Original Research Article

Prevalence of Metabolic Syndrome among Medical Students at Tertiary Health Care Center

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Abstract
Introduction: The term "metabolic syndrome" refers to a cluster of cardiometabolic risk factors that, when combined, increase an individual's likelihood of developing type 2 diabetes and atherosclerotic cardiovascular disease. The purpose of this study was to assess the prevalence of metabolic syndrome among first year MBBS students.
Materials and Methods: This cross sectional study involved 150 first year MBBS students at Sri Balaji Medical College & Research Institute. Renugunta. Anthropometric parameters, including weight, height, body mass index (BMI) and waist circumference (WC) were measured. Fasting blood samples were collected from all participants and assayed for fasting blood glucose (FBG), total cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL), and low density lipoprotein (LDL).
Result: The total prevalence of Metabolic syndrome among the first year MBBS students was 10.7%. The prevalence of MS, was higher in females, and it was statistically not significant. The BMI of patients with MS was significantly higher from that of non-MS subjects.
Conclusion: In conclusion, there is a relatively high frequency of metabolic syndrome among first-year MBBS students. There is a direct correlation between BMI and MS prevalence among students.
Keywords: Metabolic syndrome, Obesity, Waist circumference, BMI.

Introduction

The term "metabolic syndrome" is used to describe a cluster of risk factors that, if left untreated, can lead to an increased risk of developing cardiovascular disease and type 2

diabetes [1–3].Having an excessive amount of abdominal fat, having high blood pressure and triglyceride rates, as well as having altered high density lipoproteins and glycemia are all risk factors [3].

Strong evidence from the literature suggests that adult-onset cardiometabolic changes are caused by intricate interactions between a number of risk variables, some of which may have their origins in childhood and adolescence [4,5]. As a result, young people who develop MetS tend to be more susceptible to developing cardiovascular disease and diabetes as they mature. Hence, early diagnosis of MetS in the young population is characterised as a crucial primary care strategy that can significantly lower public health spending and successfully contribute to the prevention of cardiometabolic consequences in adulthood.

The metabolic syndrome has several major contributing factors, including excessive weight, inactivity, stress, and junk food.[6,7] The majority of the day is spent at the medical college hospital where medical students attend lectures, tutorials, the ward, and laboratories. They are overstressed due to regular semester exams and university exams. They typically stay inactive and steer clear of sports and frequent exercise. High levels of stress and sedentary behaviour are characteristics of this lifestyle, which may be a significant risk factor for the metabolic syndrome.

The purpose of our study was to determine the prevalence of the metabolic syndrome among first year MBBS students in the study area by measuring factors such as waist circumference, fasting blood sugar, triglyceride levels, high-density lipoprotein level, and blood pressure.

Materials and Methods

This cross-sectional observational study involved 150 first-year medical students and was carried out over the course of three months at Sri Balaji Medical College & Research Institute. Renugunta, Andhra Pradesh. The International Diabetes Federation (IDF) [8] recommends that the metabolic syndrome be considered present if a person has a waist circumference that is higher than the specified cut off value along with any two of the following parameters: TG > or = 150 mg/dl, HDL 40 mg/dl for men, 50 mg/dl for women, BP > or = 130/85 mmHg, and FBS > or = 100 mg/dl.

For South Asian men, the cut off figure for waist circumference is >90 cm, and for South Asian women, it is >80 cm. The subjects for this study provided informed permission and received ethical committee approval. None of the participants have ever had diabetes, hypertension, or a lipid condition diagnosed. The anthropometric measurements of height in metres, weight in kg, and waist circumference in cm were taken for each participant. According to the recommendations of the NCEP-ATPIII (National Cholesterol Education Program Adult Treatment Panel III), the waist was measured with an inch tape directly above the iliac crest [9].

