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An Observational Study on Association Between Obesity and Diabetes Among Older Adults

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Abstract
Blood glucose is your main source of energy and comes from the food you eat. Insulin, a hormone made by the pancreas, helps glucose from food get into your cells to be used for energy. To examine the association between increasing severity of obesity and diabetes in a participating individual. Data was merged for analysis. Inclusion criteria included age >20 years or older and had BMI in above normal range a positive diagnosis of Hypertensive disease included in the study. Exclusion criteria included Patients with diabetes mellitus, Patients with allergy, Gestational diabetes mellitus, Patients on long term steroids, daily use of oral corticosteroids or antimicrobial drugs, diabetes mellitus, alcoholism, history of pulmonary surgery or tuberculosis, or a psychiatric history and pregnancies. A total of 40 patients were enrolled as per inclusion and exclusion criteria, all together 38 patients were participated in this study. Obesity is one of the most important modifiable risk factors for the prevention of type 2 diabetes. The prevalence of diabetes increased throughout the range of obesity classes have poor glycemic control. It concludes that association between increasing obesity and increasing prevalence of diabetes, adults with diabetes have poor glycemic control and nearly half of adult diabetics are considered obese from our cross- sectional studies. It is important effort to reduce the impact of diabetes on the health care system. Obesity is one of the most important modifiable risk factors for the prevention of type 2 diabetes.

Keywords
Blood glucose, obesity, diabetes mellitus, BMI, glycemic control.

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I.INTRODUCTION
Blood glucose is your main source of energy and comes from the food you eat. Insulin, a hormone made by the pancreas, helps glucose from food get into your cells to be used for energy. Symptoms often include frequent urination, increased thirst, and increased appetite. If left untreated, diabetes can cause many complications. The most common cause is a combination of excessive body weight and insufficient exercise. Gestational diabetes is the third main form and occurs when pregnant women without a previous history of diabetes develop high blood sugar levels. Acute complications can include diabetic ketoacidosis, hyperosmolar hyperglycemic state, or death. Serious long-term complications include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes and cognitive impairment.

Diabetes is due to either the pancreas not producing enough insulin, or the cells of the body not responding properly to the insulin produced. Obesity is one of the most important modifiable risk factors for the prevention of type 2 diabetes.

It is defined as a body mass index (BMI) of 30.0 or higher. Excess weight has been shown to be associated with an increased prevalence of type II diabetes, gastroesophageal reflux, hypertension, dyslipidemia, and certain cancers and both obesity and diabetes are associated with an increased risk for mortality, particularly from cardiovascular disease. BMI was calculated as weight in kilograms divided by the square of height in meters. A BMI <18.5 was categorized as underweight; a BMI between 18.5 and 24.9 was categorized as normal weight class; a BMI between 25.0 and 29.9 was categorized as overweight; a BMI between 30.0 and 34.9 was categorized as obesity class 1; a BMI between 35.0 and 39.9 was categorized as obesity class 2; and a BMI ≥40.0 was categorized as obesity class 3. In this study, we did not differentiate between normal weight and underweight classes. There are three main types of diabetes mellitus: Type 1 diabetes results from the pancreas's failure to produce enough insulin due to loss of beta cells. Type 1 diabetes must be managed with insulin injections. Prevention and treatment of type 2 diabetes involves maintaining a healthy diet, regular physical exercise, a normal body weight, and avoiding use of tobacco. Type 2 diabetes may be treated with medications such as insulin sensitizers with or without insulin. Control of blood pressure and maintaining proper foot and eye care are important for people with the disease. Insulin and some oral medications can cause low blood sugar. Weight loss surgery in those with obesity is sometimes an effective measure in those with type 2 diabetes. Gestational diabetes usually resolves after the birth of the baby.

Types of Diabetes:

Type 1 and Type 2

What is Type 1 diabetes

When you are affected with Type 1 diabetes, your pancreas does not produce insulin. Type 1 diabetes, once called juvenile diabetes, is often diagnosed in children or teens. However, it can also occur in adults. This type accounts for 5-10 percent of people with diabetes. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which a T cell-mediated autoimmune attack leads to the loss of beta cells and thus insulin.

