Research Article

DIABESITY; Prevalence of Diabetes Mellitus Type II in Overweight and Obese Patients: A Cross-Sectional Study in Mayo Hospital, Lahore

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Abstract:
Introduction: The term 'Diabesity' refers to the association between diabetes and obesity. While it has been a serious epidemic in the past, it has never received the attention that it deserved. Currently, there is growing anxiety among the public regarding the increasing incidence of diabetes among people of different age groups. Worldwide, the prevalence of Diabetes has increased significantly, rising from 4.7% to 8.5% since 1980. The health impact of diabetes is attributable to a reduction in quality of life and long-term complications such as heart failure, renal failure, blindness, depression, and sleep disorders. This is an emerging threat during an era of technology and reduced human mobility.
Objective: This study has been designed to observe the prevalence of diabetes among obese and overweight people, as it is considered one of the leading causes of diabetes. It also studies the distribution of diabetes in both genders and different age groups.
Methodology: A cross-sectional study was performed in which a questionnaire was filled by 89 overweight and obese patients at Mayo Hospital, Lahore to get an estimate of how many of them had diabetes. The data gathered was analyzed by SPSS version-26.
Results: According to the results, 89.9% of people who were overweight or obese were diabetics too. Only 10.1% were without diabetes. Among them, 79.8% of people had classical diabetic symptoms. 28.1% of patients in our sample were striving to reduce weight while 70.8% of people had never tried to reduce their weight. 44.9% of study participants were males and 55.1% were females.
Conclusion: This is a step taken to inform people about the negative aspects of increased weight on their health. The best steps we can take to prevent diabetes are dietary measures, regular exercise, walking, and proper guidance. This illness has reached unprecedented levels, indicating the need for early diagnosis and preventive measures, otherwise, it will remain a very serious challenge for human beings in the upcoming years.
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INTRODUCTION:

Diabesity is the coexistence of type 2 diabetes and obesity, sometimes associated with other comor-bidities, such as dyslipidemias and uncont-rolled blood pressure; it refers to the etiological effect of obesity on diabetes type 2 forming a subset of metabolic syndrome.[1] This association between diab-etes and obesity is considered to be evolving into a modern global epidemic; therefore the term 'Diabesity' was coined. Diabetes is characterized by high blood glucose levels compared to normal. According to WHO, diagnostic criteria are such that blood sugar levels after fasting of at least 8 hours are 126 mg/dl or higher, and randomly it comes out to be greater than 200 mg/dl with classical diabetic indicators of thirst, polyuria, and weight loss. Obesity is a condition when the quantity of fatty tissue in the body exceeds the normal range, posing health risks. The most common scale for measuring obesity stages is the Body Mass Index, which employs the unit weight in kilograms divided by the square of height in meters. Obesity is defined as having a BMI of 30 or higher.[2] 'Overweight' designates a state between normal weight and obesity and includes people with a BMI lying in the range of 25-29.9.

Diabetes and obesity are considered to soar to high levels of prevalence. Statistics from all over the world show that diabetic patients have increased in number from 180 million to 420 million people in 34 years, from 1980 to 2014, affecting 8.5% of the total population.[3] Worldwide, obesity rates have also increased substantially, the numbers rising three times since 1975. 650 million of the 1.9 billion overweight individuals worldwide in 2016 were obese.

The people of Pakistan are also not immune to this global epidemic. Pakistan is ranked at position number 7 for diabetes prevalence as 11.7% of the total population has type 2 diabetes currently. [5] Obesity has also emerged as a major public health threat. According to Express Tribune, Pakistan has been ranked at position 9 out of 188 countries concerning obesity.[6] Despite the severity of the condition, data regarding the prevalence studies of diabesity is scarce, especially in the South East Asia region. Moreover, research is required to strengthen the evidence of the proven association between diabetes and obesity. Thus this study was undertaken to highlight this issue in a tertiary care hospital setting in Lahore, Pakistan where any significant research data is still not available.

This cross-sectional study would, therefore, provide insight into the severity of the problem. It would also serve as a database needed to develop interventions required to solve this problem of diabesity. This study aims at illuminating the fact that increased body weights are one of the biggest factors that increase the risk of the development of diabetes. By studying the established link between increased body weight and diabetes in patients of Mayo Hospital, data regarding an unexplored association would be provided. It would also direct future research.

METHODS AND METHOD:

A survey was conducted on obese and overweight patients of Mayo Hospital, Lahore to see the prevalence of diabetes in them. There were no age or

gender limitations for the selection of patients. A cross-sectional study was completed on 89 patients for a duration of 2 weeks. The outcome measure instrument was made by the research team themselves to assess the number of people who have diabetes mellitus because of their weight and to see their attitudes towards it. The survey explained whether people were aware of the complications of their weight or not, whether they were well informed of their diabetes or it was neglected, the daily routines and lifestyles of people, the steps they take or do not take to reduce their weight, and the hazards of diabetes. Multiple literature reviews were conducted to look for various risk factors of diabetes and potential ways of prevention. The survey had some demographics which were used to find the BMI of patients while others were used to see the diagnosis of diabetes in them and its effects on their daily routines.

