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Body Mass Index and Waist Circumference in patients of Type 2 diabetes.

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ABSTRACT

The percentage of diabetics with general obesity is associated with poorer glycemic control and cardiovascular morbidity and mortality.This study was done to determine the presence of general and central obesity in patients diagnosed with type 2 diabetes mellitus (DM) for duration of one year or more. The study was done on 106 type 2 DM patients attending medicine opd of Punjab Institute of Medical Scieces, Jalandhar. The demographic and clinical data of all patients was recorded. BMI ≥25 and waist circumference ≥ 90 cm in males and 80 cm in females was taken as an indicator of obesity. Statistical analysis was performed using t-test and chi square test. Significance was defined as $p<0.05$. Percentage of diabetics with general obesity was 83.9% while 85.8% had central obesity.83% patients had raised BMI and waist circumference, 8.4% had normal BMI and waist circumference, 7.5% had increased waist circumference only and 4.7% had increased BMI alone. 87% of females had a waist circumference above the cut off value as compared to 83% males $(p<0.001)$.Similarly,82% females had raised BMI compared to 77% in males $(p<0.001)$. Results suggested that a larger percentage of type 2 diabetics have central obesity as compared to general obesity and both types of obesity was higher in females.The high prevalence of obesity in this population of diabetics suggests that structured weight reduction should be an integral part of attainment of glycemic targets.
Keywords: Diabetes Mellitus, Body Mass Index,Waist Circumference,Obesity.

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INTRODUCTION

Obesity is a major,indepentent and potentially modifiable risk factor for type 2 diabetes [1]. Obesity is associated with poorer control of blood glucose levels, blood pressure and lipid profile, making patients with diabetes at higher risk for both cardiovascular and microvascular disease. Central obesity has been associated with decreased glucose tolerance.[2] Diabetes is associated with central obesity more strongly than with general fat [2]. Waist circumference and waist/hip ratio have been used as measures of central obesity and body mass index has been used as a measure of general obesity. Studies have indicated that central obesity might be more important in the Indian population [3, 4]. With the rapidly increasing diabetic population in India , to determine the prevalence of obesity in these patients and treat it at the earliest with suitable lifestyle measures has become important. The objective of the study was to determine the presence of general and central obesity in patients with type 2 diabetes mellitus .

METHODS

The study population comprised of 106 type 2 diabetes mellitus patients. Ethical approval was obtained from the institutional ethics committee. The demographic and clinical data of all patients was recorded. The data collected for each patient was as follows - age, sex, duration of disease, body mass index (BMI), waist circumference, fasting and postprandial blood glucose levels and lipid profile .BMI 25, waist circumference > 90 cm in males and 80 cm in females were taken as indicators of obesity .Statistical analysis was performed using t-test and chi square test. Significance was defined as $p<0.05$ (two tailed) and the results were analyzed statistically.

RESULTS

Of the 106 patients, the mean age was 55 years in males and 52 in females . The mean duration of the disease was 8.5 years. The percentage of diabetics with general obesity was 83.9% while 85.8% had central obesity.

The distribution of BMI has been shown in Table.1.

Table 1 Distribution of the body mass index in Tye 2 diabetes mellitus patients.

Body Mass Index (kg/m2)	Percentage of patients n=106 n=(106)(%)
<18.5	0
18.5-22.9	8
23-24.9	9
25-29.9	61
>30	28

In view of the possible gender difference in the prevalence of obesity the distributions of BMI and waist circumference were determined separately for men and women with type 2 diabetes.

The results are shown in Table.2

Table 2 Body mass index and waist circumference accoring to gender

BMI category (kg/m2)	Males n= 48	Females n=58	p value
18.5-22.9	1	7	0.001
23-24.9	6	3	0.18
25-29.9	35	26	0.16
>30	6	22	0.001

Waist Circumference.
≥ 90 cm in males ≥ 80 cm in females, 40(83%) males 51(87%)
< 0.001 cm in females.

82% females had raised BMI compared to 77% in males (p<0.001). Similarly, 87% of females had a waist circumference above the cut off value as compared to 83% males (p<0.001). The mean fasting blood glucose was 152mg/dl and postprandial blood glucose 222mg/dl.

The fasting and postprandial blood sugar levels in relation to BMI and waist circumference is shown in Table.3.

Table 3. Fasting and post prandial blood sugar levels in relation to BMI and waist circumference.

	Normal BMI	Elevated BMI
FBS(mg/dl)	171.5	148.21
PPBS(mg/dl)	276.23	211.4

	Normal waist circiumference circumference	Elevated waist circumference
FBS(mg/dl)	176	142
PPBS(mg/dl)	287	276

BMI=Body mass index, FBS=Fasting Blood sugar, PPBS=Post prandial blood sugar, Waist circumferencem more than equal to 90 cm in males and 80 cm in females.

DISCUSSION

The data showed that obesity was common in the studied sample of type 2 diabetes patients . The association between obesity and diabetes was shown in few studies [3, 4]. The percentage of patients with central obesity was higher than those with general obesity indicating that early detection and control of central obesity might be more important in Asian population. There are few conclusive studies to demonstrate the superiority of BMI or waist circumference as an indicator of diabetes, but there is an indication of waist circumference being an important indicator of progression to diabetes [5]. Impaired fasting glucose patients are prone to develop overt diabetes tend to gain visceral fat more selectively than subcutaneous fat, compared with those who remained nondiabetic. This could be sustained by defects in adipogenesis or specificities in adipose tissue morphology, independently of body fat level [6]. Those presenting with new type 2 diabetes are more overweight than non-diabetic subjects [7], and obesity plays a causal part in the pathogenesis of type 2 diabetes. About 57.5% of the patients in our sample were overweight as per the revised guidelines for measurement of obesity for Asian population [8]. This group forms an important target for primary prevention . Males predominated in the overweight category while BMI>30 was significantly more common in females. Also, increased waist circumference was more common in females. However, the blood glucose levels did not differ significantly between the obese and nonobese individuals. To the contrary, blood glucose levels were found to be lesser in those with increased waist circumference. The difference might be because the number of patients with normal waist circumference was less and had longer duration of disease and might have been treated less aggressively It is known that weight loss in overweight patients with type 2 diabetes rapidly reverses the state of insulin resistance and can restore normal blood glucose concentrations [9]. A variety of intervention studies show that patients with type 2 diabetes who succeed in losing weight often enjoy modest improvements in glycaemic control and cardiovascular risk profiles, as long as the weight loss is maintained [10].

CONCLUSION

The study showed that obesity was common in type 2 diabetics. Central obesity was significantly more common in studied population. Both general and central obesity was more common in females. Although our study did not reveal any derangement of blood sugar values as compared to non obese diabetics, impaired control of blood glucose and lipid levels has been shown in other studies. The main reason could have been the smaller sample size of nonobese diabetics and proper treatment of both group of diabetics.

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