



## Study of Anthropometric Markers of Diabetic Dyslipidemia

### KEYWORDS

Body Mass Index, Waist Hip Ratio ,Diabetic dyslipidemia

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**ABSTRACT** *Aim - To find out the relationship of anthropometric markers body mass index and waist hip ratio to dyslipidemia in type 2 diabetes mellitus . To evaluate the efficacy of body mass index and waist hip ratio as screening tools to identify dyslipidemia in diabetes mellitus<sup>3</sup> . To study the lipid abnormalities in diabetes mellitus . Materials and methods A descriptive study at Shree Sayajirao General hospital over a period of one year. Results There is high prevalence of dyslipidemia in diabetics especially in the elderly and female groups .Body Mass Index has a high specificity in detecting dyslipidemia.Waist hip ratio has a high sensitivity in predicting dyslipidemia , making it an effective screening tool in detecting dyslipidemia in diabetes.*

### Introduction

Diabetes mellitus has now a prevalence of 2 to 5 % in rural area and 4 to 15% in urban area in India and accounts for a considerable mortality and morbidity. An estimated 50% of all diabetics are having dyslipidemia. Helsinki heart study has shown that a decrease of 1 mg% of total cholesterol decreased the coronary heart disease by 4%. Framingham heart study showed that an increase in 1 mg% of HDL - cholesterol leads to a decrease of 3 % coronary risk. These observations show that diabetes with dyslipidemia makes a dangerous combination leading to micro and macro vascular complications. Obesity and dyslipidemia have been found to have a positive correlation. Framingham study showed that a change of 1 Kg/m<sup>2</sup> of body mass index is accompanied by a change of 0.07 mmol/l (2.7 mg%) in Serum cholesterol.

Anthropometric parameters like Body mass Index and Waist hip ratio (WHR) give a rough estimate of insulin resistance. Various anthropometric indices have been used to quantify generalised and central obesity. WHR is the most widely used index of regional adipose tissue distribution.

Tais et al compared BMI , waist circumference ,Waist hip ratio and percentage body fat measure as predictors of fasting lipid profile and insulin resistance in 109 Singaporean Chinese . BMI was significantly correlated with insulin resistance and there appeared to be a threshold at 25 Kg/m<sup>2</sup> above which the regression line became steeper. WHR best predicted fasting triglyceride in both men and women. CT scan and MRI are accurate imaging techniques for assessing body fat distribution but disadvantages are cost ,radiation exposure and limited availability. So other modalities like anthropometric parameters are required to act as screening tools to identify the at risk group

### Aims of the study

1 To find out the relationship of anthropometric markers body mass index and waist hip ratio to dyslipidemia in type 2 diabetes mellitus

2 To evaluate the efficacy of body mass index and waist hip ratio as screening tools to identify dyslipidemia in diabetes mellitus

3 To study the lipid abnormalities in diabetes mellitus

### Materials and methods :

Study sample - The study was carried out in clinical wards and diabetic clinic of Shree Sayajirao General hospital & Govt Medical College ,Baroda over a period of one year.

### Inclusion criteria

Age > 40 years

Type 2 diabetes previously diagnosed

### Exclusion criteria

Age < 40yrs , freshly detected diabetes mellitus, patients on treatment with lipid lowering agents, beta blockers ,thyroxin, patients of severe renal or hepatic diseases

### Methods

Clinical - All patients were examined in detail . Personal data was enquired into , following which a detailed clinical history was elicited. Duration of diabetes and treatment details were enquired. History suggestive of diabetic complications were also noted.

Anthropometric measurements were taken as per the guidelines of WHO in the WHO -Monica project. Measurements were done with a metric tape and corrected to the nearest 0.5 cm. Weight was measured by a standardized weighing machine. The weight was measured and rounded off to the nearest 200g. Lipid profile was done by NCEP guidelines.

### Results

On completion of study analysis of data was done to derive results

80 patients of type 2 diabetes was included in the study of which 52 patients (65%) had dyslipidemia.

