Original Research Article

A prospective study of association of obesity in patients with type 2 diabetes mellitus in a tertiary care hospital

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Abstract

Introduction: Diabetes is associated with a greater risk of morbidity and mortality from cardiovascular disease (CVD), and heart disease is the leading cause of death among people with diabetes.[1] Diabetes mellitus is a chronic disease that requires long term medical attention both to limit the development of its devastating complications and manage them when they occur. It is more common amongst developed countries where affluent and overweight individuals live longer than in under developed countries. **Materials and Methods:** This case control study was conducted in the Department of Medicine, Department of General Medicine, Tagore Medical College, Chennai from February 2019 to October 2019. The total 100 subjects of aged ≥ 35 years for this study. Furthermore, 50 males and females of diabetes mellitus (type II) were selected as test group and 50 control group from healthy population residing in chennai. **Results:** The comparison of BMI between cases and controls according to gender. The BMI of males in cases was 26.81±1.60 and controls was 22.73±1.58. However, BMI of females in cases was 27.09±1.54 and controls was 24.59±1.84. Therefore, the statistically significant difference of BMI in males and females between cases and controls. **Conclusion:** The difference of BMI in male and females was found to be statistically significant ($p<0.0001$) between cases and controls and BMI was found to be statistically significant ($p<0.0001$) higher in cases than controls in all the age groups. Moreover, The BMI of NIDDM of males were higher in both cases and control than females and it is more statistically significant 51-60 years.

Key Words: Diabetes, BMI, morbidity and mortality.

Introduction

Diabetes is associated with a greater risk of morbidity and mortality from cardiovascular disease (CVD), and heart disease is the leading cause of death among people with diabetes[1]. Diabetes mellitus is a chronic disease that requires long term medical attention both to limit the development of its devastating complications and manage them when they occur. It is more common amongst developed countries where affluent and overweight individuals live longer than in under developed countries[2].Although the WHO consultation agreed that the present BMI cut-off points should be retained as the international classification, they recommended for the purpose of public health action, cut off points 23.0, 27.5, 32.5, and 37.5 kg/m2 to be considered and proposed methods by which countries could make decisions for redefining obesity for the purpose of taking public health action in their population[3,4]. Moreover, waist circumference cannot distinguish abdominal subcutaneous fat, total abdominal fat, and total body fat, and it is strongly correlated with body mass index. Body mass index has been shown to be a good indicator of general fatness (fat areas in the arm, thigh, and waist using computed tomography scans), muscularity (muscle area in the thigh), and frame size (bone area in thighs)[5]. The aim of this study was to determine the BMI ranges in type II diabetic male & female subjects and to compare the BMI in type II diabetes mellitus with normal population in chennai.

Materials and methods

This case control study was conducted in the Department of Medicine, Department of General Medicine, Tagore Medical College, Chennai from February 2019 to October 2019. The total 100 subjects of aged ≥ 35 years for this study. Furthermore, 50 males and females of diabetes mellitus (type II) were selected as test group and 50 control group from healthy population residing in chennai.

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Study Design

Case - control study.

Study Location-This study was done in the Department of Medicine, Department of General Medicine, Tagore Medical College, Chennai.

Study duration -Chennai from February 2019 to October 2019.

Sample size

100 subjects.

Sample size calculation

For each variable, values were expressed as Mean±SD. The statistical analysis was carried out in Graph Pad Prism, ver.5.0 software using unpaired t-test'and ANOVA. At 95% confidence interval, p=126mg/dl. PP sugar >=200mg/dl 2 hrs. after meal RBS>=200mg/dl and HBA1C >=7 unit6 .

Exclusion criteria

1. Gestational diabetes.
2. Patients who are physically inactive.

BMI of each subject were calculated and categorized or divided in further groups to (a)To evaluate the gender distribution of cases and controls.(b) Comparison of BMI between cases and controls according to gender.(c) To evaluate the difference in the age groups between cases and controls.(d) To evaluate the comparison of blood sugar level between cases and controls in both genders.

Statistical Analysis-For each variable, values were expressed as Mean±SD. Chi-square test was used to compare the categorical variables between cases and controls. The statistical analysis was carried out in GraphPad Prism, ver.5.0 software using unpaired t-test' and ANOVA to compare BMI and blood sugar between cases and controls.

