Metabolic Syndrome in Medical Students

Shubhangi A.Kanitkar, Meenakshi Kalyan, Pradnya Diggikar, Umesh More, A.L.Kakrani, Anu Gaikwad, Rajani Agarwal, Ankit Makadia

Department of Medicine, Padmashree Dr. D.Y.Patil Medical College Hospital & Research Centre, Opp.H.A.Ltd, Sant Tukaram Nagar, Pimpri, Pune, Maharastra, India

***Abstract**: The aim of the study was to investigate the prevalence of the metabolic syndrome (MetS) and its components in medical students and to compare in terms of gender analysis. 250 medical students were enrolled in this cross sectional study for a period of 1 year to investigate the MetS prevalence. The MetS was defined based on the International Diabetes Federation (IDF) criteria. Data were processed using SPSS version.Pvalue,confidence interval (CI) and odd's ratio (OR) were used for statistical analysis. The MetS prevalence recorded according to IDF criteria was 22%.The prevalence in males was 24.3% and in females was 20%. The highest prevalence for MetS component was abdominal obesity (55.6%), followed by low levels of high-density lipoprotein (HDL) (37.2%); hypertriglyceridemia 29.2%, hyperglycemia (17.6%) and hypertension (8.4%). Out of 250 medical students,115(46%) were males and 135 (54%) were females. In terms of gender analysis, females withlow HDL levels were more compared to males and was statistically significant p <0.02. Hypertension was more prevalent in males than in females. 59 males (51.3%) and 44 females (32.5%) had increased BMI. Out of 28 males with MetS, 19 (67.85%) had increased BMI, which is statistically significant p<0.02.*

***Conclusions:** The prevalence of metabolic syndrome was 22%. Abdominal obesity was the commonest risk factor for the development of MetS in the study group of medical students, which allowed us to conclude that primary prevention interventions for MetS are needed within the population group represented by young adults.*

INTRODUCTION

The term metabolic syndrome (MetS) describes a constellation of cardiovascular risk factors, including hypertension, abdominal obesity, dyslipidemia, and insulin resistance. It is increasingly recognized worldwide, and estimated that 20-25%adult population in south Asia have developed MetS[1]. Excess weight and lack of physical activity are two important determinants of the MetS[2]. On the other hand, chronic stress hasbeen recently reported to be associated with the syndrome, especially in the work environment[3]. Since medical students generally spend a large part of the day at the medical college hospital attending lectures, practicals and residing at the hostel during the study period, itseems reasonable to suppose that this kind of lifestyle ischaracterized by high levels of sedentariness and stress that may representan important risk factorfor the syndrome. Indeed, it is increasingly appreciated that worksites represent one of the most promising settings for early-detection and follow-up interventions for the MetS[4]. The so called "unhealthy"food or "urbanized" eating or simply low quality food (*Junk food*) is the term used to describe foods with low nutritional value, with rich content of saturated fats and sugar, hyper calories,low in vitamins and minerals or high quality protein, whose consumption increases the risk of obesity[5]. All population studies in the last decades have shown that MetS occursat younger ages; the reasons most frequentlygiven are "*junk food"* and physical inactivity.The aim of our study was to evaluate the MetS parameters (waistcircumference, fasting blood sugar (FBS), triglyceride levels (TG), High density lipoproteins (HDL) level, blood pressure(BP) value), in a population of 250 medical students.In this article we present baseline findings regarding the prevalence of MetS and its main parameters recorded.

