A Study on Assessment of Metabolic Syndrome Prevalence among Medical Students, Hospital Staff and Patients

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Abstract :

Introduction : Metabolic syndrome (MS) consists of constellation of metabolic abnormalities that confirms increased risk of cardiovascular diseases and diabetes mellitus. Detection and early management of (MS) is desirable in population. **Methodology :** According to WHO criteria (1998) for Asian population, assessment of prevalence of metabolic syndrome was done in three groups: (1) medical students, (2) hospital staff and (3) patients. Abdominal girth at umbilical level, systolic and diastolic blood pressure were recorded and fasting blood sugar, S. Triglyceride, S. HDL cholesterol were measured in each subjects. **Results :** It was found that Prevalence of metabolic syndrome was on increasing trend in all assessed subjects with advancement of age with male preponderance. All clinical and biochemical parameters in positive cases rose with advancement of age, positive abdominal girth(90%) and high systolic blood pressure(83%). Positive biochemical characters like S. triglyceride, S. HDL-C, FBS were noted 71%, 54% and 37% respectively among positive cases. Clinical characters were significantly more positive than biochemical characters. **Conclusion :** Assessment of abdominal girth and systolic blood pressure parameters are considered for mass population screening as cheaper parameters to find out metabolic syndrome positive case. When clinical characters are positive subject should be advised for biochemical test.

Key Words : Metabolic Syndrome, medical students, hospital staff, patients

Introduction :

According to WHO criteria (1998) subject having any three parameter above stipulated limit out of five parameters (1) abdominal girth at umbilical level among males > 90 cm and for females > 80 cm. (2) systolic blood pressure > 130 mm of Hg or diastolic blood pressure > 85 mm of Hg or on antihypertensive therapy (3) S. Triglyceride > 150 mg/ dl (4) S. HDL Cholesterol for male < 40 mg/dl and for female <50 mg/dl or on drug therapy for lipid abnormalities,(5) Fasting blood sugar > 100 mg/dl or on drug therapy for diabetes mellitus. [1] Metabolic positive cases might develop diabetes mellitus, increase risk for cardiovascular disease and also cerebrovascular stroke. [1, 2, 3] Isolation of metabolic syndrome positive cases in population and management of such group with life style modification, dietary modification, exercise programs and drug therapy would help in reduction in numbers of avert cases of diabetes mellitus and cardiovascular diseases in future in population. [2] It is also essential to develop cheapest criteria, clinical as well as biochemical, so it can be applied in future in mass screening of population at large. In our study we have tried to evaluate easily approachable subjects for isolation of metabolic syndrome patient of all age group and to find out positive stipulated components of metabolic syndrome.

The most accepted hypothesis to describe the pathophysiology of the metabolic syndrome is insulin resistance, which is caused by a defect in insulin action. The onset of insulin resistance is heralded by postprandial hyperinsulinemia, followed by fasting hyperinsulinemia and hyperglycaemia. [1] An early major contributor to the development of insulin resistance is an overabundance of circulating fatty acids. Free fatty acids (FFAs) are derived from adipose tissue triglyceride stores released by lipolytic enzymes lipase. Fatty acids are also derived from the lipolysis of triglyceride-rich lipoproteins in tissues by lipoprotein lipase. Insulin mediates both antilipolysis and the stimulation of Lipoprotein Lipase (LPL) in adipose tissue. The inhibition of lipolysis in adipose tissue is the most sensitive pathway of insulin action. When insulin resistance develops, increased lipolysis produces more fatty acids. Excessive fatty acids enhance substrate availability and create insulin resistance by modifying downstream signaling. Fatty acids impair insulin-mediated glucose uptake and accumulate as triglycerides in both skeletal and cardiac muscle, whereas increased glucose production and triglyceride accumulation are seen in liver. So increase in abdominal obesity ultimately results in metabolic syndrome. [1]

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Methods :