DATA ANALYSIS:

Data was collected through a questionnaire and was entered in IBM Statistical Package for Social Sciences version-26 (SPSS-21). Mean ± standard deviation (S.D) was seen for quantitative data; frequency and cross tab were drawn for qualitative data.

RESULTS:

We researched to see the prevalence of diabetes in obese people and the risk factors associated with diabetes. This cross-sectional study would, therefore, provide insight into the severity of the problem.

The results from the studies are as follows:

The mean value estimated was 3.92 with a standard deviation of 1.05.44 % of men and 55.9% of women took part in our study.

N valid	89
Mean	3.82
Standard deviation	1.05771

We considered the following aspects and included these questions in this study:

	Gender	Diagnosed case of diabetes mellitus type 2	Fasting glucose level	Random glucose level	Weight gain	Family history of obesity	Family history of diabetes	Efforts for weight loss
Valid	89	89	89	89	89	80	89	89
Missing	0	0	0	0	0	0	0	0

	Regular exercise craving for sweets and carbohydrates	Snacking between meals	Hungry when stressed	Stress from skipping a meal	Eating the same kind of food	Changes in eating habits	Frequency of eating	Purpose of eating	Preferred food type
Valid	89	89	89	89	89	89	89	89	89
Missing	0	0	0	0	0	0	0	0	0

Table 1.1, 1.2, 1.3 BMI:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Underweight	1	1.1	1.1	1.1
	Normal	6	6.7	6.7	7.9
	Overweight	35	39.3	39.3	57.2
	Obese	47	58.2	58.2	100.0
	Total	**89**	**100**	**100**	

Diagnosed cases of diabetes type 2:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	80	89.9	89.9	89.9
	No	9	10.1	10.1	100.0
	Total	**89**	**100.0**	**100.0**	

Fasting glucose level

D		Frequency	Percent	Valid percent	Cumulative percent
Valid	126 mg/dl or higher	73	82.0	82.0	82.9
	Less than 126	7	7.9	7.9	89
	Don't know	9	10.1	10.1	100.0
	Total	**89**	**100.0**	**100.0**	

The results collected from the study showed the aspect of these three variables. Most of the people in this study were overweight. The results showed that diabetes was more common in overweight people while it was not prevalent in people with reduced weight.

89 % of the participants were aware of their diabetic status. The remaining who were unaware, it was noticed they had complications of diabetes and were mostly suffering from the diabetic foot. The fasting glucose was high in the majority of the people which showed that people were not keen on controlling the glucose level and were unaware of the tragic results of elevated glucose in the body.

Table 1.4, 1.5, 1.6:
Random glucose level:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	200mg/dl or higher	70	78.7	78.7	78.7
	Less than 200mg/dl	10	11.2	11.2	89.9
	Don't know	9	10.1	10.1	100.0
	Total	**89**	**100.0**	**100.0**	

Classical diabetic symptoms:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	71	79.8	79.8	79.8
	No	17	19.1	19.1	98.9
	Don't know	1	1.1	1.1	100.0
	Total	**89**	**100.0**	**100.0**	

Weight Gain:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	16	78.7	18.0	18.0
	No	71	79.8	79.8	97.8
	Don't know	2	2.2	2.2	100.0
	Total	**89**	**100.0**	**100.0**	

The tables show that along with the fasting glucose, random glucose level was elevated in most of the obese patients. This further makes clear that the level of glucose, both fasting and random, is elevated mostly in obese patients. But when they were asked about any weight gain in recent years, most of the people refused. 71% of the people were not aware or conscious of any recent weight gain that might have triggered the onset of diabetes. It meant that the weight gain was quite a few years back and diabetes takes many years to start showing symptoms and signs.

Table 1.7, 1.8, 1.9:

Family History of Obesity:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	46	51.7	51.7	51.7
	No	43	48.3	48.3	100
	Total		**100.0**	**100.0**	

Family History of Diabetes:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	52	58.4	58.4	58.4
	No	26	29.2	29.2	87.6
	Don't know	11	12.4	12.4	100.0
	Total	**89**	**100.0**	**100.0**	

Efforts for Weight Loss:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	25	28.1	28.1	28.8
	No	63	70.8	70.8	98.9
	Don't know	1	1.1	1.1	100.0
	Total	**89**	**100.0**	**100.0**	

51.7% of the people had a family history of obesity and they were overweight themselves. So this again stressed the fact that increased weight, and obesity, have a major and crucial role in the development of diabetes. 58.4 % of the people had a family history of diabetes type 2. It means that genetics has a major role. Scientists have linked several gene mutations to higher diabetes risk.

It was also concluded that most diabetics had never tried to lose weight. 63% of the people had never even tried to lose weight. This was probably due to ignorance about the importance of exercise in health maintenance.

