Original Research Article

Association of BMI with glycemic control in type 2 diabetes mellitus patients

Kanyakumari D H[1], Mamata S D[2,*], Timmareddy Kataraki[3]

[1]Dept. of of Physiology, Basaveshwara Medical College, Chitradurga, Karnataka, India
[2]Dept. of Physiology, Mandya Institute of Medical Sciences, Mandya, Karnataka, India
[3]Dept. of Anaesthesiology, Basaveshwara Medical College, Chitradurga, Karnataka, India

A R T I C L E   I N F O

A B S T R A C T

An increase in body fat is generally associated with increased risk of metabolic diseases such as type 2 diabetes mellitus, hypertension and dyslipidaemia. However, not all overweight or obese patients have metabolic diseases, and vice versa. While these concepts may be well-accepted, and assumed to be readily accessible in the literature, the authors are unaware of any single report presenting comprehensive data regarding the relationship between BMI and metabolic diseases like diabetes.

90 diabetic patients of both sex were taken for study. Three groups with different duration of diabetes were made.

Anthropometric measurements were taken and glycemic control was measured in these patients.

Proper statistical method was applied. There was a no association btw BMI and glycemic control in diabetic patients, which emphasizes the role of lifestyle modification in these patients.

1. Introduction

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, action or both. The prevalence of diabetes for all age groups worldwide was 2.8% in 2000 and is estimated to reach 4.4% by 2030. The total number of diabetics is projected to rise from 171 million in 2000 to 366 million in 2030.[1]

Obesity is highly prevalent in the modern world and it is associated with the development of a number of serious medical complications, like type 2 diabetes and cardiovascular diseases.

Indians have a genetic phenotype characterized by low BMI, but with high upper body adiposity, high body fat percentage and high level of insulin resistance.[2] With this low BMI, but with high body fat percentage, there is increased prevalence rate of metabolic perturbations and DM, which is one of the cardiovascular risk factor

Western interference has lead to loss of physical activity and changes in food pattern from traditional unprocessed natural ingredients to highly refined energy dense fatty and sugary fast foods. These two core factors will be responsible for the high incidence of diabetes in the years to come.

The WHO in 1998 recommended that the fasting plasma glucose (FPG) threshold should be reduced from 140 to 126 mg/dl for diagnosing diabetes. This reduction in FPG was justified based on epidemiological studies that the cut-off level of 126 mg/dl or greater included individual with greater degree of hyperglycemia and there was also found to be an increase in the prevalence of diabetic retinopathy beginning at approximately 126 mg/dl.[3,4] In 2003, the FPG range was further lowered to 125 mg/dl to categorise people as having prediabetes so that affected individuals would more likely adopt early lifestyle interventions to reduce potential risk of developing diabetes in future.[5]

Maintenance of blood glucose homeostasis is of paramount importance to the survival of human organism.

This study was undertaken to know the correlation or association between body mass index and glycemic control

* Corresponding author.
E-mail address: kanshreyan4@gmail.com (Mamata S D).

in diabetic patients and benefits of maintaining BMI in diabetic patients.

2. Materials and Methods

This study was conducted at Basaveshwara Medical College & Research Institute, Chitradurga, after getting the approval of the Institutional Human Research Ethics Committee. The subjects residing in the suburban area of city were chosen from the outpatient department of Medicine. Before enrollment, written informed consent was obtained from each subject after explaining the nature of the study. A complete clinical examination was done. Sample size of this study was 90 (n) which consisted of males and females between 26–45 years. Patients were classified into group A, B, C depending on duration of diabetes.

Group A consists of diabetics with 5 years duration,
Group B consists of diabetics with 10 years and
Group C consists of diabetics with 15 years duration.

2.1. Subjects criteria

Inclusion criteria included: Known diabetic patients aged between 26 years and 45 years, and both males and females.

2.2. Exclusion criteria were

Subjects taking steroids/females taking oral contraceptive pills, known hypertensives, subjects with thyroid dysfunctions.

Estimation of blood glucose

Each subject was instructed to visit laboratory with 6 hours of fasting on a specific date, the blood samples (3 ml volume) was drawn for estimation glycated hemoglobin.

2.3. Anthropometric calculations

The height was measured using sliding stadiometer (Johnson and Johnson) with an accuracy of 0. 1mm.Weight was recorded using spring balance calibrated to 0.5kg accuracy.

Body Mass Index (BMI) was calculated based on the WHO formula-BMI = Weight in kg/Height in mt^2.[6]

3. Observations and Results

Descriptive stastics and Pearsons correlation was applied.

Table 1: Group –A(5 yrs of duration)

	Mean	Std. Deviation	N
BMI	25.3423	4.58024	30
HbA1c	10.5433	2.55217	30

Tables 1, 2 and 3 shows mean and Standard deviation for different groups and Table 4 shows correlation value to be

Table 2: Group –B (10 yrs of duration)

	Mean	Std. Deviation	
BMI	27.5528	3.79174	30
HBA1c	10.3931	1.86278	30

Table 3: Group –C (15 yrs of duration)

	Mean	Std. Deviation	
BMI	27.4345	4.26332	30
HBA1c	10.1759	1.56128	30

Table 4:

Group	r value(correlation)	p-value	Significance
A	0.017	0.927	NS
B	0.263	0.168	NS
C	-0.312	0.100	NS

0.017, 0.263,-0.312 for A,B,C groups respectively which is not significant.

When we compared BMI and glycated Hb values within the three groups there was no significant correlation was found.

4. Discussion

There are conflicting results in the literature regarding the association between BMI and glycemic control in subjects with T1D.[7–10] Some studies showed a positive association between BMI and glycemic control[7,9] while others did not.[8,10]

Similarly our study also did not show any association between BMI and glycemic control.

Data from both the SHIELD and NHANES surveys reported reflect and support the common clinical observation that patients with higher BMI are at higher risk for having diabetes mellitus, hypertension and dyslipidaemia. It also confirms the converse – that the majority of patients with these metabolic diseases are either overweight or obese. These results provide nationally representative data regarding the important relationship between BMI and these metabolic diseases.[11]

Rana JS et al. found that obesity and physical inactivity independently contribute to the development of type 2 diabetes; however, the magnitude of risk contributed by obesity is much greater than that imparted by lack of physical activity.[12] Epidemiologic studies and clinical trials suggest a strong association between physical inactivity and incident type 2 diabetes.[13–15]

In Korean subjects with T1D, an inverse relationship of BMI with HbA1c levels was observed in the low BMI group, while a positive correlation was shown in the high BMIgroup.

5. Conclusion

BMI has no relation with glycemic control in our study, however maintainance of BMI may delays the complications of diabetes.

Using simple screening methods in younger ages itself like measuring BMI, WHR and FBS, it is possible to identify individuals at high risk at an early age and accordingly lifestyle modifications can be adopted to postpone the complications of the disease and reduce the burden on the community and the nation. FBS measurement by glucometer is more convenient and less time consuming than routine lab testing as the equipment is portable.

6. Source of Funding

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7. Conflict of Interest

None.

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Author biography

Mamata S D Assistant Professor

Timmareddy Kataraki Senior Resident