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To evaluate is elevated serum triglyceride the strongest single indicator for the presence of metabolic syndrome in patients with type 2 diabetes.

Pharmacology

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ABSTRACT

Background:- The metabolic syndrome (MS) is described as clusters of abnormalities including abdominal obesity, insulin resistance, hypertension , hyperglycemia , increased triglycerides and decreased high density lipoprotein cholesterol (HDL-C)1.
Patients with diabetes have metabolic syndrome with estimated prevalence of 69.9 per cent for whites, 64.8 percent for blacks, and 62.4 percent for Mexican Americans.
Material and Methods:- The study was cross sectional. A total of 384 type II DM patients among these 384 patients males were 203 (52.86%) aged 46-66 years and females were 181 (47.14%) aged 45-65 years were enrolled in the study. Blood Pressure , serum lipid profile , waist circumference were measured in this study. Glycated hemoglobin (HbA1c) test was used to confirm Type II DM among the new cases. Metabolic syndrome was diagnosed using modified National educational program adult treatment panel-III NCEP ATP-III criteria.
Result :- Among 384 diabetic patients, metabolic syndrome was present in 280 patients. The incidence was highest in 50-60 year's age group and lowest in 31-40 years age group. Metabolic syndrome was predicted highest by Triglycerides (62.14% patients,47% male & 53% females) followed by HDL (61%) and than by Hypertension (60%). Sex wise analysis of data shows that HDL in female (48%) and hypertension in males (30%) was strongest predictor indicators of MS in type II DM.
Conclusion:- Based on this study we find that triglyceride, hypertension and HDL together can be used as predictor for MS in type II DM, out of these three serum triglyceride may be considered as the strongest single predictor of MS in type II DM where as HDL in female and hypertension in males may be used as strongest predictors of MS in type II DM.

KEYWORDS

Type II Diabetes Mellitus, Metabolic Syndrome, HDL, Triglyceride (TG), Waist Circumference (WC), Hypertension, prevalence, predictor

INTRODUCTION

The term diabetes mellitus describes a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both 2.

The prevalence of diabetes has increased dramatically in the last 3 decades. Metabolic syndrome is a strong risk factor for incident diabetes. Among components of metabolic syndrome, obesity and abnormal carbohydrate metabolism are the most significant predictors. The metabolic syndrome (MS) is described as clusters of abnormalities including abdominal obesity, insulin resistance, hypertension, hyperglycemia, increased triglycerides, and decreased high density lipoprotein cholesterol (HDL-C)1.The number of people with hyperglycemia also differs by age , sex and race.

Most patients with diabetes have metabolic syndrome with estimated prevalence of 69.9 % for whites, 64.8 % for blacks and 62.4 % for Mexican Americans. Type II DM is a significant risk factor for coronary heart disease (CHD) and stroke. At least 65% of people with Type II DM die of some form of heart disease and stroke.

Patients with Type II DM have an increased prevalence of lipid abnormalities, which contribute to higher rates of CHD. High triglycerides and low HDL cholesterol levels were significantly related to all coronary heart disease events 3.

According to National Health and Nutrition Examination Survey (NHANES III) data, people who did not have MS, had the lowest risk for cardiovascular disease (CVD) events, those with MS had an intermediate level of risk, and those with diabetes had the highest level of risk 4.

Materials & Methods:-

The study was hospital based cross sectional. It was conducted in out patient department of tertiary care hospital of north India. In order to conduct the study Approval from the Institutional Ethics Committee was obtained. A total of 384 type II DM patients among these 384 patients males were 203 (52.86%) aged 46-66 years and females were 181 (47.14%) aged 45-65 years, were enrolled in the study after obtaining written informed consent. Patients with liver disorder, renal disorder, alcohol consumption, Cushing syndrome, estrogens/ OCP Administration & Acute Pancreatitis were not included in the study.

The enrolled patients were divided in metabolic syndrome and non metabolic syndrome.

Each enrolled patient was subjected to detailed medical history, demography and physical examination. . Anthropometric parameters such as BP by sphygmomanometer, waist circumference by measurement tape in cms or inches were measured.

Blood samples were obtained for testing of blood sugar, lipid profile, liver and renal function.

Metabolic syndrome was diagnosed using modified National educational program adult treatment panel-III NCEP ATP-III criteria.

**Criteria for Clinical Diagnosis of Metabolic Syndrome ATP III**
When 3 of 5 of the listed characteristics shown in Table 1 are present, a diagnosis of metabolic can be made.

