How Common is Metabolic Syndrome Prevalent among First Year Medical Students in Kashmir Valley of North India? - A Cross - Sectional Single Institutional Study

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Abstract

Background

Metabolic syndrome is defined by a constellation of an interconnected physiological, biochemical, clinical, and metabolic factors that proportionally increases the risk of atherosclerotic cardiovascular heart disease, type 2 diabetes mellitus (T2DM), and all cause mortality. It refers to the co-occurrence of several known cardiovascular risk factors, such as insulin resistance, obesity, atherogenic dyslipidemia and hypertension. These conditions are interrelated and share underlying inflammatory mediators, mechanisms and pathways. Metabolic syndrome is a group of five conditions that can lead to increased risk of heart disease, diabetes, stroke and other related health problems. Medical students have a sedentary life style which can predispose them to various health issues like obesity.

Objectives

To estimate the prevalence of metabolic

syndrome among first year medical students, and observe for sex differences if any.

Material and Methods

A cross-sectional study was conducted in GMC Srinagar in which 100 Medical students from Ist year were enrolled of which 68 (68%) were males and 32 (32%) were females. The criteria of International Diabetic federation (IDF) for Metabolic Syndrome was used for the study. Data for Age, Sex, height, weight, body mass index, waist circumference, fasting blood glucose, serum cholesterol, serum triglycerides (TG), high-density lipoprotein (HDL), and low-density lipoprotein were collected. The data was analyzed using SSPS version 20.0

Results

Metabolic syndrome was observed in 16% of the sample population comprising of 17.6% males, and 12.5% females. The prevalence among males was found to be more than females but not statistically significant (P = 0.513). The prevalence of individual parameters for metabolic syndrome were abdominal obesity (95%), raised TG (27%), reduced HDL (33%), raised blood pressure (BP) (9%) (SBP >130 or DBP >85), and raised blood glucose (0%).

Conclusion

The prevalence of metabolic syndrome was found to be 16%. The prevalence among female (12.5%) was less than male (17.6%) population but not found to be statistically significant. Early detection of metabolic syndrome is important and needs to be tackled with proven strategies.

Keywords

Mets-Metabolic Syndrome, Obesity, medical students, waist circumference.

Introduction

Over the last fifty years, many changes have been observed in the human environment, behaviors and life style. These changes have helped in improving the living condition of the people but at the same time they have also posed numerous threats to health of the people and metabolic syndrome is one of them. The metabolic syndrome is a major and escalating public-health and clinical challenge worldwide in the wake of urbanization, surplus energy intake, increasing obesity, and sedentary life habits. Metabolic syndrome is the name for a group of risk factors that increases the risk for heart disease and other health problems, such as diabetes and stroke. The term "metabolic" refers to the biochemical processes involved in the body's normal functioning. Risk factors are traits, conditions, or habits that increase the chance of developing a disease. Cross-sectional surveys indicate that in India approximately one-third of adults and an alarming proportion of children have the Metabolic syndrome [1,2].

Metabolic syndrome confers a 5-fold increase in the risk of developing type 2 diabetes mellitus (T2DM) and 2-fold risk of developing cardiovascular disease (CVD) over a period of 5 to 10 years [3]. Further, patients with Metabolic syndrome are at 2- to 4-fold increased risk of stroke, a 3- to 4-fold increased risk of myocardial infarction (MI), and 2-fold risk of dying from such an event compared with those without the syndrome [4] regardless of a previous history of cardiovascular events [5].

Metabolic syndrome, also labeled as 'insulin resistance syndrome', 'syndrome X', 'hypertriglyceridemia waist', and 'the deadly quartet', is increasingly being recognized as an important cardiovascular risk factor. Metabolic syndrome is defined by a constellation of an interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of atherosclerotic

cardiovascular disease (ASCVD), (T2DM), and all cause mortality [6,7].

Medical students spend most of the time in studies: attending lectures, practical classes and preparing for the regular exams, making their life style sedentary. Physical inactivity [8,9], often defined as the lack of moderate-to-vigorous physical activity, and sedentary behavior [10,11] have been shown to be important risk factors of metabolic syndrome. Moreover, the unhealthy eating habits of medical students also makes them prone to develop metabolic syndrome. Medical students are under constant stress of their studies. The stress has also been stated as the risk factor for developing metabolic syndrome.

