ORIGINAL RESEARCH PAPER

Physiology

KEY WORDS: tobacco, obesity, association, Type 2 Diabetes mellitus, Waist circumference, Waist hip ratio, BMI.

ASSOCIATION OF OBESITY WITH TOBACCO CONSUMPTION AMONG PATIENTS ATTENDING DIABETIC CLINIC AT A TERTIARY CARE HOSPITAL IN NORTH-EAST INDIA.

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ABSTRACT

Background : Tobacco consumption and obesity are major public health problems and leading causes of preventable morbidity and mortality worldwide. The aim of this study was to investigate the association between tobacco consumption and obesity among patients attending diabetic clinic at a tertiary hospital in north east India. **Material And Methods:** A cross-sectional , observational study conducted at the diabetic clinic of AGMC and GBP hospital. Diagnosed Type 2 diabetes mellitus cases attending the clinic were recruited after simple random sampling. Data was collected by a predesigned questionnaire. Height, weight , waist circumference and hip circumference were measured .The data was subjected for statistical analysis using SPSS-26 software for windows. Pearson's Chi-square test was used to find the association between types of obesity and various factors of the study population. P-value <0.05 was considered to be significant. **Result :**270 patients with type 2 diabetes mellitus (age>20 years) were studied out of which 138(51.1%) were male and 132(48.9%) were female. The overall prevalence of obesity according to BMI, WC, WHR, WSR was 41.90%, 57%, 87.80% and 58.90% respectively. In male, the prevalence of BMI, WC, WHR and WSR obesity was 26.80%, 35.50%, 83.30% and 44.20% respectively. However, in females the prevalence of BMI, WC, WHR and WSR obesity was 57.60%, 79.50% ,92.4% and 74.20% respectively. BMI obesity and WHR obesity was found to be statistically significant with tobacco consumption with p-values of 0.000 and 0.023 respectively. **Conclusions:** This study concluded that obesity is a highly prevalent co-morbidity in diabetic patients. The change in waist hip ratio was a better predictor of the disease. First line intervention for weight loss by combination of a low-calorie diet, increased physical activity, and behavioral therapy should be stressed for the effective management of T2DM. Consumption of fruits and vegetables may protect the development of T2DM, as they are rich in nutrients, fiber and antioxidants which are considered as protective barrier against the diseases. Tobacco consumption was significantly associated with BMI and WHR.

INTRODUCTION :

Type 2 diabetes mellitus (T2DM) is a prevalent metabolic disorder characterized by hyperglycemia and insulin resistance. Its incidence is increasing globally, with a significant impact on public health. Smokeless tobacco (SLT) is a form of tobacco consumption that has been associated with various health risks, including potential effects on glucose homeostasis.[1] Smoking and obesity are major public health challenges and the prevalence of both is increasing globally. Smoking increases the risk of cancer, respiratory and cardiovascular diseases, and is the leading preventable cause of death in developed countries.[2] Obesity is the fifth leading cause of death, globally, and accounts for 44% of cases of diabetes and 23% of ischaemic heart disease. The Framingham Study showed that the life expectancy of obese smokers is around 13 years shorter than non-obese, never smokers.[3]

Clinical evidence indicates a stronger association of diabetes with central obesity than general obesity. In spite of a relatively lower rate of obesity as defined by the Body Mass Index (BMI) cut points, South Asians tend to have larger waist measurements and waist-to-hip ratios (WHR), indicating a greater degree of central body obesity. This is associated with a characteristic metabolic profile with higher insulin levels, a greater degree of insulin resistance, a higher prevalence of diabetes.[4]

Simple anthropometric measurements have been used as surrogate measurements of obesity and have more practical value in both clinical practice and for large-scale epidemiological studies. BMI is a simple method which is used to calculate the prevalence of overweight and obesity in the population. Waist circumference (WC) is the best measure of both intra-abdominal fat mass and total fat. But BMI can be misleading, such as in individuals with a high proportion of lean muscle mass. WC, a more accurate measure of the distribution of body fat, has been shown to be more strongly associated with morbidity and mortality. Recently, the waist-to-stature ratio (WSR) has been proposed as a better screening tool than WC and BMI for adult metabolic risk factors.[4]

The anthropometric parameters have ethnic susceptibility, so the objective of this study is to determine the proportion of obesity using the anthropometric parameters of WC, WSR, WHR, and BMI among type 2 diabetes mellitus (T2DM) patients and its association with the consumption of tobacco.