MATERIAL & METHODS

This cross sectional observational study was conducted over a period of 1 year (2011-2012) on a sample of 250 randomly selected medical students comprising of undergraduates and postgraduates in Padmashree Dr.D.Y.Patil medical college hospital and Research centre Pune. This study was conducted according to the criteria for MetS definition by International Diabetes Federation(IDF)[6]. IDF recommends that the threshold for waist circumferences to define abdominal obesity in people of Asian origin should be > or = 90 cm for men and > or = 80 cm for women and any two of the following: TG > or = 150 mg/dl, HDL< 40 mg/dl for men,< 50 mg/dl for women, BP > or = 130/85 mmHg, FBS> or = 100 mg/dl. Ethical committee approval and informed consent obtained from the subjects for the conduct of the study. None of the subjects has been previously diagnosed with diabetes, hypertension or dyslipidemia and was never treated with medications for the same. All subjects were measured for the following anthropometric parameters: height, weight, and waist circumference. Height was measured using theheight meter and weight with the standardizedscale. Waist circumference was measured using an inch tape immediately above the iliac crest as defined by National Cholesterol Education Program- Adult Treatment Panel III (NCEP-ATPIII) guidelines[7]. Body mass index (BMI) was calculated as: Weight (kg)/Height^2 (meters)[8]. BMI between 25 -29.9 isoverweight and 30.0 or higher is obese according to Centre for Disease Control and Prevention and WHO[8]. Blood pressure was measured in the right arm supine positionusing the following protocol: first measurement was made after at least 5 minutes of rest and was repeated 3 times, keeping 1 minute of interval between each measurement. Final data is the average of 3 measurements. Blood samples were collected from the antecubital vein, in the early morning, after a minimum of 12 hours of fasting period, in a supineposition. Biochemical determinations were made in Padmashree Dr. D. Y. Patil medical college hospital laboratory, Pune. Serum TG was estimated by GPO Trinder method and FBS was estimated by GOD-POD End point colorimetric method[9]. Serum HDL Direct was estimated by liquid stable reagent[10]. Data were processed using SPSS version. P value, confidence interval (CI) and odd's ratio (OR) were used for statistical analysis. P value <0.05 was considered for statistical significance.

***Correspondence: Dr Shubhangi A. Kanitkar** , Department of Medicine, Padmashree Dr. D.Y.Patil Medical college hospital & Research centre, Opp.H.A.Ltd, Sant Tukaram Nagar, Pimpri, Pune – 411 018*
Tel : 27421250, 27421095/96 Fax : 27421449, Mob: 9422027161
***e-mail:** s.kanitkar@yahoo.com*

RESULTS

Out of 250 participants, 115 (46%) were males and 135 (54%) were females. The mean age was 23 years (age range: 18-27 years). The prevalence of MetS according to IDF criteria was 22% comprising of 24.3% in males and 20% in females. Prevalence of individual parameters for MetS are abdominal obesity (55.6%), low HDL levels (37.2%), Hypertriglyceridimia (29.2%), Hyperglycemia (17.6%), Hypertension (8.4%). In males Abdominal obesity was most commonparameter followed by hypertriglyceridimia and low HDL where as in females the commonest parameters were abdominal obesity,low HDL and

hypertriglyceridimia (Fig 1). Statistical difference in prevalence of MetS and its individual components in males and femalesis shown in Table 1.

59 males (51.3%) and 44 females (32.5%) had increased BMI. 49 out of the 115 males (42.6%) were overweight and 10 out of the 115 males (8.69%) were obese.37 out of the 135 females (27.4%) were overweight and 7 out of the 135 females (5.18%) were obese. Out of the 28 males with MetS,19 (67.85%) had increased BMI. Among these,15 (53.57%) were overweight and 4 (14.28%) were obese.Out of the 27 females with MetS,12 (44.4%) had increased BMI. Among these,9 (33.3%) were overweight and 3 (11.1%) were obese (Table 2).

Table 1: *Statistical difference in prevalence of MetS and its individual components in males and females*

PARAMETERS		MALE	%	FEMALE	%	P VALUE	ODD'S RATIO	95% CI
MetS	Present Absent	28 87	24.3% 75.7%	27 108	20% 80%	0.44	1.287	0.707-2.344
RAISED TG LEVELS	Present Absent	37 78	32.1% 67.9%	36 99	26.66% 73.34%	O.4	1.304	0.755-2.253
Low HDL LEVELS	Present Absent	34 81	29.5% 70.5%	59 76	43.7% 56.3%	0.02	0.541	0.320-0.914
RAISED FBS	Present Absent	24 91	20.9% 79.1%	20 115	14.8% 85.2%	0.24	1.51	0.788-2.197
RAISED BP	Present Absent	14 101	12.2% 87.8%	7 128	5.1% 94.9%	0.06	2.53	0.986-6.515
ABDOMINAL OBESITY	Present Absent	61 54	53% 47%	78 57	57.8% 42.2%	0.44	0.79	0.483-1.315

Table 2 shows risk of developing MetS in subjects with raised BMI.