The early detection of metabolic syndrome and early intervention is the best way to tackle it. The life style modification, which includes dietary modifications, increase in physical activity, meditation etc. can help reduce the risks in the long run.

Objectives

The objectives of our study were;

1. Estimation of prevalence of metabolic syndrome among 1st year medical students of Govt Medical College Srinagar.
2. To compare the prevalence among male and female medical students.

Material and Methods

A cross-sectional study was conducted in GMC Srinagar after obtaining the ethical clearance from institutional ethical committee. 100 medical students from 1st year were enrolled in the study after obtaining the consent. The students suffering from diabetes mellitus (DM), hypertension (HTN) or any other disease that could affect the parameters and students not willing to participate in the study were excluded.

The study was carried according to the criteria for metabolic syndrome defined by IDF. According to the IDF definition, someone has the metabolic syndrome if he or she has central adiposity plus two or more of the following four factors [12]: 1) raised concentration of triglycerides: ≥150 mg/dl (1.7 mmol/l) or specific treatment for this lipid abnormality; 2) reduced concentration of HDL cholesterol: <40 mg/dl (1.03 mmol/l) in men and <50 mg/dl (1.29 mmol/l) in women or specific treatment for this lipid abnormality; 3) raised blood pressure: systolic blood pressure ≥130 mmHg or diastolic blood pressure ≥85 mmHg or treatment of previously diagnosed hypertension; and 4) raised fasting plasma glucose concentration ≥100 mg/dl (5.6 mmol/l) or previously diagnosed type 2 diabetes. The IDF lists the thresholds for waist circumference to define central adiposity in South Asian men >90 cm and women >80cm.

The height was measured using height meter and weight with the standardized scale. The waist circumference was measured using an inch tape immediately above the iliac crest as defined by National Cholesterol Education Program - Adult Treatment Panel III guidelines.[13] The BMI was calculated as weight/height in meter square (Quetelet'sindex)[14]. The BP was taken after giving rest for 5 min and then recorded in the supine position from the right arm. Three readings were taken with 1 min of interval between each measurement, and best of three was considered. After taking proper aseptic precautions Blood samples (blood glucose and lipid profile) were collected from the antecubital vein, in the early morning, after a minimum of 12 h of fasting period, then sent for estimation. Serum TG, Cholesterol, HDL, and LDL were estimated in the department of Biochemistry GMC Srinagar.

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The statistical analysis was processed using SPSS write IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. (Armonk, NY: IBM Corp.). Independent t-test and Chi-square test were applied for comparison of parameters and metabolic syndrome between male and females. Statistical significance was set at 5% level (P < 0.05)

Results

Of 100 students, 68 (68%) were males and 32 (32%) were females [Table 1],[Figure 1]. Considering that this study used the criteria established by the IDF for diagnosing metabolic syndrome, the prevalence of metabolic syndrome was found to be 16% [Table 2] [Figure 1] comprising of 12 males (17.6%) and 4 females (12.5%) with a total of 16 students suffering from metabolic syndrome. The prevalence of individual parameters for metabolic syndrome were raised BMI (26%) [Table3], abdominal obesity (95%) [Table 4], raised TG (27%) [Table6], reduced HDL (33%) [Table7], raised BP (9%) [Table8], and raised fasting blood glucose (0%) [Table5]. The difference between males and females was not statistically significant (p value>0.05) [table 9,10].

Discussion

Metabolic syndrome, also known as 'insulin resistance syndrome', 'syndrome X', 'hyper triglyceridemic waist', and 'the deadly quartet', is increasingly being recognized as an important cardiovascular risk factor. Metabolic syndrome is defined by a constellation of an interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of atherosclerotic cardiovascular disease (ASCVD), type 2 diabetes mellitus (T2DM), and all cause mortality [6,7]. A global transition in the disease pattern has been observed, where the relative impact of infectious diseases is decreasing while chronic diseases like cardiovascular disease (CVD) and diabetes are increasingly dominating the disease pattern [15].