Of the 80 patients 32 were male of which 17 patients had dyslipidemia .Prevalence in female patients was higher, 33 of 48 patients (69%).Prevalence in the elderly as defined by age more than 60 years was 69%.

BMI showed a sensitivity of 40% and specificity of 67% for

predicting dyslipidemia. Predictive value of BMI for dyslipidemia, that is, diagnostic power of high BMI for detecting dyslipidemia was 70%.

Predictive value of BMI to identify normal lipid profile was 38%. Percentage of false positives (high BMI with normal lipid profile) was 30%. 39 of 52 patients (75%) with dyslipidemia had high waist hip ratio (sensitivity of 75%). 17 of 28 patients with normal lipid profile had normal waist hip ratio.

11 of the 7 patients (40%) with normal lipid profile had high waist hip ratio

Age distribution - of the 82 patients 33 were elderly as defined by age more than 60 years.

dyslipidemia was present in 69% in elderly group. Of these high BMI was found in 62%.

High WHR was found in 76%.

Physical activity - 34 of the 80 patients were having sedentary lifestyle. 23 of them (67%) were having dyslipidemia.

Hypertension- 32 of the 80 were hypertensive. 9 patients with hypertension had high BMI and 86% had high WHR.

Lipid profile in diabetes : 52 of the 80 patients were having dyslipidemia. 35 patients were having hypertriglyceridemia, 24 patients had low HDL and 35 patients had raised LDL.

Relation of LDL with BMI and WHR - 14 patients with raised LDL had high BMI.

Sensitivity of BMI for raised LDL was 40% and specificity was 64%. 27 patients with high WHR had raised LDL. WHR had a sensitivity of 77% and specificity of 49% in detecting raised LDL.

## Discussion

In the present study the prevalence of dyslipidemia was 65%. A similar high prevalence was seen in Diabcare Asia study (54%). This is higher compared to the western studies showing a prevalence of 40-55%. The higher prevalence in the present study could be due to the Indian dietary habits with increased intake of refined carbohydrates and saturated fats. The sedentary life of urban population may also be another contributing factor. Ramachandran et al has observed a genetic predisposition for metabolic risks in Indians in his study in southern India. Prevalence of dyslipidemia in elderly was also high, could be due to the increased duration of diabetes.

BMI has a low sensitivity of 40% but a high specificity of 67%. But the association of BMI and dyslipidemia was not statistically significant ( $p > 0.05$ )

The disparity of dyslipidemia at low BMI may be more related to the Asian Indian phenotype of obesity where there is increased body fat with decreased lean body mass.

50 patients in the study had high WHR of which 39 patients had dyslipidemia. The association was statistically highly significant ( $p < 0.01$ ). This is consistent with the study of Fred Pet et al who found that WHR effectively identified individuals with dyslipidemia in his Study of

dyslipidemia and abdominal obesity in Europe. Mohan et al also found that WHR has a high association with dyslipidemia.

The higher prevalence of central obesity compared to BMI in the present study may again be related to Asian Indian phenotype of obesity where there is a tendency to accumulate excessive fat in abdomen.

Most of the patients leading sedentary lifestyle had high WHR (79%) while only 37% had high BMI. A positive correlation between central obesity and physical inactivity seen in the present study is consistent with that shown in the literature.

In present study 32 patients were hypertensives. High WHR was significantly associated with hypertension ( $p < 0.01$ ) which shows there is a clustering of risk factors of obesity and hypertension in diabetes.

Lipid profile in the present study showed 65% had dyslipidemia. 33% had decreased HDL and 43% had hypertriglyceridemia.

On comparing the efficacy of BMI and waist hip ratio to identify dyslipidemia in terms of raised LDL, decreased HDL and raised triglycerides, Waist hip ratio was found to be most sensitive than BMI especially in hypertriglyceridemic group.

## Conclusion

There is high prevalence of dyslipidemia in diabetics especially in the elderly and female groups.

Body Mass Index has a high specificity in detecting dyslipidemia. Waist hip ratio has a high sensitivity in predicting dyslipidemia, making it an effective screening tool in detecting dyslipidemia in diabetes.

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