



COMPARISON OF VARIOUS PARAMETERS OF METABOLIC SYNDROME, AND ILLUSTRATION OF MOST COMMON PARAMETER LEADING TO METABOLIC SYNDROME IN TYPE2 DIABETES.

Endocrinology

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KEYWORDS

INTRODUCTION

Metabolic syndrome is a cluster of metabolic abnormalities that often co-exist and would lead to a marked increase in the risk of cardiovascular disease (CVD) and type 2 diabetes mellitus (T2DM) including obesity, hyperglycemia, dyslipidemia and hypertension [1-7]. The essence of the metabolic syndrome lies in the clustering of these risk factors, whose presence has extensively been reported to point to an almost five-fold elevation in CVD risk [6,8-11]. Metabolic syndrome is common in individuals with diabetes mellitus (DM) and significantly more common in patients with T2DM than in those with type 1 diabetes mellitus (T1DM) [12-14]. The total CVD risk attributable to the syndrome has been observed to exceed the sum of the risk from each of the separate components [8,15]. Hence, it becomes a great burden on public health and clinical practice [16]. Metabolic syndrome consists of a multi-factorial set of indicators [17-19]. The World Health Organization (WHO) definition [5] was the first to tie together the key components of Metabolic syndrome: insulin resistance, obesity, dyslipidemia and hypertension, where the presence of insulin resistance is mandatory. With that said, this definition also allows patients with T2DM to be diagnosed with Metabolic syndrome if they meet the other criteria. Although different terms have been used for the insulin resistance syndrome or syndrome X, the term Metabolic syndrome was coined by Adult Treatment Panel III- National Cholesterol Education Program (ATP III- NCEP) to use a common definition in global context(20).

NCEP: ATP III 2001 criteria for the metabolic syndrome modified for asian population.

Three or more of the following

- Central obesity: waist circumference >90 (males), >80cm (females).

Hypertriglyceridemia: triglyceride level ≥ 150 mg/dl or specific medication.

Low HDL cholesterol: <40mg/dl for men and <50 mg/dl for women or specific medication.

Hypertension: blood pressure > 130 mmHg systolic or > 85 mmHg diastolic or specific medication.

Fasting plasma glucose level: ≥ 100 mg/dl or specific medication or previously diagnosed type 2 diabetes.

Metabolic syndrome increases the risk factor of developing diabetes and/or CVD by 30%-40% within 20 years, depending upon the number of risk factors present(21). Various studies have shown high prevalence of Metabolic syndrome in South Asians including India, probably due to high level of insulin resistance among them(22)

Aims and objectives

The aim of the present study was Comparison of various parameters of metabolic syndrome, and illustration of most common parameter leading to metabolic syndrome in type2 diabetes mellitus patients attending medicine opd of SGT medical college Gurgaon.

Methodology

A total of 100 patients of type II diabetes who were willing to take part in the study and who had given informed written consent were randomly selected and recruited. Information about subject's age, sex, monthly income, life style, family history of diabetes and other diseases/disorders were recorded. Height, weight and waist circumferences were measured with the subject barefooted and lightly dressed. The abdominal circumference (waist) was measured at the end of expiration. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. Blood pressure was measured with special precaution individuals were requested to take 10 min rest at sitting position before measuring the BP. Blood pressure was measured by standardized protocols, and hypertension was defined based on the criteria of the Seventh Report of the Joint National Committee guidelines. According to this protocol, systolic and/or diastolic blood pressure $\geq 130/85$ mmHg and/or the current use of antihypertensive medication in diabetes diagnosed as hypertension. Before registering for the study written consent was obtained from each participant. Blood sample (5ml) was collected from each subject. Plasma was separated by centrifuging blood and analyzed for fasting blood glucose, total cholesterol triglycerides and HDL cholesterol were estimated by CHOD-PAP, triglycerides and HDL- Cholesterol was estimated by spectrophotometric assays employing commercially available kits. LDL and VLDL were calculated from Friedewald's formula.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean \pm SD and categorical variables were summarized as percentages. Frequency distribution tables, bar and pie charts were used for data presentation. Chi-square test or Fisher's exact test, whichever appropriate, was used to determine association between various categorical variables. P-value less than 0.05 was considered statistically significant. All P-values were two tailed.

Results :

A total of 100 patients of type 2 diabetic were recruited, with 57 male(57%)and 43 females (43%). Table 1 is showing the different clinical parameters among male and female groups. The mean age of the participant was 53 years and the mean duration of diabetes was 5.3years with (P \leq 0.05) significant difference between male and female. When comparison was made between male and female, fasting blood glucose, weight, height, systolic as well as diastolic blood pressure were observed to be significant(P<0.001).