Table 2: *Risk of developing metabolic syndrome in subjects with raised BMI*

PARAMETER					P VALUE	ODD'S RATIO	95% CI
BMI MALES	Raised BMI Normal BMI	59(51.3%) 56(48.7%)	Raised BMI & MetS Normal BMI & MetS	19(67.85%) 9(32.15%)	0.04	2.481	1.010-6.090
BMI FEMALES	Raised BMI Normal BMI	44(32.6%) 91(67.4%)	Raised BMI & MetS Normal BMI & MetS	12(44.44%) 15(55.56%)	0.14	1.9	0.801-4.509

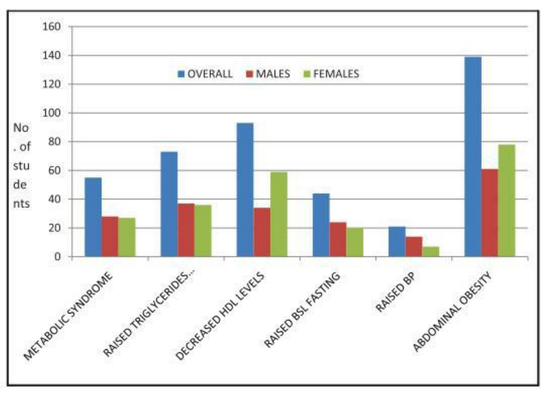

Fig 1: *Comparison of incidence of metabolic syndrome and individual components of the same; overall, males and female*

DISCUSSION

The study comprised of medical students aged between 18 and 27 years. The prevalence of 22% was in accordance with other studies. In a study by Apurva Sawant et al, prevalence of MetS was found to be in 20.61% in 20-40 years age group[11]. The prevalence of MetS among U.S adults aged between 20 -29 years was 21.8% in men and 14.6% in women according to a study by Earl. S. Ford[12]. In this study, the prevalence of MetS in men was more than that in women, which was not statistically significant. Many studies have shown no difference in prevalence of MetS in men and women. A study by Anthonia. O. Ogbera showed same prevalence in both sexes[13]. Abdominal obesity was the most common risk factor in men (53%) and women (57.8%). 43.7% femaleshad low HDL levels as compared to males which was statistically significant (P value-0.02). Men had higher incidence of increased BP as compared to women (P value- 0.06), which is nearing statistical significance. In a study by D S Prasad et al. Central obesity was present in 41.9% males and 56% females. Low HDL (84.5%) was the commonest abnormality among females[14].

In this study, 51.3% men and 32.5% women had increased BMI.Those with increased BMI had a greater risk of developing MetS, which was statistically significant in males (P value-0.04). Rajeev Gupta et al, in a study found that obesity was an independent determinant of multiple metabolic abnormalities as shown by MetS[15]