Indians are a high-risk population with respect to diabetes and CVD, and the numbers are consistently on the rise [16]. The prevalence of MS in Indians varies according to the region, the extent of urbanization, lifestyle patterns, and socioeconomic/cultural factors. Recent data show that about one third of the urban population in India's major cities have MS [17]. Our results illustrate marked heterogeneity in the prevalence of MS according to gender in medical students. The prevalence of MS in our study in males was higher as compared to females, whereas in other studies in India, MS prevalence in women was 1.5–2 times higher than in males [18, 19]. A higher prevalence in men might be related to their higher rates of overweight BMI, high TG, and low levels of HDL.

The present study was undertaken on 1st year medical students aged between 19 and 22 years. The prevalence of metabolic syndrome was estimated as 16% comprising of 17.6% males and 12.5% females with a total of 16 students suffering from metabolic syndrome. Central obesity was found in 95% of the students. BMI was raised in 26% of the students, 15% being over-weight and 11% being obese. Fasting glucose levels were within the normal range for all subjects. Serum Triglycerides were raised in 27% of the subjects whereas the serum HDL levels were reduced in 33%. 9% of the students presented with raised blood pressures at the time of study. Thus, a good percentage of subjects had altered single variable which gives a chance for primary prevention.

A similar study led by Kanitkar et al., on metabolic syndrome in 250 medical students with a age group between 18 and 27 years, showed a prevalence of

22%.[20]. The prevalence was found to be more compared to our study as this study considered all undergraduates and postgraduates students wherein we restricted our study to only 1st year medical students. Furthermore, the same study showed abdominal obesity as the most prevalent risk factor which is in accordance with our study where waist circumference was the most prevalent risk factor (95%). Furthermore, the same study had a very similar prevalence for low HDL levels in women 43.7%, as compared to our study with 33%.

The prevalence of metabolic syndrome for men and women was found to be 17.6% and 12.5%, respectively, in the present study. The prevalence between men and women was not statistically significant. Similar study by Ford on US adults aged between 20 and 19 years showed that the prevalence of metabolic syndrome was 21.8% in men and 14.6% in women; even though the prevalence was more in men than that in women, it was not statistically significant[21]. A study by Teli et al [22], showed that the prevalence of metabolic syndrome was 10.83% among 1st year medical students with 9.4% in men and 11.94% in women. Another study led by Ogbera stated the same prevalence for both the sexes [23].

The study concludes that the prevalence of metabolic syndrome was 16% among 1st year medical students with 17.6% in men and 12.5% in women. Large number of students were found to be having at least one risk factor for developing Metabolic Syndrome. Hence its important to promote healthy life style which includes healthy eating habits and increase in physical activity and routine exercise. Early detection and hence early prevention of the condition and awareness to the young students can help them to remain fit and healthy.

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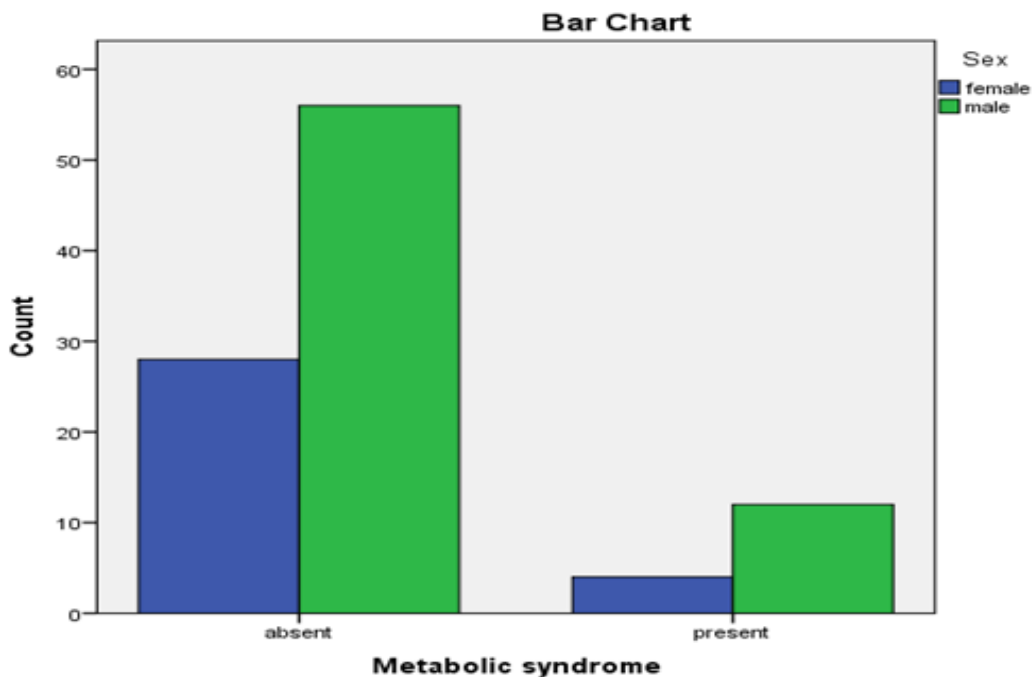
Figure 1. Percentage distribution of metabolic syndrome among male and female students.

