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Original Research Article

Prevalence of Diabetes mellitus in obese subjects in South Kerala

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Abstract

Background: Obesity is an independent risk factor for Type2 Diabetes and is rising in prevalence throughout the developed and developing countries This study aims to find the prevalence of Diabetes Mellitus in Obese Patients compared to non-obese patients who attended Medicine and Diabetology departments of various hospitals in South Kerala during the period June 2010 to May 2013.
Materials and methods: The participant population comprised of 426 patients in the age group 30 to 65 years. All participants underwent routine physical examinations that included measurement of Body mass Index and waist circumference. Fasting plasma glucose concentration was measured by the hexokinase method Among the study group 186 patients were obese (90 males and 96 females).
Results: The mean FBS was higher in obese(131.2mg/dl) compared to non obese(102mg/dl), and there was a higher proportion of people with hyperglycemia among the obese. This difference was found to be statistically significant.
Conclusions: Although not all overweight or obese individuals are metabolically unhealthy, the majority are insulin resistant. The combination of obesity, physical inactivity, and consumption of an atherogenic diet is believed to lead to insulin resistance and thus to Type 2 Diabetes Mellitus.
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Keywords: Diabetes, obesity, fasting blood sugar

Introduction

Chronic non-communicable diseases are assuming increasing importance among the adult population in both developed and developing countries. The impact of chronic diseases on the lives of people is serious when measured in terms of loss of life, disablement and economic loss to the country. Life-style diseases are preventable, and can be lowered with changes in diet, lifestyle, and environment.

Obesity is an independent risk factor for Type2 Diabetes and Coronary artery disease and is rising in prevalence throughout the developed and developing countries. It has been proposed that hyperinsulinaemia stimulates 11β-hydroxysteroid dehydrogenate in mental adipose tissue,

generating cortisol and promoting a cushingoid fat distribution. Adipose tissue is now recognized to be a source of a number of 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)Weight reduction is associated with an improvement in a number of coronary risk factors including BP and fasting blood glucose. Rapid weight gain in childhood (between 2 and 11years) appears to predict Diabetes and coronary disease in adulthood. Both diabetes mellitus and impaired glucose tolerance are important risk factors for CAD. In patients with diabetes, a high HbA1c is associated with an increased risk of CAD.

Metabolic syndrome is a cluster of metabolically related cardiovascular risk factors, the core components of which comprise of central obesity, insulin resistance, dyslipidemia, and hypertension. The presence of metabolic syndrome predicts the risk of cardiovascular disease in non-diabetic subjects as well as in those with diabetes Body Mass Index is promulgated by the World Health Organization(WHO) as the most useful epidemiological measure of obesity. A BMI between 25 and 30kg/m^2 is defined as overweight and above 30kg/m^2 is defined as obesity. Persons with normal weight has a BMI of 18.5-24.9 It is nevertheless a crude index that does not take into account the distribution of body fat, resulting in variability in different individuals and populations. An increase in visceral fat reflects central obesity and increases health risks. The Waist Circumference(WC) is used to assess the amount of visceral obesity. Waist-hip circumference ratio (WHR),Waist-height ratio(WHR) and Waist Circumference(WC) are commonly used to predict the risk of obesity related morbidity and mortality as they account for regional abdominal obesity. The term metabolic syndrome is applied to a constellation of obesity, poor glucose tolerance and an atherogenic lipid profile. It is also known as Insulin resistancesyndrome.Insulin resistance or reduced glucose tolerance and abdominal obesity are hallmarks.

Epidemiological studies have shown that Asian Indians are more insulin resistant and it is considered to be a major reason for the higher prevalence of type2diabetes and cardiovascular disease. Insulin resistance and hyperinsulinemia have been demonstrated as a characteristic feature in Asian Indians. A main factor contributing to insulin resistance is obesity. From the field of obesity and diabetes, insulin resistance has spread to adjacent areas (Eg: Hypertension, dyslipidemia, ischemic heart disease), from which new angles have emerged.

Materials and methods

The study was conducted on patients who attended Medicine and Diabetology departments of various hospitals in South Kerala during the period June 2010 to May 2013.

The participant population comprised of 426 patients in the age group 30 to 65 years. Self-answered questionnaires were used for collecting participants information including age, occupation, medical history, the use of ant diabetic, antihypertensive or lipid lowering medications, smoking status and alcohol consumption habits.

All participants underwent routine physical examinations that included measurement of waist circumference and resting blood pressure. Waist circumference was measured midway between the inferior margin of last rib and the iliac crest at the end of expiration with a heavy duty inelastic plastic fiber measuring tape to the nearest 0.5cm while the subject stood balanced on both feet.BMI was calculated in all patients. Systolic and diastolic blood pressure was measured using sphygmomanometer after the subjects had been in a rested seating

position for at least five minute. Central obesity was measured by waist circumference. The cut points were greater than or equal to 40inches for men and greater than or equal to 35 inches for women.