BMI was computed as follows: Weight (kg)/Height^2 (meters). According to the World Health Organization, a BMI of 25 to 29.9 indicates being overweight, and a BMI of 30.0 or higher indicates being obese.[10] Blood pressure was measured in the right arm supine position using the following protocol: the first measurement was taken after at least 5 minutes of rest, and it was repeated three times. The average of 3 measurements makes up the final data. After at least 12 hours of fasting, blood samples were taken in the early morning from the antecubital vein. The Biochemistry Department of IGIMS made the biochemical determinations. The Glycerol 3 phosphate oxidase Trinder method was used to assess serum TG, and the Endpoint colorimetric glucose oxidase and

peroxidase method was used to measure FBS. The liquid stable reagent was used to determine serum HDL Direct. Data were processed using SPSS version. Chisquare test was used to compare the variables. $P < 0.05$ was considered for statistical significance.

Result

Out of 150 participants, 76 (51%) were male and 74 (49%) were female [Figure 1]. The mean age was 21.4 years and age ranged from 18–24 years.
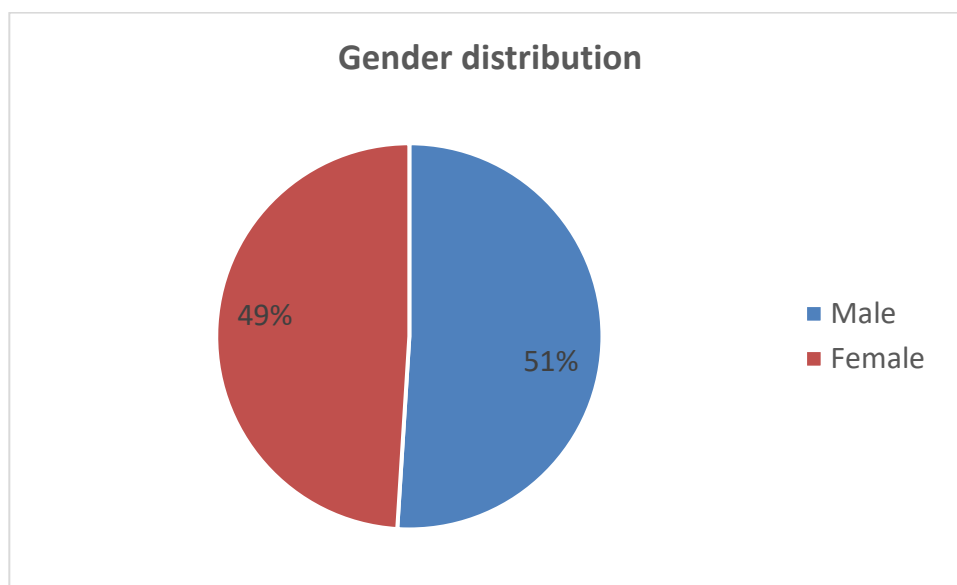

Figure 1: Gender distribution

The anthropometric characteristics, blood pressure and biochemical profile are summarized in Table 1.

Table 1: Age, anthropometric, clinical and biochemical parameters

Variable	Mean±SD
AGE	21.4±0.9
BMI (kg/m2)	21.8±2.4
Waist circumference (cm)	78.6±7.1
SBP (mm Hg)	122.4±8.5
DBP (mm Hg)	79.4±9.2
Glucose (mg/dl)	95.1±6.2
Total Cholesterol (mg/dl)	159.8±18.4
Trygliceride (mg/dl)	84.6±9.1
LDL (mg/dl)	92.8±15.3
HDL (mg/dl)	55.3±6.4

The prevalence of metabolic syndrome according to IDF criteria was 10.7% among which 9 (12.2%) were female and 7 (9.2%) were male. The prevalence of metabolic syndrome according to BMI is also calculated, in which 20% of overweight and 66.7% of obese had metabolic syndrome. No subjects with BMI <25 are found to have metabolic syndrome.

Table 2: Prevalence of Metabolic syndrome categorized by gender & BMI

Variable		MS prevalence N=15	Normal subjects N=135	Total N=150	P-value
Gender	Male	7 (9.2%)	69 (90.8%)	76	0.12
	Female	9 (12.2%)	71 (87.8%)	74	0.08
BMI	Underweight <18.5 kg/m2	0 (0%)	7 (100%)	7	<0.01
	Normal weight 18.5-24.9 kg/m^2	0 (0%)	103 (100%)	103	<0.01
	Overweight 25.0-29.9 kg/m^2	5 (20%)	20 (80%)	25	<0.001
	Obese ≥30 kg/m^2	10 (66.7%)	5 (33.3%)	15	<0.001