Table 1 showing various parameters of study group with type2 diabetes

Parameter	Males (n=57)	Females (n=43)	Difference(95%CI) p value
Age (years)	56±8.5	54±7.0	2(.388,3.5)*
Diabetes duration (yrs)	6±3	5.8±3	0.2(0.0182,1.60)*
Blood sugarF(mg/dl)	142.7±55	157±58.6	-15(-30.8,-8.5)**
P.P (mg/dl)	209±55	221±79	-12(-25.02,2.03)
Waist Cir. (Inches)	39±16.4	38.4±20	1.6(-1.68,4.86)
Systolic BP (mmHg)	138.6±20	132.7±18.5	5.1(2.1,7.8)**
Diastolic BP (mmhg)	82.8±12	85.2±11.1	2.5(-.76,4.4)*
Triglycerides mg/dl	159.3±79	151.3±61	-4.3(-16.8,8.8)
HDL-C(mg/dl)	42.6±20	44.7±18.2	1.1(-4.6,2.4)
Height (cms)	165.5±7.8	153.3±7.5	11.7(10.3,13.08)**
Weight (kgs)	67.8±10.8	62±11.1	5.8(4.5,8.4)**

Data tabulated as Mean ±SD, *P< .05, **P< .001. Difference is the difference in the mean and percentage of the variable between males and females.

Metabolic syndrome was diagnosed in 46(46%) [95%CI: 42.31-49.69]participants using the NCEP-ATPIII criteria .The prevalence of metabolic syndrome was found to be highest in age group of 50-59 years with 39%.

Table 2. Comparing the clinical data among two groups (Metabolic and Non Metabolic) of type 2 diabetic subjects in males.

Parameter	Subjects with metabolic syndrome n1 = 25	Subjects without metabolic syndrome n2= 33	Significance
Age (year)	56±8.5	53±21	p=0.696
Waist Circumference (Inches)	39.±16.4	35.4±3.2	p<<0.001
SBP (mmHg)	138.6±20	122.4±12	p<<0.001
DBP (mmHg)	82.8±12	73.32±10	p<<0.001
Diabetes duration yrs	6±3	5.7±4	p=0.696
Triglyceride (mg/dl)	159.3±79	116.8±50	p<<0.001
HDL-C (mg/dl)	44.7±18.2	49.6±5	p<<0.001
Fasting (mg/dl)	142.7±55	123.3±48	p<<0.001

Table 3 Comparing the clinical data among groups (Metabolic and Non Metabolic) of type 2 diabetic subjects in females.

Parameter	Subjects with metabolic syndrome n1 = 25	Subjects without metabolic syndrome n2= 18	Significance
Age (year)	54±7	52±75	p=0.096
Waist Circumference (Inches)	38.4±2	34.2±2	p<<0.001
SBP (mmHg)	132.7±18	123.4±16	p<<0.001
DBP (mmHg)	85.2±11.1	72.32±10	p<<0.001
Diabetes duration yrs	5.8±3	4.7±2	p<<0.001
Triglyceride (mg/dl)	151.3±61	119.8±55	p<<0.001
HDL-C (mg/dl)	42.6±20	50.4±20	p<<0.001
Fasting (mg/dl)	157±58.6	149.3±55	p=0.496

Presence of components of metabolic syndrome with percentage according to ncep ATPiii guidelines in table 4

Variable	Males n =57	Females n =43	
Waist circumference (Men >90 cm; Women >80 cm)	32(56%)	35 (81%)	Most common parameter in females
Hypertension	34(59%)	28(64%)	Most common parameter in males

Elevated triglyceride (>150 mg/dl)	27(47%)	19(44%)	
Low HDL cholesterol (Men >90 cm; Women >80 cm)	15(27%)	23(53%)	

Discussion :

The study was done on the prevalence of Metabolic syndrome and Comparison of various parameters of metabolic syndrome, and illustration of most common parameter leading to metabolic syndrome in Indian diabetic population attending opd of medicine department of SGT medical college using National Cholesterol Education Program-Adult Treatment Panel-III (NCEP- ATPIII).The study also compared different parameters defining metabolic syndrome between male and females.The mean Age group seen in our study was of 56±8.5 in males and 54±7 in females which was also in study done by **Dr Rajpal Verma et al (23)**. The prevalence of metabolic syndrome in diabetes was found to be 46% in accordance with study done by **Dhananjay Yadav et al(24)**,prevalence of metabolic syndrome is increased in patients with type II diabetes as compared to general population in north India where it was found in **ICMR task force collaborative study(25)** prevalence of metabolic syndrome was 30 per cent in urban areas of Delhi and 11 per cent in rural Haryana as per NCEPATP III criteria.while comparing different parameters leading to metabolic syndrome it was seen waist circumference was most common parameter contributing to metabolic syndrome in females with 81 % females having central OBESITY followed by hypertension and low HDL finally elevated triglycerides same results were seen In a study by **Hsieh et al (26)**where as in males most common parameter leading to metabolic syndrome was hypertension followed by central obesity ,elevated triglycerides and low HDL similar to results given by study **DHANARAJ et al (27)**. Females usually are involved in household work and have a sednary life style and this is a Valid argument explaining more prevalence of metabolic syndromes in females than males and common parameter being central obesity. With cigarette smoking more common in males and as a risk factor for developing hypertension hence a more common finding leading to metabolic syndrome in males.

Conclusion :

prevalence of metabolic syndrome is more in diabetes and more prevalent in female sex mainly due to sednary livestyle in females and noncompliant to dietary modification and treatment Most important factor of metabolic syndrome in diabetic females is central obesity followed by hypertension , low HDL and elevated triglycerides follows while as different pattern is seen in males with hypertension being most common factor followed by central obesity and elevated triglycerides and low HDL .

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