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Relation between waist-hip ratio and lipid profile in type 2 diabetes mellitus patients

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ABSTRACT

Objective: To observe the relation between waist-hip ratio and lipid profile in type 2 diabetes mellitus patients. **Materials and Methods:** The present study was carried out at R L Jalappa Hospital attached to Sri DevaRaj Urs Medical College, Tamaka, Kolar, after a written consent from all the participants. The study includes 505 diabetic patients, in which 336 were males and169 werefemales. The waist andhip circumference were measured and the ratio was taken as Waist-Hip ratio and about 5 ml of blood sample was collected and used for the estimation of serum cholesterol, triglyceride and HDL-Cholesterol levels by using standard methods. Statistical analysis was done by using independent student t test and Pearson Correlation coefficient was calculated. **Results:** The waist hip ratio and lipid profiles were not significantly correlated. In type 2 diabetes male patients showed higher triglycerides (177.96 ± 100.19) with waist hip ratio > 0.9, whereas female patients showed less Triglycerides (178.19 ± 99.52) with waist hip ratio > 0.8. However these differences were statistically not significant. **Conclusion:** Multiple anthropometric parameters are required to correlate lipid profile rather than single parameter in type 2 diabetes mellitus. Along with anthropometric measurements, lipid profile is also need be monitored in type 2 diabetics.

Key words: Type two diabetes mellitus, Waist hip ratio, Lipid profile

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INTRODUCTION

Type 2 Diabetes mellitus (T_2DM) 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] Alterations in body fat distribution are associated with changes in lipids and lipoproteins and with increased coronary heart disease (CHD).[2] Individuals with diabetes mellitus may have several forms of dyslipidemia. In obese patients with T_2DM 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.[3] 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.[4] The present study was undertaken to establish the relation between waist-hip ratio and lipid profile in type 2 diabetes mellitus patients.

MATERIALS AND METHODS

The present study was carried out at R L Jalappa Hospital attached to Sri DevaRaj Urs Medical College, Tamaka, Kolar, after a written consent from all the participants. The study includes 505 diabetic patients in which 336 male's

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and169 females. The circumference of the waist and the hip were measured and the ratio was taken as Waist-Hip Ratio (WHR). Internationally accepted cut of points for WHR are >0.90 for men and >0.80 for women (National Cholesterol Education Program, 1994)[5] were considered. Male diabetic patients were divided into Group 1 with 49 patients withWHR< 0.90 and Group 2 with 287 patients with WHR> 0.90. Female diabetic patients were divided into Group1 with 7 patients with WHR < 0.80 and Group 2 with 162 patients with WHR> 0.80. About 5 ml of fasting blood sample was collected and used for the estimation of serum cholesterol, triglyceride and HDL- Cholesterol levels using standard methods. 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. Data were expressed as Mean ± SD. Statistical analysis was done by using independent student 't' testand Pearson Correlation coefficient was calculated and P value was taken as significant at 5 percent confidence level (P<0.05).

RESULTS

Total 505 type 2 diabetics were studied out of which 336 male and 169 were female patients. The base line features of the patients were shown in Table 1. The mean serum cholesterol, triglyceride and HDL-cholesterol levels of male type-2 diabetes mellitus patients with WH ratio <0.90 were 162.61 mg/dl, 163.12mg/dl and 37.46mg/dl respectively, and mean serum cholesterol, triglyceride and HDL-cholesterol levels of male type-2 diabetes mellitus patients with WH ratio >0.90 were 161.70 mg/dl, 177.96 mg/dl and 37.50mg/dl respectively. Table 2 and Figure 1 shows mean values of cholesterol, triglycerides and HDL cholesterol in relation to WHR in male type 2 diabetics. The mean serum cholesterol, triglyceride and HDL-cholesterol levels of female type-2 diabetes mellitus patients with WH ratio <0.80 were 184.14 mg/dl, 188.28 mg/dl and 35 mg/dl respectively, and mean serum cholesterol, triglyceride and HDL-cholesterol levels of female type-2 diabetes mellitus patients with WH ratio >0.80 were 180.41 mg/dl, 178.19 mg/dl and 37.88 mg/dl respectively. Table 3 and Figure 2 shows mean values of cholesterol, triglycerides and HDL cholesterol in relation to WHR in female type 2 diabetics.