**Table 1. ATP III Clinical Identification of the Metabolic Syndrome**

| Risk Factor	Defining Level
Men (Waist Circumference)	> 102 cm (>40 in)
Women (Waist Circumference)	> 88 cm (> 35 in)
Triglycerides	> 150 mg/dl
Men (HDL Cholesterol)	< 40 mg/dl
Women (HDL Cholesterol)	< 50 mg/dl
Blood Pressure	> 130/>85 mm hg
Fasting Glucose	> 110 mg/dl

Results & Observations
1. Graph No. 1 shows Mean Systolic Blood Pressure in Metabolic Syndrome positive patients is 126+25.65 and in Metabolic Syndrome negative patients 129+15.20.

Mean SBP
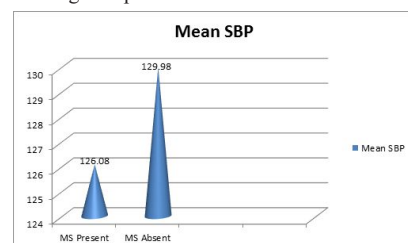
2. Graph No. 2 shows Mean Diastolic Blood Pressure in Metabolic Syndrome positive patients is 86.60+14.09 and in Metabolic Syndrome negative patients 82.43+15.31

Mean DBP
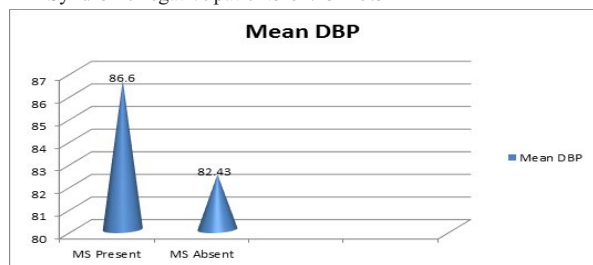
3. Graph No. 3 shows Waist Circumference in Metabolic Syndrome positive patients is 91.49+7.10 and in Metabolic Syndrome negative patients 88.49+7.33

Mean WC
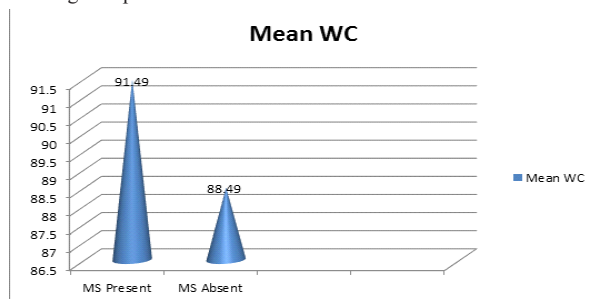
4. Graph No. 4 shows Mean Triglyceride in Metabolic Syndrome positive patients is 184+83.20 and in Metabolic Syndrome negative patients 136.80+49.67

Mean TG
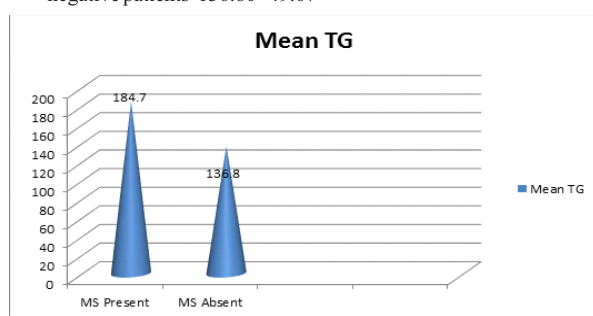
5. Graph No. 5 shows HDL-C in Metabolic Syndrome positive patients is 42.87+6.51 and in Metabolic Syndrome negative patients 45.45+6.32

Mean HDL-C
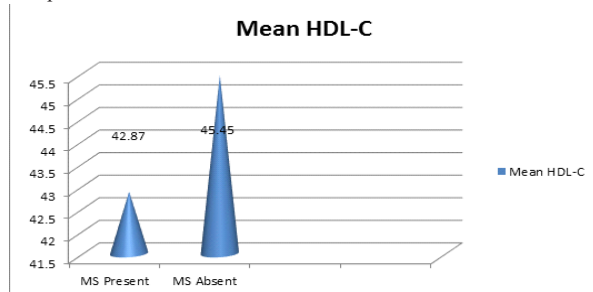
6. Table no. 1 shows, that among 384 diabetic patients, metabolic syndrome is present in 280 (72.92%) patients according to NCEP-ATP III Criteria, and metabolic syndrome is absent in 104 (27.08%) patients.

