ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Relation between Waist-Hip Ratio and Lipid Profile in Male Type 2 Diabetes Mellitus Patients

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ABSTRACT

Obesity is a positive risk factor in the development of type 2 Diabetes mellitus, dyslipidemia, insulin resistance and hypertension, which are linked more strongly to intra-abdominal and/or upper body fat than to overall adiposity. The present study was undertaken to establish the relation between W/H ratio and lipid profile in male type 2 diabetes mellitus patients. The study includes 69 male diabetic patients and were divided into Group 1 with 38 male diabetic patients with W/H ratio < 0.95 and Group 2 with 31 male diabetic patients with W/H ratio > 0.95. About 5 ml of blood sample was collected and used for the estimation of serum cholesterol, triglyceride and HDL- Cholesterol levels using standard methods. The circumference of the abdomen (waist) and the circumference of the hips were measured and the ratio was taken as Waist-Hip ratio (W/H ratio). From our study, we found that the mean serum cholesterol and triglyceride levels were higher in males in the diabetic group with W/H ratio > 0.95. The mean serum HDL-cholesterol levels were lower in males in the diabetic group with W/H ratio >0.95. When W/H ratio increases, serum cholesterol and triglyceride levels increases in male type 2 diabetes mellitus patients.

Keywords: W/H ratio, type 2 diabetes mellitus , obesity, serum cholesterol, triglyceride, lipid profile.

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ISSN: 0975-8585

INTRODUCTION

Type 2 Diabetes mellitus is characterized by three pathophysiologic abnormalities: impaired insulin secretion, peripheral insulin resistance, and excessive hepatic glucose production. Obesity, particularly visceral or central (as evidenced by the waist-hip ratio), is very common in type 2 Diabetes mellitus [1].

Individuals with diabetes mellitus may have several forms of dyslipidemia. Circulating lipoproteins are just as dependent on insulin as the plasma glucose. In obese patients with type II diabetes, a distinct “diabetic dyslipidemia” is characteristic of the insulin resistance syndrome. Its features are a high serum triglyceride level (300-400 mg/dl), a low HDL-cholesterol (less than 30 mg/dl), and a qualitative change in LDL particles. Measures designed to correct the obesity and hyperglycemia, such as exercise, diet and hypoglycemic therapy, are the treatment of choice for diabetic dyslipidemia. In the patients in whom normal weight was achieved, all the features of lipoprotein abnormalities are cleared [2].

In type 2 diabetes mellitus patients who are centrally obese, increased lipolysis causes the liver to increase glucose and very low-density lipoprotein output, while muscle uses less. This leads to a rise in blood glucose and triglycerides, a drop in HDL cholesterol, and an increase in small, dense LDL particles [3]. The present study was undertaken to establish the relation between waist-hip (W/H) ratio and lipid profile in male type 2 diabetes mellitus patients.

MATERIALS AND METHODS

The present work was carried out at KMC hospital, Attavar, Mangalore, after a written consent from all the participants and the institutional ethical clearance. The study includes 69 male diabetic patients and were divided into Group 1 with 38 male diabetic patients with W/H ratio < 0.95 and Group 2 with 31 male diabetic patients with W/H ratio > 0.95. About 5 ml of blood sample was collected and used for the estimation of serum cholesterol, triglyceride and HDL- Cholesterol levels using standard methods. The circumference of the abdomen (waist) and the circumference of the hips were measured and the ratio was taken as Waist-Hip ratio (W/H ratio).

Major selection criteria for diabetes included: a random plasma glucose level of 200mg/dL or greater when the symptoms of diabetes were present and fasting plasma glucose level of 126 mg/dL or greater.

STATISTICAL ANALYSIS

Data are expressed as Mean ± SEM. Statistical analysis was done by using “ANOVA”; students ‘t’ test. Tukey’s test was used in intercomparison of the three groups. P value was taken as significant at 5 percent confidence level ($P<0.05$).

ISSN: 0975-8585

RESULTS

The mean serum cholesterol, triglyceride and HDL-cholesterol levels of male type-2 diabetes mellitus patients with W/H ratio <0.95 were 198.18mg/dL, 237.78mg/dL and 36.97mg/dL respectively, and mean serum cholesterol, triglyceride and HDL-cholesterol levels of male type-2 diabetes mellitus patients with W/H ratio >0.95 were 226.88mg/dL, 255.22mg/dL and 33.79mg/dL respectively.

The mean serum cholesterol and triglyceride levels were higher in male type-2 diabetes mellitus patients with W/H ratio > 0.95 and it was statistically significant. The mean serum HDL-cholesterol levels were lower in male type-2 diabetes mellitus patients with W/H ratio >0.95 (Table-1, Fig-1).

TABLE -1: Cholesterol, Triglyceride, HDL (mg/dL) levels and W/H ratio in Male diabetic patients. Data were expressed as Mean ± SEM.