Results

A total of 100 subjects was enrolled in this study and further divided in 50 cases and 50 controls were included. Furthermore, the objective of our study, to determine the BMI of each subject were categorized or divided in further groups to (a) To evaluate the gender distribution of cases and controls. (b) Comparison of BMI between cases and controls according to gender. (c) To evaluate the difference in the age groups between cases and controls. (d)To evaluate the Comparison of blood sugar level between cases and controls in both genders.

Table 1: Gender distribution of cases and control

Gender	Cases (n=50)		Control (n=50)		P-Value
	Number	%	Number	%	
Male	27	54	28	56	**0.62**
Female	23	46	22	44	

Table 2: Comparison of BMI between cases and controls according to gender

Gender	Cases	Controls	P-Value
Male	26.80±1.50	22.64±1.51	0.001
Female	27.03±1.43	24.56±1.75	

The comparison of BMI between cases and controls according to gender. The BMI of males in cases was 26.81±1.60 and controls was 22.73±1.58. However, BMI of females in cases was 27.09±1.54 and controls was 24.59±1.84. Therefore, the statistically significant difference of BMI in males and females between cases and controls. Moreover, there is higher reduction in BMI of both cases and control in males and females is shown in table 2.

Table 3: Comparison of BMI between cases and controls according to age groups

Age in years	Cases	Controls	P-Value
<40 years	26.42±1.45	23.10±1.32	0.001
41-50	26.84±1.60	22.92±1.80	0.001
51-60	27.30±1.65	23.83±1.63	0.001
>60	26.52±1.10	24.63±1.82	0.001

Table 4: Comparison of blood sugar level between cases and controls

	Blood sugar (mg/dl) (Mean±SD)
Cases	305.02±60.75
Controls	113.80±12.30
P Value	0.0001

Discussion

In the present study was conducted in the Department of General Medicine, Tagore Medical College, Chennai with the objective to determine the BMI ranges in type II diabetic male and female subjects. A total subject were 100 which is further divided into 50 cases and 50 controls were included in the study. In this study we found that, More than one third of cases (38%) and (19%) of controls were in the age group 51-60 years. The mean age of cases and controls was 53.62±10.19 and 48.76±10.87 years respectively. There was insignificant (p>0.05) difference in the age groups between cases and controls. Furthermore, more than half of both cases (53%) and controls (57%) were males. There was insignificant (p>0.05) difference in the gender between cases and controls, But the body mass index (BMI) of the cases was found to higher than control subjects. BMI was 26.91±1.57 in cases and 23.53±1.94 in the controls. BMI was found to be in borderline of obesity in cases and within normal range as per WHO recommendations. Furthermore, the BMI of males in cases was 26.81±1.60 and controls was 22.73±1.58. However, BMI of females was 27.09±1.54 and controls was 24.59±1.84. In the past study, BMI of non-diabetic male and female were found to be around 22 kg/m[6,7].In 2002 WHO expert consultation was made to recommend body mass index (BMI) cut-off points for determining over-weight and obesity in Asians populations. They noted that the number of Asians with a high risk of Type II diabetes and cardiovascular disease is substantial at BMIs lower than 25 kg/m2. The cut-off points for observed risk varies from 22 kg/m2 to 25 kg/m2 in different Asian populations and for high risk it varies from 26 kg/m2 to 31 kg/m2. WHO consultation proposed that further study is required in different Asian countries to find out BMI cut-offs to assess potential risk in overweight population for diabetes and cardiovascular diseases[8,9].In the present study, the sensitivity and specificity of BMI with cutoff value ≥25.99 was 69% and 91%. PPV and NPV was 88.5% and 74.6% with accuracy being 80%. In a past study, for the definition of overweight, ROC curve analysis suggested optimal BMI cut-offs of 28.50 to 29.50 in men and 30.50 to 31.50 in women, but the levels of sensitivity and specificity were too low to be of clinical value and the overall misclassification was unacceptably high across all the selected BMI values (>0.80). In another previous study, for different BMIs, sensitivity and specificity for percentiles 25, 50, 75, 90 and 95 were obtained. Increased odds ratios for diabetes mellitus and hypertension were observed with BMI values > 25kg/m2. The 50th percentile corresponded to the highest sensitivity and specificity for the identification of risk for both diseases[10].

Conclusion

The difference of BMI in male and females was found to be statistically significant (p<0.0001) between cases and controls and BMI was found to be statistically significant (p<0.0001) higher in cases than controls in all the age groups. Moreover, The BMI of NIDDM of males were higher in both cases and control than females and it is more statistically significant 51-60 years.

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