Tables:

Table 1. Sex distribution of the study sample

	Sex	Valid Percent
Female	32	32
Male	68	68
Total	100	100

Table 2. Prevalence of Metabolic Syndrome in study sample

	Metabolic syndrome	Valid Percent
Absent	84	84
Present	16	16
Total	100	100

Table 3. BMI of study sample.

	BMI	Percent
underweight (<18.5 kg/m2)	11	11
normal or lean BMI (18.5–22.9 kg/m2)	63	63
overweight (23.0 –24.9 kg/m2	15	15
obese (>25 kg/m2)	11	11
Total	100	100

Table 4. Waist Circumference of study sample.

	Waist-Hip ratio	Valid Percent
No obesity	5	5
Central obesity	95	95
Total	100	100

Table 5. Fasting blood glucose of study sample.

T	Glucose Fasting (>=100)	Valid Percent
No	100	100

Table 6. Serum triglyceride levels of study sample.

	Trig (>=150)	Valid Percent
No	73	73
Yes	27	27
Total	100	100

Table 7. Serum HDL levels of study sample.

	UHDL (<40/<50)	Valid Percent
No	67	67
Yes	33	33
Total	100	100

Table 8. Blood pressure levels of the study sample.

	High BP (SBP >=130 or DBP >=85)	Valid Percent
No	91	91
Yes	9	9
Total	100	100

Table 9. Table showing mean, median, range and standard deviation of various variables.

	N	MEAN±SD	MEDIAN (IQR)	RANGE
Age	100	19.55±0.72	19(19,20)	19 to 22
Height (ft)	100	5.61±0.24	5.6(5.5,5.8)	4.4 to 6
Weight (kg)	100	63.67±7.7	64(58,68)	45 to 86
BMI	100	21.79±2.72	21.45(20.05,23.08)	15.4 to 30.6
gluc. Fasting	100	78.73±8.37	80(73,84)	62 to 98
Chol	100	147.91±30.74	152.5(130,166)	67 to 211
Trig	100	119.61±71.53	99(75.5,150)	55 to 525
UHDL	100	46.85±9.16	46.5(41,53)	26 to 86
DLDL	100	90.36±23.5	93(75.25,105.75)	23 to 154
Waist-hip ratio	100	0.98±0.32	0.96(0.83,0.98)	-0.81 to 2.1
SBP	100	117.17±6.68	118(110,120)	110 to 140
DBP	100	78.88±3.73	80(76,80)	70 to 90
Height (ft)	100	5.61±0.24	5.6(5.5,5.8)	4.4 to 6
Weight (kg)	100	63.67±7.7	64(58,68)	45 to 86
BMI	100	21.79±2.72	21.45(20.05,23.08)	15.4 to 30.6

Table10. Prevalence of metabolic syndrome in males and females and total x`

Metabolic syndrome * Sex Crosstabulation			Sex		Total
			female	male	
Metabolic syndrome	absent	Count	28	56	84
		% within Sex	87.5%	82.4%	84.0%
	present	Count	4	12	16
		% within Sex	12.5%	17.6%	16.0%
Total		Count	32	68	100
		% within Sex	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	df	P value (<0.05 is significant)
Pearson Chi-Square	.429	1	.513