

FREQUENCY OF OBESITY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT

Objective: To determine the frequency of Obesity in patients with Type 2 Diabetes Mellitus in patients visiting the Outpatient department of Khyber Teaching Hospital, Peshawar

MATERIALS AND METHODS. This descriptive cross-sectional study was conducted in the Department of Medicine Khyber Teaching Hospital Peshawar after approval from the hospital's ethical committee. All type 2 diabetes mellitus patients fulfilling inclusion criteria, presented to medical OPD and ward were interviewed in detail. Relevant information like age, gender, height weight, etc. recorded using proforma. BMI was calculated using height and weight. Patients with RBS of more than 200 mg/dl and symptomatic were labeled as having diabetes (American diabetes association). Patients with a BMI of more than 25kg/m² were labeled as having obesity (Asian Pacific criteria). Data was analyzed using SPSS version 20 and presented in tables.

RESULTS. The mean and standard deviation (SDs) for age were recorded as 56±9 years. Mean and SDs for height were recorded as 1.5± 0.8 meters. Mean and SDs for weight were recorded as 65±12 kilogram. Mean and SDs for random blood sugar were recorded as 238±77 mg/dl. Mean and SDs for BMI were recorded as 26±5. One hundred and eighty-nine (49.2%) patients were female and 195(50.8%) were male. Two hundred and seven (53.9%) patients were recorded as obese and 177(46.1%) were recorded as non-obese.

CONCLUSION. In our study, we found that the majority of type 2 diabetes mellitus patients were obese. Thus, by adopting a healthy lifestyle we can reduce and delay the onset and morbidity associated with diabetes mellitus.

KEYWORDS Diabetes mellitus (DM), Body mass index (BMI), Random blood sugar (RBS), Glycated hemoglobin (HBA1C).

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INTRODUCTION

Obesity is generally considered a pandemic, with potentially devastating concerns for human health. ¹ Approximately one-fourth of adults in the United Kingdom were obese in 2006 compared with 7% frequency in the 1980s. ² Worldwide more than 1 billion people have obesity and among them 650 million are adults. World obesity atlas 2023 predicts that more than half of the global population will be living with overweight and obesity in the next 12 years. ³ The percentage of obesity in Pakistan in 2023 is estimated to be 9.8%. ⁴ Obesity has an adverse influ-

ence on mortality and morbidity. Obesity at the age of 40 years and older reduces survival by up to seven years for non-smokers and by thirteen years for those who smoke. Coronary artery disease (CAD) is the leading cause of death in people with obesity. ¹

Diabetes mellitus is viewed as an epidemic. ⁵ Centers for Disease Control and Prevention (CDC) approximates that 28 million US citizens have diabetes mellitus. This disease affects 9.3% of the US population and 12% of people over the age of 20 years. ⁶ Globally the number of people with diabetes mellitus (DM) has increased from 108 million in the 1980s to approximately 422 million in 2014. ⁷ In 2021 537 million adults will be living with diabetes and this number is predicted to rise to 643 million by 2030. ⁸ This worldwide pandemic mainly includes type 2 diabetes mellitus and is connected with inordinate longevity, obesity, inactive lifestyle, and growing urbanization. ⁹ According to the international diabetes federation, 26.7% of adults in Pakistan are affected by diabetes in 2022 and rank third in the world. The prevalence increased to 30.8

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% in 2023.¹⁰

Obesity is a key modifiable risk factor for diabetes mellitus.^{11, 12} Overweight body habitus and obesity have been linked with profound healthiness concerns comprising; Hypertension (HTN), lipid disorders, diabetes, stroke, degenerative joint diseases, gallstones, lung diseases, psychosomatic and emotional distress.^{13, 14} Obesity has further been associated with poor control of hypertension, dyslipidemia, and hyperglycemia in patients with diabetes mellitus type 2.¹⁵

Obesity leads to insulin resistance, although the precise mechanism is not recognized.¹⁶ The risk of diabetes mellitus 2 increases exponentially with an increase in the body mass index (BMI).¹⁷

Obesity affects not only the inception but also the progression of diabetes mellitus 2.¹⁸ Patients with diabetes mellitus 2 who lose weight have improved glycemic control.¹⁹ The intention to lose weight is linked with a decreased risk of all-cause mortality, irrespective of the target weight being achieved or not.²⁰ The relationship between diabetes mellitus and obesity has been augmented by the fact that people with diabetes mellitus put off weight much harder as compared to the general population.²¹ It is anticipated that there will be a mounting burden of diabetes mellitus 2 among adults aged 20 years to 79 years. It is estimated that 86 % of type 2 diabetics are overweight, 52 % are obese and 8 % have morbid obesity in UK.²²

This study aims to find the local frequency of obesity in patients with type 2 diabetes mellitus as local data on the subject is lacking. Diabetes is a common disease and the burden of disease is increasing day by day. The data will be helpful in the management of patients with type 2 diabetes in this part of the world by showing them local results. This will also be helpful for the health department to promote a healthy lifestyle, and that weight loss is associated with better diabetes control.