DISCUSSION

Accelerated coronary and peripheral vascular atherosclerosis is one of the most common and serious complications of long term diabetes mellitus.[6] Along with other risk factors including hypertension, smoking and obesity, increasing importance has been given to secondary hyperlipidemia in the causation of accelerated atherosclerosis.[7] Obesity is a positive risk factor in the development of type 2 Diabetes mellitus, dyslipidemia, insulin resistance and hypertension.[8] Obesity is often expressed in terms of body mass index (BMI).[9] 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, most easily makes this distinction.[10] 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.[11] NarasimhaRaiet al[12] found that, asWaist-Hip ratio increases, serum cholesterol and triglyceride levels increases in male type 2 diabetes mellitus patients. Haffner SM et al.[13], in 1987 assessed diabetes and cardiovascular risk factors in Mexican-Americans and found that Waist-Hip ratio was associated with type 2 diabetes mellitus rates, low HDL-cholesterol levels and high triglyceride levels. Buynes C et al.,[14] studied the sex

Table 1: Base line features of patients

Parameter	Mean±SD
Age (years)	55.38±11.60
Height (cm)	162.91±8.87
Weight (Kg)	65.68±11.17
BMI (Kg/m^2)	24.69±4.23
Waist circumference (cm)	94.95±10.21
Hip circumference (cm)	94.89±10.14
WHR	1.01±0.12
Total cholesterol (mg/dl)	168.11±38.75
Triglycerides(mg/dl)	176.70±98.28
HDL-cholesterol(mg/dl)	37.59±5.34
LDL-cholesterol(mg/dl)	94.58±36.84

Table 2: WHR and lipid profile in male type 2 diabetic patients

Lipid parameter (mg/dl)	WHR≤0.90 (*N*=49)	WHR>0.90 (*N*=287)	*P* value
Cholesterol	162.61±33.05	161.70±36.08	0.948
Triglyceride	163.12±75.86	177.96±100.19	0.323
HDL-cholesterol	37.46±4.19	37.50±6.59	0.974

P= <0.05 considered significant

Table 3: WHR and Lipid profile in female type 2 diabetic patients

Lipid parameter (mg/dl)	WHR≤0.80 (*N*=162)	WHR>0.80 (*N*=162)	*P* value
Cholesterol	184.14±39.37	180.41±41.80	0.954
Triglyceride	188.28±139.16	178.19±99.52	0.120
HDL-cholesterol	35.00±4.93	37.88±5.12	0.627

P= <0.05 considered significant

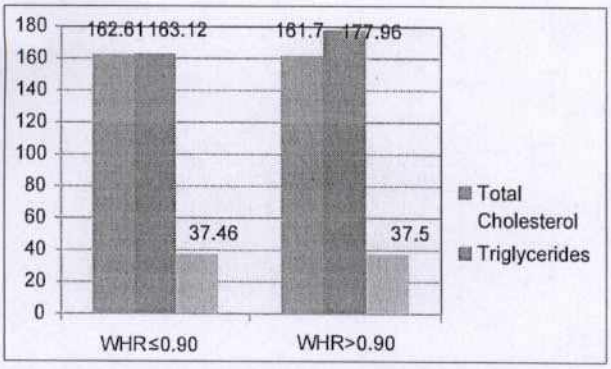

Figure 1: WHR and Cholesterol, Triglyceride and HDL-cholesterol levels in male diabetic patients

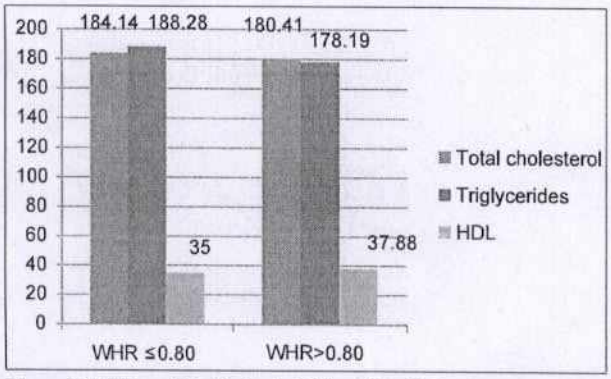

Figure 2: WHR and Cholesterol, Triglyceride, HDL-cholesterol levels in female diabetic patients

differences in fat distribution, WH ratio, serum lipids, and blood pressure, in male and female patients with type 2 diabetes mellitus, and found that men had higher WH ratio and lower HDL-cholesterol. Samir B Al - Mukhtar et al[15] found that , obese diabetics, when compared to non- obese diabetics, had significant increase in the levels of serum total cholesterol, triglycerides, LDL-C and VLDL-C while serum HDL-C differs significantly.

CONCLUSION

In the present study we found that waist hip ratio is not significantly associated with abnormal lipid parameters in both male and female type 2 diabetes mellitus. Multiple anthropometric parameters are required to correlate lipid profile rather than single parameter in type 2 diabetes mellitus. Along with anthropometric measurements, lipid profile is also need be monitored in type 2 diabetics.

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Authors Contribution:
JN – Concept of the study, Study Design, Manuscript Editing; **RRP** – Manuscript writing, Data collection, review of literature; **MRM** – Results and Discussion and Data Collection; **MV** – Statistical analysis.

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