

Prevalence of Obesity in Diabetic Subjects in South Kerala

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ABSTRACT

Introduction: The increasing prevalence of obesity in the population poses as an independent risk factor in developing diabetes. This study aimed to find the prevalence of Obesity in Diabetic patients compared to non diabetic patients who attended Medicine and Diabetology departments of various hospitals in South Kerala during the period June 2015 to May 2016.

Material and Methods: A total of 326 participants aged between 30 to 60 years were included in the study. Body mass Index and waist circumference was measured. Fasting plasma glucose was determined using the hexokinase method. 116 patients were obese (60 males and 56 females).

Results: The percentage of obese people were significantly more in diabetic compared to non diabetic and hyperglycemia was more prevalent in the obese. This prevalence of hyperglycemia was significant statistically.

Conclusions: The majority of overweight individuals are insulin resistant. Obesity, lack of exercise and a diet rich in saturated fat lead to insulin resistance and Diabetes. The more the grade of obesity, more was the prevalence of Diabetes.

Keywords: Diabetes, obesity, fasting blood sugar

INTRODUCTION

The incidence of Diabetes and other lifestyle diseases are increasing day by day in developing countries. Lifestyle diseases have an impact on the socioeconomic scenario because of increase in morbidity, mortality and loss of work hours.¹ Alteration in the pattern of lifestyle diseases can be achieved by modifying diet, increasing physical activity and probably an altered environment.^{2,3}

Obesity is an independent risk factor for Type 2 Diabetes and is rising in prevalence throughout the world.¹ Many inflammatory cytokines (interleukin IL-6), tumor necrosis factor- α (TNF- α), growth factors (heparin binding epidermal growth factor HB-EGF) and hormone-like substances (leptin, adiponectin, resistin) are found in adipose tissue.⁴ Weight reduction is associated with an improvement in a number of risk factors including fasting blood glucose. Although diabetes is a major risk factor for CAD, prediabetes in the form of impaired fasting glucose and impaired glucose tolerance can also be considered a risk factor. High HbA1C in diabetic population increases the risk of developing ischemic heart disease.

A combination of central obesity, insulin resistance, dyslipidemia, and hypertension constitutes metabolic syndrome. Metabolic syndrome is a major predictor of CAD both in diabetic and non diabetic patients.^{5,6}

World Health Organization (WHO) considers Body Mass Index (BMI) as the most important epidemiological measure of obesity. Obesity is defined as a BMI more than 30 and overweight between 25 and 30. BMI of 18.5-24.9 is seen in a person with normal weight. The distribution of body fat is not taken into account while calculating BMI, resulting in

differences in individuals and populations. Visceral fat increase results in truncal obesity, which is considered an important risk factor for heart disease.⁷

Visceral obesity is quantitated by measuring Waist Circumference. Waist-hip circumference ratio, Waist-height ratio and Waist Circumference account for regional abdominal obesity.

Metabolic syndrome is a group of disorders characterized by obesity, impaired glucose tolerance and an atherogenic lipid profile.^{8,9} It is also known as Reaven's syndrome or Insulin resistance syndrome. The hallmarks of this syndrome are Insulin resistance or reduced glucose tolerance and abdominal obesity.¹⁰ A characteristic feature in Asian Indians is the presence of Insulin resistance and hyperinsulinemia. Obesity is a main factor contributing to insulin resistance.^{11,12} This study aimed to find the prevalence of Obesity in Diabetic patients compared to non diabetic patients who attended Medicine and Diabetology departments of various hospitals in South Kerala during the period June 2015 to May 2016.

MATERIAL AND METHODS

We conducted this study on patients who attended Internal Medicine Department and Diabetic clinics of 2 hospitals in Trivandrum from June 2015 to May 2016. The study comprised 326 patients in the age group 30 to 60 years selected by random sampling. Information was collected from patients including age, occupation, history of preexisting diseases, the use of OHA, antihypertensives, statins, and history of addictions.

Waist circumference and body mass index were measured in both the groups. Waist circumference is the measurement midway between the inferior margin of last rib and the iliac crest at the end of expiration. Central obesity was calculated by measuring the waist circumference. The patients were said to be obese when waist circumference was greater than or equal to 40 inches for males and greater than or equal to 35 inches for females. WHO defines Diabetes mellitus as fasting plasma glucose concentration (FPG) greater than or equal to 126mg/dl, two hour PPG greater than or equal to 200mg/dl plus classic symptoms of hyperglycemia with a random plasma glucose greater than 200mg/dl. Prediabetes includes Impaired fasting plasma glucose (IFG), which is FPG between 100mg/dl and 125mg/dl.