The current study was conducted at one of the Medical College at Ahmedabad city, India. After necessary permission from institutional ethical committee and oral consent from the study participants, the study was initiated. Subjects were randomly selected and classified in different three groups accordingly which were (1) Medical students' Group (2) Hospital staff and (3) Patients. Exclusion was done of those subjects, previously known cases of metabolic syndrome. All selected subjects were informed to come after overnight 8 hours fasting. After competing consent & formalities & personal data registration, abdominal girth (A/G) at umbilical level was noted in centimetres, systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded in recommended ideal condition of sitting posture with sphygmomanometer twice and the average reading was noted. There after subject underwent venepuncture with proper aseptic precautions and blood samples were collected & send for investigations like serum triglyceride (S.TG), serum High Density Lipoprotein (S.HDL) –Cholesterol & fasting blood sugar (FBS). Biochemical estimation was done with standard laboratory methods. [2]

Analysis of all results was done by classifying all subjects according to their age and classes and statistical analysis done by standard methods.

1. Classification according to class
   - Group 1 A: Medical Student, 2. Group 1B: Hospital Staff, 3. Group 1C: Patients.
2. Classification according to age group
   - Group 2 A: 20 years or below, 2. Group 2 B: 21 to 40 years, 3. Group 2 C: 41 or more years of age.

Result :

Table 1 : Prevalence of metabolic syndrome among study groups

Positive Metabolic syndrome	Medical Student Group 1A	Hospital Staff Group 1 B	Patients Group 1 C 18/27
Male	4/25	5/16	
Female	0/42	8/50	7/40
Total	4/67 (5.9%)	13/66 (19.6%)	25/67 (37.3%)

Table 1 shows lowest (MS) positive cases in Medical students while highest among patients attending the hospital.

Table 2 describe percentage of positive metabolic syndrome percentage in each classified groups. In group 1A medical student, 1 b staff and 1 c patients positive metabolic syndrome percentage are 5.9%, 19..6% and 37.3% respectively. Positive percentage in male as compare to female is significantly very high in all specified group. As mean age (SD) in group 1 a , group 1 b & group 1 c are 19.7(0.82),31.95 (12.36),& 40.28(13.1) respectively increases also results in increase in positive cases percentage 5.9%, 19.6% and 37.3% respectively.

Table 2: Distribution of characteristics of metabolic syndrome among study groups

Study groups		Age	characteristics of Metabolic syndrome					
			Abdominal Girth	SBP	DBP	S.TG	S.HDLC	FBS
			cm	mm of Hg	mm of Hg	mg/dl	mg/dl	mg/dl
Medical Student Group 1A	Mean (SD)	19.7 (0.82)	74.9 (11.54)	117.2 (10.46)	73.85 (5.88)	88.7 (29.19)	45.2 (7.65)	72.85 (10.73)
	Total		8	8	1	3	34	1
	Male		8	8	1	3	30	0
	Female		0	0	0	0	4	1
Hospital Staff Group 1 B	Mean (SD)	31.95 (12.36)	82.2 (10.31)	118.6 (11.72)	76.9 (8.36)	88.7 (29.19)	49.9 (9.9)	89.4 (11.07)
	Total		18	14	13	7	13	5
	Male		4	8	4	1	9	1
	Female		18	6	9	6	4	4
Patients Group 1 C	Mean (SD)	40.28 (13.1)	89.3 (14.02)	132.9 (15.97)	83.79 (11.88)	119 (40.0)	48.9 (9.9)	91.3 (11.07)
	Total		43	43	23	7	17	14
	Male		19	27	13	4	17	8
	Female		24	16	10	3	0	6

Table 3: Distribution of positive characteristics of metabolic syndrome among diagnosed cases(N=41)

Criteria	Characteristic (%)					
	Abdominal Girth	Systolic B.P.	Diastolic B.P.	S. Triglyceride	S. HDL	FBS
Positive	37 (90%)	34 (83%)	22 (54%)	29 (71%)	22 (54%)	15 (37%)
Negative	4 (10%)	7 (17%)	19 (46%)	12 (29%)	19 (46%)	26 (63%)
Total	41(100%)	41 (100%)	41(100%)	41 (100%)	41(100%)	41 (100%)

Table 3 describes that percentage of positive characteristics in metabolic syndrome diagnosed cases in all groups. Prevalence of positive cases percentage in abdominal girth, systolic B.P. and S triglyceride is 90%, 83% and 71%, respectively which is significantly higher than positive cases percentage in diastolic B.P. HDL-C and FBS is 54%.54% and 37% respectively. [4]

Table 4 shows as age is advances in each group either male or female there is increase in percentage of positive characteristics as compared with each group significantly. Only S. HDL-C decreases in percentage as positive characteristic in group 2C as compared to 2A but it is insignificant by percentage 13.3% to 9.0% respectively.