Age Group (In yrs)	Metabolic Syndrome		Total
	Present	Absent	
31-40	21 (5.47)	19 (4.95)	40 (10.42)
41-50	65 (16.93)	22 (5.73)	87 (22.66)
51-60	98 (25.52)	33 (8.59)	131 (34.11)
61-70	71 (18.49)	24 (6.25)	95 (24.74)
71+	25 (6.51)	6 (1.56)	31 (8.07)
Total	280 (72.92)	104 (27.08)	384 (100.00)

The graph shows Mean age of MS positive patients is 56.77+10.52 and mean age of MS negative patients is 54.07+11.49.

In MS positive patient's highest incidence was b/w 50-60 years and lowest was b/w 31-40 years.

Mean Age
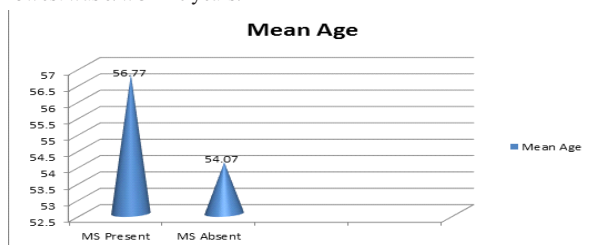
7. Table no. 2 shows various single parameters of metabolic syndrome as per NCEP ATP - III Criteria in type 2 DM patients.

Parameter	Male	Female	Total	Mean+SD
HDL	37	135	172	42.87+6.52
TG	82	92	174	184+83.35
W.C.	26	68	94	91+7.10
HYPERTENSION	84	85	169	NA

Observations:-

In our study 384 pts of type 2 diabetes mellitus were included, among these 384 patients males were 203 and females were 181, Metabolic Syndrome was present in 280 (72.92 %) pts and absent in 104 pts as per modified NCEP ATP-III Criteria.

By analyzing various individual parameters predictors of metabolic syndrome in type 2 diabetic patients, triglycerides predicted maximum 174(62.14%) patients in which 82 (29.28%) were males and 92 (32.85%) were females. HDL predicted 172 (61.14%) patients in which 37 (13.21%) were males and 135 (48.21%0 were females. Hypertension predicted 169 (60.35%) in which 84 (30%) were males and 85 (30.35%) were females. WC predicted 94 (33.57%) in which 26 (9.28%) were males and 68 (24.28%) were females.

In summary we can assume that in our study serum triglyceride is strongest predictor in males while HDL predicted strongest predictor in females.

Complications :-

In our study MS with type 2 DM had complications as IHD. Our studies shows 32.29% MS positive pts have IHD while in MS negative group only 7.03 % have IHD. Thus it indicates more cardiovascular complications associated with MS and type 2 DM.

Conclusion

All type 2 DM patients divided in to MS positive 280 (72.92 %) and MS negative 104 (27.08 %) group by modified NCEP ATP III Criteria. Out of 280 MS positive patients TG (62.14%), HDL (61.42 %) , HTN (60.35 %), WC (33.57 %) predicting MS.

Females have higher chances of MS (41.15%) than Males (31.77%).If gender excluded TG was highest predictor for MS in type II DM pts.

Cardiovascular complications as IHD were higher in MS positive pts as compared to non MS type II DM pts.

References

1. Grundy SM. Hypertriglyceridemia, insulin resistance, and the metabolic syndrome. Am J Cardio11999; 83:25 F-29 F.
2. Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications, Report of WHO Consultation, 1999.
3. Alexander CM,man PB, Teutsch SM, Haffner SM. Third National Health and Nutrition Examination Survey (NHANES III0; National Cholesterol Education Program (NCEP). NCEP defined metabolic syndrome, diabetes, and prevalance of Dhanaraj et al : Metabolic syndrome in Newly Detected T2 DM 513 coronary heart disease among NHANES III participants age 50 years and older. Diabetes 2003; 5 : 1210-4.
4. Park YW, Zhu S, Palaniappan L , Heshka S, Carnethon MR, Heymsfield SB. The metabolic syndrome : prevalence and associated risk factor findings in the US population from the third National Health and Nutrition Examination Survey, 1988-1994. Arch Intern Med 2003 ; 163:427-36