MATERIALS AND METHODS:

Study Design: Cross-sectional study.
Type Of Study: Observational study.
Study Setting: Diabetic clinic at AGMC and GBP hospital
Study Population: Diagnosed Type 2 diabetes mellitus cases attending diabetic clinic in AGMC & GBP Hospital.

Inclusion Criteria: i) Age ≥20 years of both gender. ii) Diagnosed with T2DM willing to participate. iii) Patients attending the Diabetic clinic of AGMC and GBP hospital.

Cases were interviewed in the hospital and additional details about other investigations & complications obtained from OPD patient records for cases.

Exclusion Criteria : i) Patients with type 1 diabetes mellitus. ii) Patients of type 2 diabetes mellitus having severe co-morbidities like stroke, chronic renal diseases and chronic lung diseases at the time of recruitment into the study. iii) Pregnant and lactating women.

Sample Size Calculation: Sample size was calculated to be 270 using the Cochran's formula considering p = 53.42.[5]

Sampling Technique: Simple random sampling

Study Tools: (1) A pre-designed and pre tested questionnaire set (2) Non stretchable measuring tape (3)Hesley Digital weighing scale, Hesley Inc Germany (4) Stadiometer
Consent: Written informed consent was obtained from all the study subjects.

Operational Definitions: (1) Diabetes: Any subject with FBS value of ≥7mmol (≥126 mg/dl) or two-hour plasma glucose ≥11mmol (≥200mg/dl) or HbA1C ≥6.5 %(48mmol/mol) was considered as having diabetes (as per WHO [10] criteria for

diagnosis of diabetes).[6]

Waist Circumference: It was measured at the midpoint between the tip of the iliac crest and the lower margin of last palpable rib, using a non stretchable tape, at the end of normal expiration, with the subject standing erect and arms relaxed in sides. Abdominal/central obesity was considered to be present when the waist circumference was ≥80 cm in women and ≥90 cm in men.[7]

Hip Circumference: It was measured by a measuring tape and recorded in centimeters, to the nearest 0.1 cm, at the level of maximum circumference of the ischial tuberosity of the participant.

Height: Height was measured by a stadiometer and recorded in centimeters to the nearest 0.1cm.

WHR (Waist-hip ratio): It was calculated as waist circumference divided by hip circumference. (6)Body Mass Index (BMI) : Defined as weight in kilograms divided by the square of the height in meters. Individuals are classified as underweight (BMI <18.5), normal (BMI 18.5 – 24.99) and overweight (BMI ≥25) in WHO criteria.[8]

In Asians, the cut-offs for overweight (≥23.0 kg/m^2) and obesity (≥25.0 kg/m^2) are lower than WHO criteria due to risk factors and morbidities.

Data collection: All the cases will be selected consecutively during the study period following the inclusion and exclusion criteria. The data will be collected from diabetes mellitus patients attending diabetes clinic of AGMC and GBP hospital, Agartala.

All the patients will be personally subjected to detailed history regarding name, age, sex, occupation, socioeconomic status, educational status, family history of diabetes mellitus, anthropometric measurements, dietary habits etc. These findings will be recorded in a predesigned and pretested proforma.

Consent: Written informed consent will be obtained from all the study subjects.

Criteria for defining obesity:

- BMI ≥ 23.0 kg/m^2 - overweight and BMI ≥25.0 kg/m^2 – obese.[8]
- WSR > 0.5.[9]
- WC ≥ 90 cm in males and ≥ 80 cm in females (central/abdominal obesity).[9]
- WHR ≥ 0.95 for men and ≥ 0.85 for women.[9]

RESULTS :

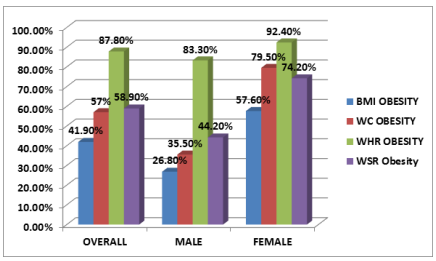

Figure 1 : Proportion of different types of obesity among Type 2 Diabetes patients

Table 1 : Distribution of the study participants according to the types of obesity.

