Brief Communication

Correlations between anthropometry and lipid profile in type 2 diabetics

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ABSTRACT

Over a period of time, anthropometric parameters have evolved into reliable indicators for predicting the incidence of diabetes mellitus. A number of studies have shown correlations between anthropometry and lipid profiles in healthy volunteers. This study examined correlations between anthropometry and lipid profile in type 2 diabetics. The limited observations made in this study reveal that anthropometric parameters are not ideal for predicting lipid profile abnormalities in type 2 diabetics.

Key words: Body mass index, lipid profile, waist circumference, waist height ratio, waist hip ratio

Introduction

The prevalence of diabetes is rapidly rising all over the globe at an alarming rate. Diabetes is second only to cardio vascular disease (CVD) as a health burden in India. Type 2 diabetes mellitus – confined to older adults for most of the 20th century – now affects obese children even before puberty. Type 2 diabetes is commonly associated with obesity, hypertension, CVD, and lipid abnormalities. Approximately 58% of diabetes and 21% of ischemic heart disease globally are attributable to a body mass index (BMI) above 21 kg/m^2. At the same time, around 60% of low income patients borrow, mortgage, or sell their property just to keep their blood sugar levels under control.[1]

Anthropometric parameters are commonly used as research tools to assess the noncommunicable disease risk factors in the populations as they are inexpensive and easy to monitor at the community level.[2] Over a period of time these anthropometric parameters have evolved into reliable indicators for predicting the incidence of various noncommunicable disease risk factors in all populations though the threshold cut off values vary from population to population. Various studies have shown that anthropometric parameters such as BMI, waist circumference (WC), waist hip ratio (WHR), and waist height ratio (WHtR) are useful indicators for predicting incidence of type 2 diabetes in populations.[3-5]

Patients with type 2 diabetes mellitus-associated dyslipidemia remain exposed to a high residual risk of CVD complications, even if they are treated with current standards of care, making this one of the major unmet needs in the treatment of patients with diabetes. An understanding of the complex interplay of how treating dyslipidemia reduces the risk for CVD events in patients with type 2 diabetes mellitus and an ability to assess at-risk patients is necessary to ensure the most appropriate treatment strategies are implemented.

Aims and Objectives

The objective of this study was (1) to examine anthropometric parameters and lipid profile patterns in

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type 2 diabetics and (2) to study the correlations between anthropometry and lipid profile in type 2 diabetics.

Materials and Methods

This observational cross-sectional study includes 102 consecutive type 2 diabetics who satisfied the inclusion criteria. Informed written consent was obtained from every participant and the study was approved by the institutional ethics review committee. After taking a brief medical history, a detailed physical examination was conducted for all participants by a physician and the data was recorded in a predesigned questionnaire. Type 2 diabetics above the age of 25 years were included in the study. Smokers, alcoholics, and subjects with hepatic, renal, endocrine disorders, and those on lipid lowering agents were excluded from the study.

Weight, height, WC, and hip circumference were measured. BMI; WHR, and WHtR were calculated. The threshold cut off values adopted for anthropometrical parameters were BMI =>25 kg/m^2, WC=>90 cm for males and =>85 cm for females, WHR=>0.90 for males and =>0.85 for females and WHtR =>0.53 for both men and women.[6] The cut off values for dyslipidemia were according to National Cholesterol Education Program Adult Treatment Panel III criteria.[7] Hypertension was diagnosed when systolic blood pressure was 140 mmHg and diastolic blood pressure 90 mmHg. Venous blood samples were taken after an overnight fast for fasting blood glucose and 2-h post glucose blood sugar, glycosylated hemoglobin, and lipid profile.

Statistical analysis was carried out using SPSS16 version and in MS-Excel 2007. Pearson correlation coefficient was calculated to see the correlation between anthropometric parameters and lipid profile. For all statistical analyses, a P value < 0.05 was considered statistically significant.