What is Type 2 diabetes

Type 2 diabetes occurs when the body does not produce enough insulin, or when the cells are unable to use insulin properly, which is called insulin resistance. Type 2 diabetes is commonly called "adult-onset diabetes" since it is diagnosed later in life, generally after the age of 45. It accounts for 90-95 percent of people with diabetes. In recent years, Type 2 diabetes has been diagnosed in younger people, including children, more frequently than in the past. The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor. However, the specific defects are not known. Diabetes mellitus cases due to a known defect are classified separately.

Aim and Objectives:

The aim of this study was to determine the prevalence of obesity and the state of glycemic control among diabetic with increasing severity of obesity.

To examine the association between increasing severity of obesity and diabetes in a participating individual.

II. MATERIALS AND METHODS

All the patients admitted in the department of General medicine and attending outpatient department of General medicine, Hyderabad during the period of January 2020 to August 2020, who are fitting into the inclusion criteria were included in the study. It consists of an extensive health information interview, a complete physical examination, and extensive laboratory testing. The physical examinations are performed in a mobile examination center.

Data was merged for analysis. Inclusion criteria included age >20 years or older and had BMI in above normal range a positive diagnosis of Hypertensive disease included in the study. Exclusion criteria included Patients with diabetes mellitus, Patients with allergy, Gestational diabetes mellitus, Patients on long term steroids, daily use of oral corticosteroids or antimicrobial drugs, diabetes mellitus, alcoholism, history of pulmonary surgery or tuberculosis, or a psychiatric history and pregnancies. The study was approved by the medical ethics committee of the University Hospital of., Hyderabad and all patients gave informed consent. Written informed consent was obtained from patients. We collected data on demographics, risk factors, diagnosis modalities, imaging findings and diabetic & obesity characteristics were collected at the time of admission, who are fitting into the inclusion criteria were included in the study.

Data files extracted for this study included demographic information, systolic blood pressure measurements, medical disease history, smoking

history, and laboratory measures (lipid profile and fasting glucose, insulin, c- peptide, and hemoglobin A1C levels). Height and weight were measured using standardized protocols. Participants were considered to have diabetes mellitus if they were told by their doctor they have diabetes, had a fasting plasma glucose concentration of 125 mg/dL, or use anti-diabetic medication(s) such as insulin or oral hypoglycemic agents. We categorized adults with diabetes according to increasing weight classes and analyzed the levels of fasting glucose, insulin, c-peptide, and hemoglobin A1C across the classes of obesity.

Statistical Analysis

Statistical analyses were conducted in SAS 9.1. The stratification and clustering variables were used in all analyses. Statistical analyses were performed using the x2 test and the Fisher's exact test to test relationships in cross tables. Statistical significance was set at P values <0.05.

III. RESULTS AND DISCUSSION

A total of 40 patients were enrolled as per inclusion and exclusion criteria, all together 38 patients were participated in this study, and the response was 100%. Table 1 shows the participants were divided into 4 groups by age: 20-30years (n=12, 31.57 %), 31-40 years (n=11, 28.94%),.41-50 years (n=9, 23.68%), 51-60 years (n=6 ,15.78 %) The majority of patients in the age group between 20-30years (n=12, 31.57 %).

Age wise distribution of patients

N= 38	No. of Patients	Percentage
20-30	12	31.57%
31-40	11	28.94%
41-50	9	23.68%
51-60	6	15.78%