REFERENCES

1. *D.Eapen, G.L.Kalra, N.Merchant, A.Arora, B.V.Khan, "Metabolic syndrome and cardiovascular disease in South Asians", Vascular Health and risk management.2009;5:731-743*
2. *Laaksonen DE, Lakka HM, Niskanen LK, Kumpusalo E, TuomilehtoJ, Salonen JT. 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.*
3. *Chandola T, Brunner E, Marmot M. Chronic stress at work and the metabolic syndrome: prospective study. BMJ.2006;332:521–5.*
4. *LeutLeutzinger J, Pirner M, Landschulz W, Nevins RL,SullivanS,SilbermanC.Metabolic syndrome and work site health promotion.Am J Health Promot.2006:21(suppl 1):1-11*
5. *Bodor J.N., Rice J., Farley T., Swalm C.M, Rose D. The Association between Obesity and Urban Food Environments,Journal of Urban Health. 2010; 87: 771–781.*
6. *AlbertiKG,ZimmetP,Shaw J 2006 Metabolic syndrome- a new world wide definition. A consensus Statement from the International Diabetes Federation .Diabet Med 23:469-480*
7. *Wang J, Thornton JC, Bari S, Williamson B, Gallagher D et al: Comparison of waist circumference measured at 4 sites. Am J clinNutr 2003;77:379-384*
8. *K.Borch-Johnson, "The metabolic syndrome in a global perspective , The public health impact", Danish Medical Bulletin.2007;54:157-159*
9. *Trinder ,P.Ann. Clin.Biochem.1969;6;24-7*
10. *Williams P. et al, High density lipoprotein and coronary risk factor, Lancet.1979;1:72*
11. *ApurvaSawant, RanjitMankeshwar, Swarup Shah, Rani Raghavan, Gargi,Dhongde et al. Clinical StudyPrevalence of Metabolic Syndrome in Urban India; Cholesterol Volume 2011 (2011), Article ID 920983,doi:10.1155/2011/920983*
12. *Ford ES: Prevalence of the metabolic syndrome defined by the International Diabetes Federation among adults in the U.S. Diabetes Care 28:2745, 2005[PMID: 16249550]*
13. *Anthonia. O. OgberaPrevalance and gender distribution of the metabolic syndrome.Diabetalogy and Metabolic syndrome2010;2:1186/1758-5996-2-1.*
14. *D.S.Prasad, Z.Kabir, A.K Dash, B.C Das. Prevalence and risk factors for metabolic syndrome in Asian Indians: A community study from urban Eastern India; Journal of Cardiovascular Disease Research 2012 ;3 : 204-211*
15. *Rajeev Gupta, MukeshSarna, JyotiThanvi, PriyankaRastogi, Vijay Kaul, VP Gupta High Prevalence of Multiple Coronary Risk Factors in Punjabi Bhatia Community: Jaipur Heart Watch-3 Indian Heart J 2004; 56: 646–652*

LITERATURE REVIEW

EPISODES OF PARALYSIS IN CHINESE MEN WITH THYROTOXIC PERIODIC PARALYSIS ARE ASSOCIATED WITH ELEVATED SERUM TESTOSTERONE

Yu Yao, Linbo Fan, Xiangxun Zhang, Zhu Xiao, Yang Long, and Haoming Tian *: Thyroid 2013;23(4):420-27.doi:10.1089/thy.2011.0493.*

The strong predilection for thyrotoxic periodic paralysis (TPP) to occur in males suggests androgen may contribute to its pathogenesis. We therefore sought to determine if serum total and free testosterone (TT and FT) concentrations differed among patients with TPP during episodes of paralysis, patients with TPP between episodes of paralysis, and patients with Graves' disease (GD) not having TPP. A total of 105 Chinese men were included in the study, and were divided into three groups. Group 1 consisted of men with TPP who were studied during episodes of paralysis; group 2 consisted of men with TPP who were studied between episodes of paralysis; group 3 consisted of men with GD not having TPP. Patients in each were different persons. Serum electrolytes, free triiodothyronine (FT3), free thyroxine (FT4), TT, and FT were measured. Multiple regression analyses and analysis of covariance were performed to analyze the relationship of serum parameters, group status, and age. One multiple regression analysis was used to determine if serum TT concentrations were associated with age, FT3, FT4, or group status. This analysis indicated that age, FT4 level, and group status were significantly and independently associated with serum TT concentrations. With regard to group status, patients in group 1 had serum TT concentrations 0.92 ng/mL higher than patients in group 3 (p=0.033). As to FT4 level, TT concentrations increased by 0.016 ng/mL for each additional pmol/L of FT4 (p=0.002). Another multiple regression analysis was used to determine if serum FT concentrations were associated with age, FT3, FT4, group status, or serum TT concentrations. This analysis revealed that serum TT concentrations and group status were significantly and independently associated with serum FT concentrations. In terms of group status, patients in group 1 had serum FT concentrations of 2.11 pg/mL greater on average than patients in group 3 (p=0.006). CONCLUSIONS: We infer that episodes of paralysis in Chinese men with TPP are associated with elevated serum testosterone. We also found serum TT and FT concentrations of men with GD are both affected by group status; serum TT rather than FT concentrations are associated with thyroid function.

Complied by : Prof. N. S. Neki