The objective of the study was to determine the frequency of obesity in patients with type 2 diabetes mellitus.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted at the Department of Medicine Khyber Teaching Hospital Peshawar after approval from the hospital's ethical committee (21 February 2022). The sample size was 384 using 52 % frequency of obesity in patients with type 2 diabetes mellitus, 95 % confidence interval, and 5 % margin of error on the WHO sample size calculator.²³ A non-probability consecutive sampling technique was used. Symptomatic patients with random blood sugar of 200 mg/dl or more were labeled as diabetic (American diabetes association criteria). Patients with a body mass index of 25 kg/m² were labeled as obese (Asia Pacific region criteria). Patients with either gender or age between

35 to 70 years were included in the study. Patients with chronic kidney disease, chronic heart failure, type 1 diabetes mellitus, and stroke were excluded from the study. The weight of the patients was measured with shoes and light clothes using the digital weighing machine in kilograms. Height was measured using a stadiometer in centimeters and converted to meters. The body mass index of every patient was calculated using the formula weight in kg/height in meter square. A sample of blood was sent to the hospital laboratory for measurement of random blood sugar using a Cobas machine. All patients' old record was checked and were labeled as diabetic only if random blood sugar was more than 200mg/dl and symptomatic (American Diabetes Association). All information was recorded using structured proforma. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. Frequencies and percentages were calculated for categorical variables like gender, obesity, socioeconomic status, and education. Mean± standard deviation was calculated for numerical variables like age, weight, height, and body mass index. Obesity was stratified among age and gender, socioeconomic status, education, etc. to see effect modification. Results were presented in tables.

RESULTS

This study was conducted at the Department of Medicine Khyber Teaching Hospital Peshawar on 384 patients. The results are as below: 189 (49.2%) patients were female and 195 (50.8%) patients were male. Mean and standard deviation (SDs) for age were recorded to be 56 ± 9 years, for height 1.5± 0.8 meters, for weight 65± 12 kilogram, for random blood sugar 238±77 mg/d/dl and BMI 26±5. 207(53.9%) patients were recorded as obese and 177(46.1%) were recorded as non-obese (Table 1). 96 (25 %) patients were illiterate,154 (40.1%) patients had primary education,68 (17.7%) patients had secondary education,31 (8.1%) patients were having intermediate education and 35 (9.1%) patients were having higher level education status. 98 (25.5%) patients were having

Table No 1: Obesity in type diabetes

	Frequency	Percent
No	177	46.1
Yes	207	53.9
Total	384	100.0

Table No 2: Stratification of obesity with respect to gender

		Gender		Total	P value
		Female	Male		
Obesity Status	No	87	90	177	0.891
	yes	102	105	207	
Total		189	195	384	

There was no significant difference of obesity in patients with different socioeconomic status with p-values of 0.891(table no 3).

Table No 3. Stratification of obesity with respect to socioeconomic status

		Socioeconomic status			Total	P value
		less than 15000 Rs/ month	35000-15000 Rs/ month	more than 35000 Rs/month		
Obesity Status	No	49	79	49	177	0.293
	Yes	49	109	49	207	
Total		98	188	98	384	

There was no significant difference in obesity in patients with different education levels (table no 4).

Table No 4. Stratification of obesity with respect to education status

		education status					Total	P value
		Illiterate	Primary	secondary	intermediat	Higher		
Obesity Status	No	38	70	39	14	16	177	0.273
	yes	58	84	29	17	19	207	
Total		96	154	68	31	35	384	

There was no significant difference in obesity in patients with different education levels (table no 4).

monthly income less than 15,000 PKR, 188 (49%) patients were having monthly income between 15,000 and 35,000 PKR and 98 (25.5%) patients were having monthly income more than 35,000 PKR. Stratification of obesity concerning gender, socioeconomic status, and education level is presented in the table below.

