razi SM, Manish G, Keshav GK, Sukriti K, Gupta A. Site or size of waist circumference, which one is more important in metabolic syndrome? Int J Med Public Health. 2016;6(2):69-72.
21. D'Souza J, Shekar A. Anthropometric measurements as a predictor of metabolic syndrome among young adults aged 18-24 years in Mumbai city. Int J Med Public Health. 2015;5(1):40-4.

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