STATISTICAL ANALYSIS

Microsoft office 2007 was used for the statistical analysis.

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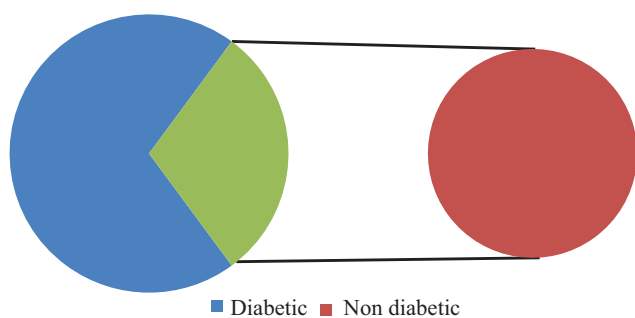


Figure-1: Obese diabetic and non diabetic

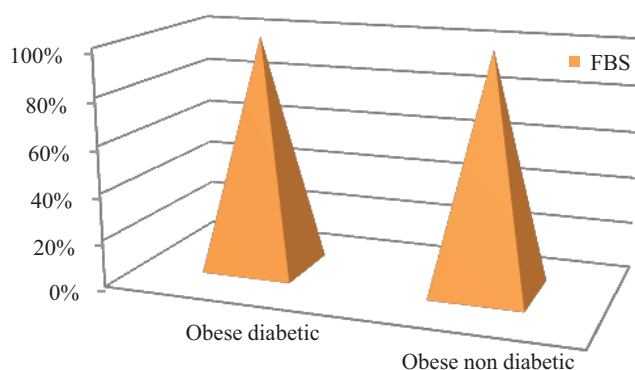


Figure-2: FBS

Descriptive statistics like mean and percentages were used for the data analysis.

RESULTS

The study population comprised of 326 subjects of age between 30 to 65 years. 116 subjects were obese (60 males and 56 female). 66% of diabetics had obesity, whereas 28% non diabetic were obese (figure 1). The study showed that there was a significant prevalence of obesity in the diabetic population ($p < 0.05$).

The average FPG in Obese diabetic group was found to be 131.2mg/dl and 98 mg/dl in control group (figure 2). Hyperglycemia was more common in the obese population, irrespective of the diabetic status. This difference was statistically significant. (A chi-square test- $\chi^2 (1, N=326) = 7.824, P < 0.005$)

DISCUSSION

326 patients in this study were grouped into obese and non obese category based on BMI. The subjects were grouped into obese, overweight and normal based on BMI >30 , between 25 and 30, and less than 25 respectively.

In this study, 116 subjects were obese. As obesity progresses, the chance of developing insulin resistance increases, with risk of impending diabetes.

Majority of obese individuals though active and healthy are insulin resistant. Diabetes becomes more prevalent in the obese population when multiple factors like physical inactivity and a lipid rich diet increases the chance of insulin resistance.⁵⁻⁷

The results show the following pattern. In the Diabetic population, the mean FPG was higher in obese when compared to the non obese. The proportion of obesity was higher in the diabetic population when compared to controls. This was found to be statistically very significant. (Chi-square test - $\chi^2 (1, N=326) = 7.824, P < 0.005$).

In the study by Aviva et al and Michael Criqui, similar findings were observed. The pathogenesis of diabetes was always related to increasing prevalence of overweight and obesity in general population. Increasing insulin resistance in this population leads to development of prediabetes and diabetes.⁸⁻¹⁰

New research findings suggest that obesity causes stress in a system of cellular membranes called endoplasmic reticulum, which in turn causes the endoplasmic reticulum to suppress the signals of insulin receptors, which then leads to insulin resistance and diabetes.

CONCLUSION

The study confirmed the increasing prevalence of obesity in diabetic individuals. Metabolic syndrome or Reaven's syndrome of which obesity is a major component is significantly prevalent in Diabetes. Insulin resistance is very common in overweight and obese population. Hence a community based education in this regard is of utmost importance. Only then specific targeted action in high risk individuals can be commenced to decrease the incidence of diabetes.

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