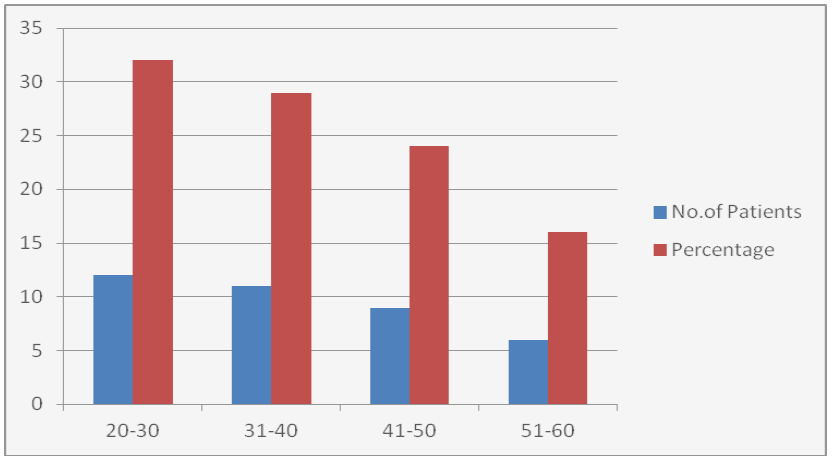


Table 2: The diagnosis of diabetes in the study subjects was based on the following clinical symptoms history of blurred vision 10 (26.31%) (in 100% of subjects), urination (32%), weakness (18%), fatigue (13.15%), and weight loss (10.52%) at the first day of pharmacokinetic assessment.

Symptoms	No. Patients (%)
Blurred vision	10 (26.31 %)
Urination	12 (31.57.4%)
weakness	7 (18.42%)
Fatigue	5 (13.15%)
Weight loss	4 (10.52%)

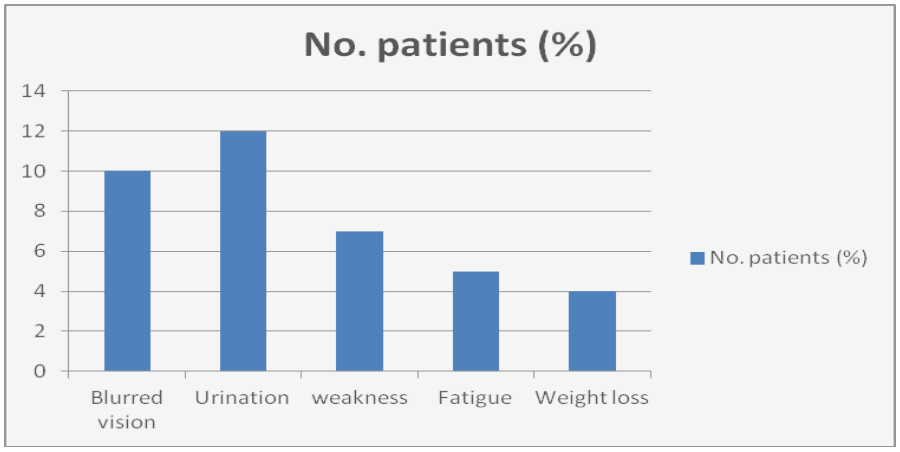
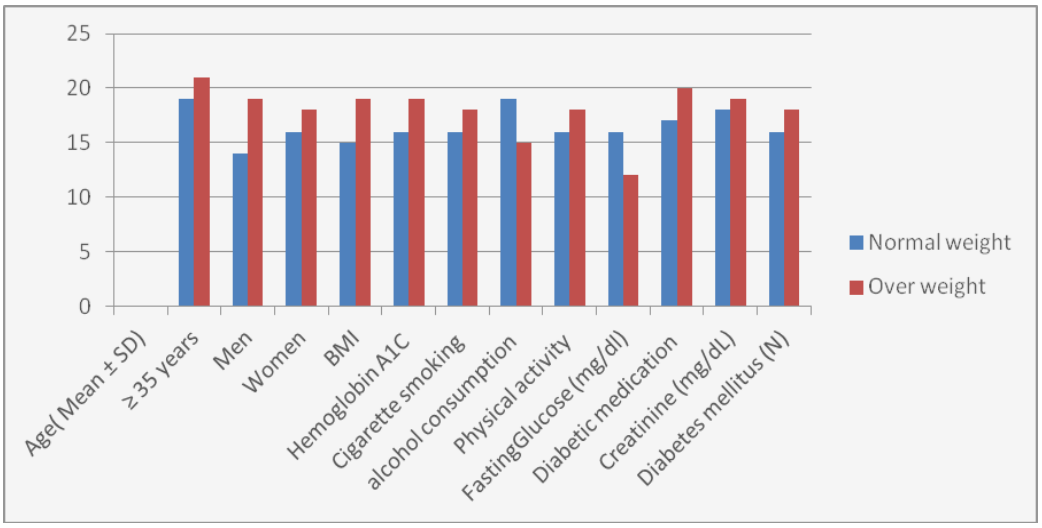