Table 4 : Age wise distribution of characteristics of metabolic syndrome among study participants

Age (in years)	Group	Frequency	A/G (%)	SBP (%)	DBP (%)	S.TG (%)	S.HDLC	FBS (%)
< 20 years	Group 2A							
	Male	26	4 (15)	7(27)	3(12)	2(7)	4(15)	0(0)
	Female	49	0 (0)	3(6)	0(0)	2(4)	6(12)	0(0)
	Total	75	4 (5.3)	10(13)	3(4)	4(5)	10(13.3)	0(0)
20-40 years	Group 2B							
	Male	26	9 (34)	12(46)	11(42)	2(7)	7(26)	4(15)
	Female	56	8(14)	12(21)	9(16)	2(3)	6(10)	1(19)
	Total	82	17(20.7)	24(29)	20(24)	4(4.8)	13(15.8)	15(18.20)
> 40 years	Group 2C							
	Male	16	14(87)	10(62)	11(68)	4(25)	3(18)	8(50)
	Female	28	7(25)	13(46)	13(46)	5(17)	1(3)	4(14)
	Total	44	21(52)	23(52)	24(54)	9(20.4)	4(9)	12(27.20)

Table 4 shows as age is advances in each group either male or female there is increase in percentage of positive characteristics as compared with each group significantly. Only S. HDL-C decreases in percentage as positive characteristic in group 2C as compared to 2A but it is insignificant by percentage 13.3% to 9.0% respectively.

Discussion :

Metabolic syndrome is a most interesting field in preventive medicine, as it predispose to diabetes mellitus type 2, cardiovascular diseases and cerebrovascular stroke etc. Identification of subjects suffering from metabolic syndrome, its prevalence in population and development of cheapest characteristics for mass screening is a challenging task. In this study, the result shows group related and age related prevalence. Prevalence of metabolic syndrome in our study in medical students was only 5.9% and 100% male predominance. Mean age in this group is below 20 years also suggesting metabolic syndrome also starts as early age due to dietary habits in the affluent class students. Age group analysis shows prevalence rises 5.3% to 20.7% in group 1A, below 20

years and group 1C between 21 to 40 years of age respectively. This is an alarming situation of bed dietary habits, sedentary life style. [5] Rise of metabolic syndrome prevalence from 20.7% to 52% in group 1.B and group 1.C respectively with male predominance suggest lack of hormonal protection in male and bad dietary habits and sedentary life style. The metabolic syndrome prevalence in male was from 15%, 34% & 83% in different three age groups studied while the metabolic syndrome prevalence in female was 0%, 14% & 25% in different three age groups. In all characteristics separately also showed same phenomena of rise in prevalence with rise in age as well as male preponderance. But HDL-C criteria where group 1B showed lowest prevalence of positive cases as compare to both other groups, which might be due to hormonal protection in female and awareness of exercise in1B female group. Prevalence of positive cases in abdominal girth, systolic B.P. and S triglyceride was 90%, 83% and 71%, respectively. Prevalence of positive cases in diastolic B.P., HDL-C and FBS was 54%.54% and 37% respectively. It suggests abdominal girth rise and rise in blood pressure might be due to high carbohydrate, fat and high salt in diet.[6] For mass screening of population for (MS), abdominal girth and blood pressure measurement can be utilised as cheapest characteristic and then positive cases should be submitted for fasting biochemistry for diagnosis of metabolic syndrome. Prevalence of metabolic syndrome in male and female shown in table 3 suggests less percentage of positive cases in female. It is due to hormonal protection as most of females are below menopausal age and more awareness about diet and exercise in young group of female.

Limitation of study :

Due to economical constrain number of subjects for study was less. Study with more number of subjects is advisable to confirm the conclusion.

Conclusion :

Prevalence of metabolic syndrome rises with advancement of age with male predominance. Abdominal girth and systolic blood pressure can be considered as most positive characteristic of metabolic syndrome as cheapest clinical assessment for mass screening.

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