DISCUSSION

Obesity is a key modifiable risk factor for DM type 2. Obesity has been linked with adverse health consequences including; elevated blood pressure, lipid disorders, diabetes, cardiovascular diseases, osteoarthritis, lung diseases, and psychological problems. Moreover, obesity has been associated with raised blood pressure, high cholesterol levels, and deranged blood sugar readings in patients with diabetes.¹⁵ In individuals with obesity, glucose-dependent insulin secretion is impaired and there is increased gluconeogenesis hence making them at greater risk of developing diabetes mellitus 2 and, at a younger age. The risk of type 2 diabetes mellitus increases exponentially with rise in the BMI.¹⁷

In this descriptive cross-sectional study, we have found that 53.9 % of patients with diabetes mellitus type 2 were obese. KH Yoo conducted a study in Asia, which showed that the number of individuals having both diabetes mellitus and obesity has increased and the pace of this trait is not slowing down.²⁴ Another research study by Fajarini R.A, and Sartika R.A revealed that approximately 64% of patients with diabetes mellitus type 2 were having obesity and this was related to inadequate nutrition knowledge, low education status, and long duration of diabetes mellitus, etc.²⁵ The frequency of obesity in this study was higher than our study. Risk factors for obesity were not included in our study. An additional article showed that as the prevalence of obesity increases, there is an increase in the prevalence of diabetes mellitus 2 as well. Obesity is not only an important risk factor for diabetes mellitus 2 but it also has an impact on the management of diabetes.²⁶ A

research study from Sweden displayed that the frequency of diabetes is increasing globally and the incidence of obesity has amplified dramatically in recent years. Once type 2 diabetes mellitus develops, the presence of obesity will affect the progression of the disease as well as its management strategies.²⁷

A study conducted in Chile revealed that the overall prevalence of obesity in diabetes mellitus 2 was 56.1 % and its frequency is increasing.²⁸ Results of this study were almost similar to our study and risk factors of obesity were also not included in this study. Another research article demonstrated that childhood disorders increase the risk of obesity during adulthood and in this manner, the risk of diabetes mellitus type 2 is escalated.²⁹ A paper published by H.U. F.B. Malik indicated that artificially sweetened drinks increase the risk of obesity and DM2.³⁰ A study from Saud Arabia established that 38 % of patients with type 2 DM were obese and out of that 23 % had mild obesity while 15% had severe obesity and most of the study population were females.³¹ The Frequency of obesity in this study was much lower than in our study. The overall frequency of obesity was calculated in our study and different classes of obesity were not studied in detail. The research study by Mustafa Et al presented that obesity is a significant risk factor for impaired glucose tolerance and diabetes mellitus type 2. Approximately 70 % of individuals with impaired glucose tolerance eventually progress to diabetes mellitus 2.³² The literature revealed that obesity is increasing in the general population and essentially the rate of diabetes mellitus type 2 is aggregating more rapidly predominantly in Asian countries. The risk of diabetes mellitus in these states is raised even at lower BMIs as compared to countries from other continents.³³ A study conducted in Pakistan revealed that 72 % of diabetes mellitus type 2 patients had obesity and most of the obese patients were females.³⁴ The frequency of obesity in this study was also higher than in our study. There was no significant gender-wise difference in obesity in our

study.

A Yemeni article demonstrated that 58% of patients with DM 2 were obese. The age and sex-matched weights were considerably higher in females than males. With increased incidence and prevalence, obesity, and diabetes mellitus type 2 have become a key global health problem.³⁵ The frequency of obesity in this study was comparable to our study, however, there was no significant gender-wise difference in obesity in our study. Further literature review described 52% frequency of obesity in type 2 diabetes mellitus patients. Diabetic patients with obesity were younger, had hypertension, lipid disorders, poorly controlled blood sugar levels, and had greater requirements for antihypertensive and lipid-lowering medications as compared to diabetics without obesity.³⁶ Other aspects of metabolic syndrome were included in this study that were not mentioned in our study. Obesity has been acknowledged as a significant risk factor for diabetes mellitus 2 by causing insulin resistance and pancreatic dysfunction. These obesity-associated flaws tend to progress following an increase in body weight and can ultimately lead to deteriorating glycemic levels over time. Therefore, weight management is important for achieving good glycemic control in obese patients with diabetes.³⁷ The high prevalence of obesity is driving the diabetes mellitus 2 epidemic to startling levels and the role of primary care is emerging of utmost importance for the management of obesity in diabetes mellitus type 2. The response to anti-diabetic therapies improves with effective weight management measures.³⁸

The major limitation of our study is that it was conducted in Khyber Teaching Hospital only and there is a lack of generalizability of our data to populations with different quality of life.

CONCLUSION

In our study, we found that the majority of type 2 diabetes mellitus patients were obese. Thus, by adopting a healthy lifestyle we can reduce and delay the onset and morbidity associated with obesity and diabetes mellitus.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Khan S	✓	✗	✓	✗	✓	✗
Ubaid M	✓	✓	✗	✓	✓	✗
Wazir Z	✗	✓	✓	✗	✗	✗
khan S	✓	✗	✗	✓	✓	✓
Khan IA	✗	✓	✓	✓	✗	✓

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 91/DME/KMC.

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