Note: N=number, significant at $p<0.05$; (chi-square test was used)

Discussion

Among medical students, the overall prevalence of MS was 10.7% ((as per IDF criteria). Comparable studies among medical students in Bangalore and Sewagram found that the prevalence of metabolic syndrome was 3.3% (IDF criteria) and 11.2% (NCEP/ATPIII). [11,12]

MS was more common in females than males in our study, which accords with the Al-Nozha study [13], which found that the prevalence of metabolic syndrome was higher in girls than males. In southern India, Chow *et al* [14] discovered a prevalence of MS of 26.9% in males and 18.4% in females.

Obesity was determined to be 10% and overweight to be 17% in the current study. Just individuals who are overweight or obese were found to have metabolic syndrome in this study. The prevalence of metabolic syndrome is 20% in overweight people and 66.7% in obese people. Obesity and overweight were found to be 8.6% and 24.3%, respectively, in a study conducted by Selvaraj and Sivaprakasam among medical students in South India. [15]

Conclusion

The prevalence of Metabolic Syndrome is moderately high among first-year medical students and is directly proportional to BMI. The main risk factor for cardiovascular disease and type 2 diabetes is abdominal obesity.

References

1. Lam DW, LeRoith D. Metabolic syndrome. South Dartmouth: MDText.com, Inc.; 2015.
2. Kaur J. A comprehensive review on metabolic syndrome. Cardiol Res Pract. 2014; 2014:943162.
3. Alberti KG, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA, *et al*.Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and. Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society;and International Association for the Study of Obesity. Circulation. 2009; 120:1640–5.
4. Zimmet P, Alberti KG, Kaufman F, Tajima N, Silink M, Arslanian S, *et al*. The metabolic syndrome in children and adolescents - an IDF consensus report. Pediatr Diabetes. 2007; 8:299–306.
5. Poyrazoglu S, Bas F, Darendeliler F. Metabolic syndrome in young people. Curr Opin Endocrinol Diabetes Obes. 2014; 21:56–63.

6. Laaksonen DE, Lakka HM, Niskanen LK, Kaplan GA, Salonen JT, Lakka TA. Metabolic syndrome and development of diabetes mellitus: Application and validation of recently suggested definitions of the metabolic syndrome in a prospective cohort study. Am J Epidemiol. 2002; 156:1070-7.

7. Chandola T, Brunner E, Marmot M. Chronic stress at work and the metabolic syndrome: Prospective study. BMJ 2006; 332:521-5.

8. International Diabetes Federation. The IDF Consensus, Worldwide Definition of the MetabolicSyndrome;2006.Availablefrom:https://www.idf.org/e-library/consensus-statements/60-idfconsensus-worldwide-definition of the metabolic syndrome.

9. Wang J, Thornton JC, Bari S, Williamson B, Gallagher D, Heymsfield SB, *et al.* Comparison of waist circumference measured at 4 sites. Am J Clin Nutr .2003; 77:379-384.

10. Borch-Johnsen K. The metabolic syndrome in a global perspective. The public health impact – Secondary publication. Dan Med Bull. 2007; 54:157-9.

11. Usha SM, Chandrika N, Shetty HV, Reena RA. Study of the components of metabolic syndrome in young adults. Biomed Res India. 2014; 5:45-50.

12. Jain J, Rao T, Desmukh P, Banalt S. Prevalence and correlates of metabolic syndrome in young population: A cross sectional study. J Diabetes Metab. 2015; 6:1-51

13. Al-Nozha MM, Al-Khadra A, Arafah MR, Al-Maatouq MA,Khalil M, Khan NB. Metabolic Syndrome in Saudi Arabia. SMJ. 2005; 26(12): 1918–1925

14. Chow CK, Naidu S, Raju K, *et al*. Significant lipid, adiposity and metabolic abnormalities amongst 4535 Indians from a developing region of rural Andhra Pradesh. Atherosclerosis. 2008; 196(2): 943-952.

15. Selvaraj K, Sivaprakasam PA. Study on the prevalence of overweigh and obesity among medical students of Kanchipuram District. Natl J Res Community Med. 2013; 2:79-148