Types of obesity	n (%)
BMI	
Underweight (<18.5)	10 (3.7)
Normal (18.5-22.9)	78 (28.9)
Overweight (23.0 – 24.9)	69 (25.6)
Obese (≥25)	113 (41.9)
WC Obesity	
Obese	154 (57.0)
Non Obese	116 (43.0)
WHR Obesity	
Obese	237 (87.8)
Non Obese	33 (12.2)
WSR Obesity	
Obese	159 (58.9)
Non-obese	111 (41.1)

Table 2 : Association of different types of obesity with tobacco consumption using Pearson's Chi square test.

Risk factors	n	BMI Obesity	WC Obesity	WHR Obesity	WSR Obesity
Tobacco product consumption					
Cigarette	23	7 (30.4)	11 (47.8)	23 (100.0)	13 (56.5)
Betel nut and leaf	112	39 (34.8)	61 (54.5)	100 (89.3)	63 (56.3)
Gutkha	4	0	0	2 (50.0)	1 (25.0)
Khaini	9	4 (44.4)	6 (66.7)	9 (100.0)	4 (44.4)
Nothing	122	63 (51.6)	76 (62.3)	103 (84.4)	78 (63.9)
p-value		0.000	0.087	0.023	0.363

The overall proportion of BMI obesity, Waist circumference obesity, Waist to hip ratio obesity and waist to stature ratio obesity were 41.90%, 57%, 87.80% and 58.90% respectively. The male proportion of BMI obesity, WC obesity, WHR obesity, WSR obesity were 26.80%, 35.50%, 83.30%, 44.20% respectively.

The female proportion of BMI obesity, WC obesity, WHR obesity, WSR obesity were 57.60%, 79.50%, 92.40%, 74.20% respectively.

Pearson's Chi-square test was used to find the association between types of obesity and various factors of the study population. P value <0.05 was found to be statistically significant at 95% confidence interval.

Tobacco consumption was significantly associated with BMI obesity and WHR obesity.

DISCUSSION:

Type 2 Diabetes Mellitus is a prolonged metabolic disease. T2DM prevalence has been steadily rising, especially in emerging nations, which has resulted in an epidemic in several of these nations. T2DM is the multifactorial disorder which can be caused by various factors like age, diabetic history, obesity, physical activity (Okur et al., 2017). In addition to these factors, the tobacco use showed to be associated with development of T2DM, especially smoking.[1]

This cross sectional study was conducted in a Tertiary care centre of North-Eastern region of India to assess the proportion of obesity among the patients attending the diabetic clinic of the centre and to determine the factors associated with various types of obesity. 270 of such diabetic patients were taken as samples for this study.

The distribution of the study participants was such that most of them were between the age group of 41 and 60 years which shows that T2DM (type 2 diabetes mellitus) was more prevalent among the age group of 41-60 years. This observation was similar to the WHO report which predicts that in India and other developing countries, the highest increase would occur in the age group of 41-60 years.[10]

The overall proportion of obesity based on BMI was 41.9% and proportion of overweight patients in our study was 25.6%.

Study conducted in Warangal reported 59.2% of overweight and obese subjects.[10] Another study conducted in Bangalore reported 73% obesity with the mean BMI 26 kg/m^2 which is in par with our study.[11]

The proportion of central obesity assessed by WC, WHR and WSR was 57%, 87.80% and 58.90% respectively in our study. "Asian Indian phenotype" is characterized by less of general obesity(measured by BMI) and more of central obesity. Our study supports this hypothesis. In a study done in a rural area of Mangalore district of Karnataka showed higher central obesity prevalence (90.63%) when compared to BMI.[12]

In our study we found that tobacco consumption was significantly associated with BMI obesity and WHR obesity with p values of 0.000 and 0.023 respectively.

CONCLUSION:

In the present study, it can be concluded that, the overall proportion of BMI obesity, Waist circumference obesity, Waist to hip ratio obesity and waist to stature ratio obesity among T2DM patients were 41.90%, 57%, 87.80% and 58.90% respectively. Furthermore all three types of obesity were more prevalent among females.

General obesity (measured by BMI) was significantly associated with glycemic status. The proportion of WHR obesity is more in our study. "Asian Indian phenotype" is characterized by less of general obesity and greater central body obesity. Our study supports the hypothesis.[9] We found that tobacco consumption was significantly associated with BMI obesity and WHR obesity.

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