	W/H ratio < 0.95 (N = 38)	W/H ratio > 0.95 (N = 31)	P value
Cholesterol (mg/dL)	198.18 ± 4.49	226.68 ± 5.27	0.044 *
Triglyceride(mg/dL)	237.78 ± 8.65	255.22 ± 9.48	0.048 *
HDL (mg/dL)	36.97 ± 1.33	33.79 ± 1.77	0.299 #

* Significant, # Not Significant

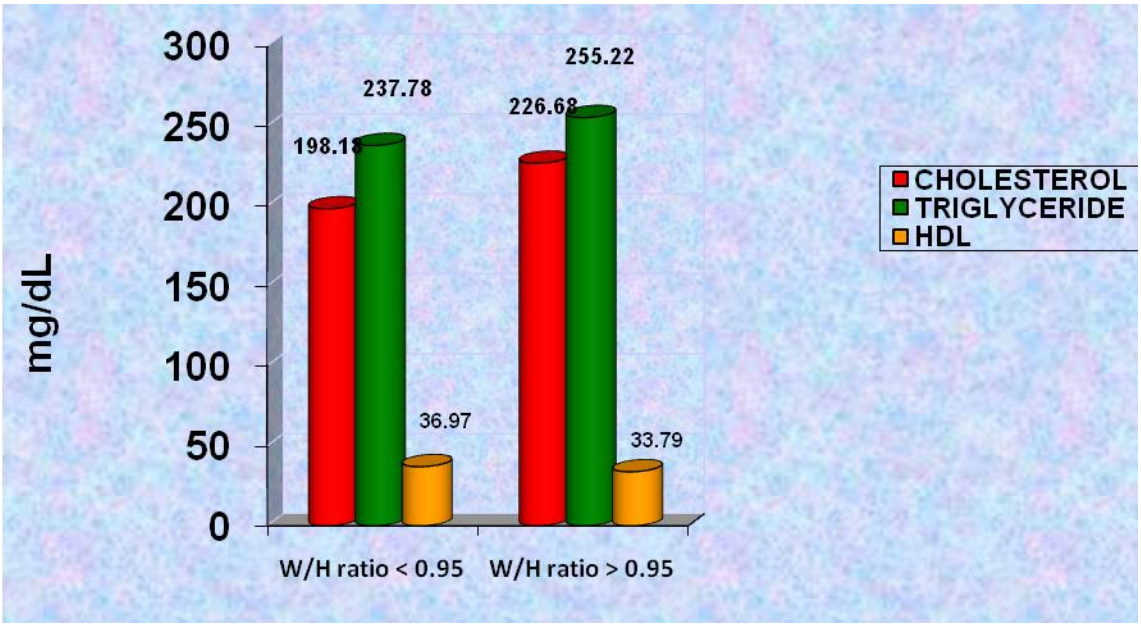

Fig-1: Mean Cholesterol, Triglyceride, HDL (mg/dL) levels, & W/H ratio in male diabetic patients

DISCUSSION

Obesity is a positive risk factor in the development of type 2 Diabetes mellitus, dyslipidemia, insulin resistance and hypertension [4]. Obesity is an abnormal growth of the adipose tissue due to an enlargement of fat cell (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity), or a combination of both. Obesity is often expressed in terms of body mass index (BMI) [5]. The distribution of adipose tissue in different anatomic depots also has substantial implications for morbidity. Specifically, intra-abdominal and abdominal subcutaneous fat has more significance than subcutaneous fat present in the buttocks and lower extremities. Determining the waist-to-hip ratio (W/H ratio), most easily makes this distinction [6].

The risk of diabetes increases progressively with increasing body mass index and waist-hip ratio. Weight gain is associated with an increase in insulin resistance and deterioration in glucose tolerance. Mainly the centrally located adipocytes have specific metabolic roles in the pathogenesis of insulin resistance and type 2 diabetes mellitus [7]. Haffner SM [8] et al., in 1987 assessed diabetes and cardiovascular risk factors in Mexican-Americans and found that W/H ratio was associated with type 2 diabetes mellitus rates, low HDL-cholesterol levels and high triglyceride levels. Buynes C [9] et al., studied the sex differences in fat distribution, W/H ratio, serum lipids, and blood pressure, in male and female patients with type 2 diabetes mellitus, and found that men had higher W/H ratio and lower HDL-cholesterol. Prospective studies of Gothenburg, Sweden have shown that both men and women who have a high Waist-Hip Ratio have increased risk of death, stroke, IHD, diabetes mellitus, hypertension and hyperlipidemia [10,11].

CONCLUSION

The present data indicte that when Waist-Hip (W/H) ratio increases, serum cholesterol and triglyceride levels increases in male type 2 diabetes mellitus patients. Improvement of glycemic control can lower serum triglyceride levels and have a modest beneficial effect on rising HDL-cholesterol.

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