Diabetes mellitus is defined by fasting plasma glucose concentration(FPG) greater than equal to126mg/dl, two hour plasma glucose greater than or equal to200mg/dl during an OGTT, or by classic symptoms of hyperglycemia or hyperglycemic crisis with a random plasma glucose greater than or equal to200mg/dl.Impaired fasting plasma glucose (IFG) is defined as FPG 100mg/dl to125mg/dl.Family history of diabetes mellitus is defined as the positive history of diabetes in first degree relations such as patients or siblings. Fasting is defined as no calorie intake for at least eight hours. About 5 ml of blood sample was collected from anterior cubital vein under aseptic conditions after an overnight fast from all participants. It was collected in a plain dry tube and was allowed to clot. After retraction of the clot, serum was separated by centrifugation at 3000 rpm for 5minute.Fasting plasma glucose concentration was measured by the hexokinase method (enzymatic reference method),All these estimations were carried on Roche Cobas Integra 400 plus fully automated clinical chemistry analyzer.

Results

The present study included 426 patients in the age group of 30 to 65 years who attended medicine and Diabetology OPD in various hospitals in South Kerala after informed consent. Among the study group 186 patients were obese (90 males and 96 female).As seen in Table-1,66% of no obese patients had normoglycemia,while 68% obese patients had FBS above 110mg/dl.

Table 1: Fasting blood glucose in the study groups

Fasting blood sugar	Obese	Non-obese	Total
<100mg/dl	59 (32%)	158 (66%)	217
≥100mg/dl	127 (68%)	81 (34%)	208
Total	186	239	425

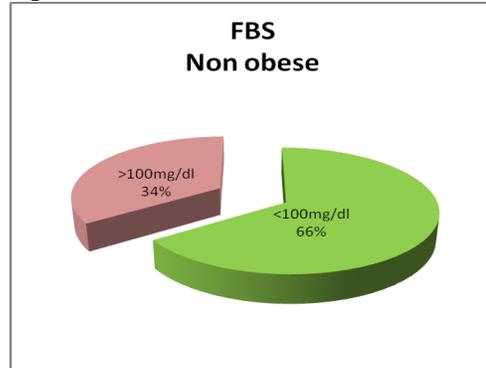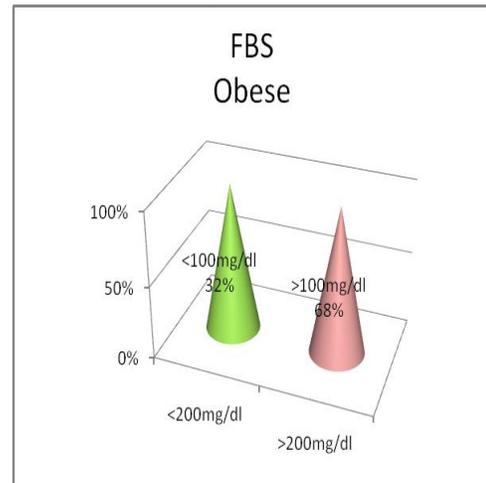Chart -1: Fasting Blood Sugar In The Study Groups
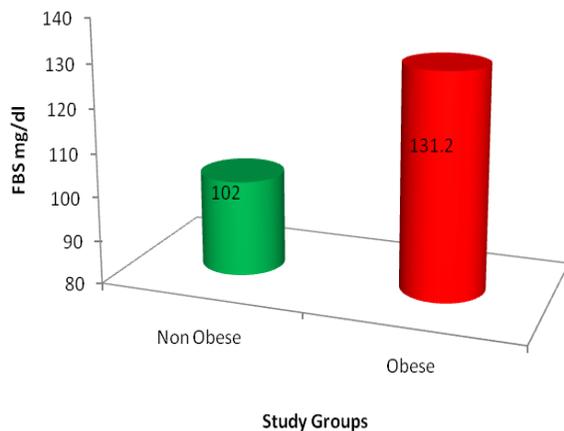

Chart-2

The Mean FBS in Obese Group was found to be 131.2mg/dl and in no obese Group it was 102mg/dl.

Chart 3 shows the comparison.

Chart 3: Blood glucose: comparison of mean

Mean FBS

Study Groups

Discussion

In the present study, 426 subjects were included. They were grouped into obese and non obese based on their Body Mass Index (BMI). BMI above 30 was taken as obese and BMI < 25 was as normal weight subjects. BMI between 25 and 30 was taken as overweight. 186 subjects were obese. The increase in the prevalence of obesity in the recent decades is a likely cause of the rising incidence of insulin resistance and Type 2 Diabetes mellitus. Although not all overweight or obese individuals are metabolically unhealthy, the majority are insulin resistant. The combination of obesity, physical inactivity, and consumption of an atherogenic diet is believed to lead to insulin resistance and thus to Diabetes.

Fasting blood glucose was estimated in all subjects and the results summarized. From the graph it is seen that the mean FBS was higher in obese compared to non obese, and there is a higher proportion of people with hyperglycemia among the obese. This difference was found to be statistically significant. (A chi-square test showed χ^2 (1, N=425) =7.824, P<0.005). Similar findings observed in Aviva et aland Michael Criqui.Type 2 DM showed a strong increase in prevalence with increasing overweight

class among both younger and older subjects. Accompanying the increase in obesity there will be increase in insulin resistance which include pre-diabetes and diabetes.

Conclusion

By analyzing the results of the study conducted among 425patients it was found that the prevalence of hyperglycemia was significant in the obese patients compared to non-obese individuals. From the above findings it has been concluded that there is an increased risk of Type2 Diabetes among obese compared to non-obese people. Although not all overweight or obese individuals are metabolically unhealthy, the majority are insulin resistant. The combination of obesity, physical inactivity, and consumption of an atherogenic diet is believed to lead to insulin resistance and thus to Type2Diabetes Mellitus. Hence a community based education in this regards is of utmost important.

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