Table 3: Shows the participants were divided based upon demographic and clinical characteristics. We have estimated the average value of characteristics of each patient of hypertension group. Information obtained on sociodemographic parameters, BMI, physical activity, dietary patterns, Cigarette smoking, alcohol consumption and habits of the study population is shown in Table 3. There was significant difference in average age between women (16±4.2 years) and men (14.5 ± 3.5 years). These differences were statistically significant.

VARIABLES	Normal weight	Overweight
Age(Mean ± SD)		
≥ 35 years	18.5 ±0.7	20.5±0.7
Men	14.5 ± 3.5	18±2.8
Women	16±4.2	17.5±3.5
BMI	15±8.4	18.5±3.5
Hemoglobin A1C	16±7.0	19.5±3.5
Cigarette smoking	15.5±7.7	17.5±2.1
alcohol consumption	18.5±3.5	14.5±7.7
Physical activity	16±2.8	17.5±4.9
Fasting Glucose (mg/dl)	15.5±6.3	12±11.3
Diabetic medication	17±7.0	20±2.7
Creatinine (mg/dL)	17.5±2.1	19.5±2.2
Diabetes mellitus (N)	15.5±8.9	18±2.0



IV. DISCUSSION

Obesity is one of the most important modifiable risk factors for the prevention of type 2 diabetes. The prevalence of diabetes increased throughout the range of obesity classes have poor glycemic control[1]. The prevalence of obesity among diabetic in our study is much higher than the reported prevalence of obesity. The glycemic control for individuals with diabetes is improving during the past decade. In this study, we also found the mean fasting glucose and HbA1c levels were highest for diabetics with BMI <25.0 higher severity of disease. These results may suggest that more diabetics within normal weight range have type 1 classification and diabetes in the obese are mostly type 2 with associated insulin resistance. It includes prevention of obesity in combination with medical and surgical treatments of obesity. A greater proportion of the individuals in the lifestyle intervention group had reduction in diabetes, hypertension, and lipid-lowering medications. Prevention of obesity is a key public health initiative in an attempt to reduce the incidence of obesity and diabetes risk. The glycemic control for individuals with diabetes is improving during the past decade. In this study, we also found the mean fasting glucose and HbA1c levels were highest for diabetics with BMI <25.0, suggesting a state of higher severity of disease. Our study shows a clear association between obesity and diabetes, using a large nationwide database. An important implication from this study is that medical or surgical weight loss and obesity prevention are important interventions in an effort to reduce the impact of diabetes on the health care system. Obesity prevalence is rising rapidly among adults with and without Type 2 diabetes. This has important implications for the likely growth of the population with Type 2 diabetes and diabetes related comorbid conditions. our findings demonstrate an association between increasing obesity classes and increasing prevalence of diabetes. Nearly one fourth of adults with diabetes have poor glycemic control and nearly half of adult diabetics are considered. An important implication from this study is that medical or surgical weight loss and obesity prevention are important interventions in an effort to reduce the impact of diabetes on the health care system.

V. CONCLUSION

It concludes that association between increasing obesity and increasing prevalence of diabetes, adults with diabetes have poor glycemic control and nearly half of adult diabetics are considered obese from our cross- sectional studies. It is important effort to reduce the impact of diabetes on the health care system. Obesity is one of the most important modifiable risk factors for the prevention of type 2 diabetes. The prevalence of obesity among diabetic in our study is much higher. The finding of a high prevalence of obesity in adults with diabetes from this study suggests that more effort should be taken to combat obesity since obesity is a modifiable risk factor for the development of diabetes.

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