Results

A total of 102 type 2 diabetic subjects with a mean age of 51.8 ± 10.72 years were studied and the mean duration of diabetes was 81 months. The mean values were above the threshold cut off values for three of the four measured anthropometric parameters (BMI, WC, and WHtR). The most common lipid abnormality found in this study was triglycerides followed by HDL and LDL. Statistically significant positive correlations were seen (r = 0.273, P = 0.033) between VLDL and BMI ≥25 kg/m^2 [Table 1] and significant inverse correlations were seen (r = −0.261, P = 0.048) between WHR and HDL in type 2 diabetics without hypertension. Statistically significant correlations were not seen between anthropometry and lipid profile in the total study group [Table 2].

Discussion

Anthropometric parameters above the threshold cut off values were found to be predictors of diabetes and other cardiovascular risk factors in various populations even though it is not clear which anthropometric parameter is ideal for a particular population. In some studies, positive correlations were seen between anthropometric parameters and lipid profile in healthy volunteers.[8] This study examined the correlations between anthropometry and lipid profile in type 2 diabetics. The study subjects were divided into several groups based on age, gender, poor and optimal glycemic control, with and without hypertension, anthropometric indices below and above the threshold cut off values, and with normal and abnormal lipid profiles. Positive correlations were seen only between BMI > 25 kg/m^2 and VLDL in the total study group. Inverse correlations were seen between WHR and HDL in type 2 diabetics without hypertension. In

Table 1: Correlations between BMI and lipid profile in type 2 diabetics

	TC	TG	HDL	LDL	VLDL
BMI ≥25 kg/m^2					
Pearson correlation	0.207	0.173	0.161	0.021	0.273*
sig. (2-tailed)	0.110	0.182	0.214	0.874	0.033
N	61	61	61	61	61

BMI: Body mass index, TC: Total cholesterol, TG: Triglycerides, HDL: High-density lipoprotein cholesterol, LDL: Low-density lipoprotein cholesterol, VLDL: Very low-density lipoprotein cholesterol, *Statistically significant positive correlations were seen (r=0.273, P=0.033) between VLDL and subjects with BMI ≥25 kg/m^2

Table 2: Correlations between anthropometry and lipid profiles in the total study population

	TC	TG	HDL	LDL	VLDL
BMI					
Pearson correlation	0.017	0.117	0.150	−0.022	0.210*
sig. (2-tailed)	0.866	0.243	0.132	0.829	0.034
N	102	102	102	102	102
WC					
Pearson correlation	−0.078	−0.029	−0.042	−0.131	0.027
sig. (2-tailed)	0.434	0.775	0.673	0.188	0.789
N	102	102	102	102	102
WHR					
Pearson correlation	−0.065	−0137	0.000	−0.098	−0.139
sig. (2-tailed)	0.514	0.168	0.997	0.326	0.163
N	102	102	102	102	102
WHtR					
Pearson correlation	0.001	0.044	0.013	−0.069	0.110
sig. (2-tailed)	0.996	0.660	0.894	0.491	0.270
N	102	102	102	102	102

BMI: Body mass index, WC: Waist circumference, HC: Hip circumference, WHR: Waist hip ratio, WHtR: Waist height ratio, TC: Total cholesterol, TG: Triglycerides, HDL: High-density lipoprotein cholesterol, LDL: Low-density lipoprotein cholesterol, VLDL: Very low-density lipoprotein cholesterol, Statistically significant correlations were not seen between anthropometry and lipid profile in the total study population

a recent Korean study, there was association found between WHR, total cholesterol and LDL cholesterol in men. In the same study, inverse correlations were seen between WC and HDL in women.[9] In a recent study from North India Sandhu *et al.* reported positive correlations between WHR, total cholesterol, LDL cholesterol, and triglycerides in the 41 to 50 year age group in men.[10] A recent study has demonstrated significant differences in anthropometric parameters and lipid profile patterns in type II diabetics in three different ethnic groups living in Malaysia.[11] These studies reveal that anthropometric parameters and lipid profile patterns may vary from one ethnic group to other, one geographical region to other and among different races. So the results of one study cannot be extrapolated to other studies and generalized conclusions cannot be drawn for all populations.

Conclusion

This lack of consistency between anthropometry and lipid profile in various studies shows that anthropometrical parameters are not ideal for predicting lipid abnormalities in type 2 diabetics.

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