Table 1.10, 1.11, 1.12:
Regular exercise:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	26	29.2	29.2	29.2
	No	63	70.8	70.8	100.0
	Total	**89**	**100.0**	**100.0**	

Craving for sweets and carbohydrates:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	56	52.9	52.9	52.9
	No	32	36.0	36.0	98.9
	Don't know	1	1.1	1.1	100.0
	Total	**100**	**100.0**	**100.0**	

Snacking between meals:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	41	46.1	46.1	46.1
	No	48	53.9	53.9	100.0
	Total	**89**	**100.0**	**100.0**	

The majority of the obese people in this study did not have the habit of exercising. They did very little physical activity and aerobic training. It was also found that the majority of obese people with diabetes were very fond of eating sweets and carbohydrate diets. At the same time, 48% of the people did not have the habit of snacking between meals. They eat when they are hungry.

Table 1.13, 1.14, 1.15:
Hungry when stressed:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	56	62.9	62.9	62.9
	No	30	32.7	32.7	96.5
	Don't know	3	3.4	3.4	100.0
	Total	**89**	**100.0**	**100.0**	

Stress from skipping meals:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	56	62.9	62.9	62.9
	No	31	34.8	34.8	97.8
	Don't know	2	2.2	2.2	100.0
	Total	**89**	**100.0**	**100.0**	

Eating the same kind of food for days:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	35	39.3	39.9	39.9
	No	50	56.2	56.2	95.9
	Don't know	4	4.5	4.5	100.0
	Total	**89**	**100.0**	**100.0**	

Even though eating frequently does not directly cause diabetes, eating a lot under stress can increase sugar levels. 62% of patients ate a lot when stressed, making the sugar level reach higher values that are difficult to control. Stress hormones are released into the bloodstream by the body in response to emotional stress (fear, worry, anger, excitement, tension) and physiological stress (disease, pain, infection, damage). So, eating can raise the glucose level further. The patients were, however, very much concerned about their meals. The majority of them took meals at regular intervals and had a liking for simple homemade food. Despite the simple food, the majority were still obese and overweight.

Table 1.16, 1.17, 1.18:
Changes in eating habits leading to diabetes:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Yes	15	16.9	16.9	16.9
	No	67	75.3	75.3	92.1
	Don't know	7	7.9	7.9	100.0
	Total	**89**	**100.0**	**100.0**	

Frequency of eating:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	All day	11	12.4	12.4	12.4
	Only when hungry	29	32.6	32.6	44.9
	At regular meal times	49	55.1	55.1	100.0
	Total	**89**	**100.0**	**100.0**	

Purpose of eating:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	To avoid low sugar	27	30.3	30.3	30.3
	For pleasure	15	16.9	16.9	47.2
	To stay healthy	46	51.7	51.7	98.9
	Due to frustration	1	1.1	1.1	100.0
	Total	**89**	**100.0**	**100.0**	

67 % of the people did not have any change in their eating habits, and the majority were still obese. This indicated that it was not the change and the type of eating habit that was the problem; it was the balance of the type of food and the calories taken. Another notable thing was that the people ate mostly at meal times.

Table 1.19:
Preferred food type:

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Fruits and vegetables	6	6.7	6.7	6.7
	Simple homemade food	57	64.0	64.0	70.8
	Fast food	3	3.4	3.4	74.2
	Traditional fatty food	23	25.8		100.0
	Total	**89**	**100.0**		

The majority of the people took homemade food, but they were still overweight. It showed that obesity might be due to excess intake of calories even from simple food and lack of proper exercise. It means that high-caloric food consumption is associated with the development of disorders in glucose metabolism leading to diabetes mellitus.

So, there is a chance of upsetting the sugar level by increased uptake of even simple homemade food, as in the case of these patients.

DISCUSSION:

According to this study, obese individuals had a higher chance of developing diabetes than those with a lower BMI. Type 2 diabetes revealed a clear predominance of women. But as lifestyles have changed, it now affects both men and women equally. Men appear to be more vulnerable than women to the negative effects of obesity, perhaps due to variations in insulin sensitivity and localized fat deposition. However, Type 2 diabetes is more likely to be passed on to children by women.

Individuals who are obese or overweight put more strain on their body's capacity to use insulin to effectively control blood sugar levels, which increases their risk of developing diabetes. Nearly 90% of type 2 diabetics are also overweight or obese.

Most of the people who have diabetes are unaware of their disease. They remain unaware as the disease progression is slow and takes years to develop and show symptoms. Most people were unaware of their high glucose state, which was an important aspect in the progression of their disease. People need to get regular checkups and blood tests to keep a record of their levels of blood glucose.

Most of the people in this study had a fasting glucose level of more than 126 mg/dl. The high fasting glucose was mostly in elderly people. Most of the patients, along with fasting glucose, had a very high level of random glucose. They alone had the classical signs of diabetes but continued to ignore them, leading to the worsening of their ill state. Their negligence was mostly due to poverty, stress, and workload, and they did not have time for medical checkups.

Most patients had a family history, and most were aware of the risk they were predisposed to. But still, the majority did not make any effort towards weight reduction or to include exercise as a part of their daily routine.

A lot of people, though overweight, had a greater liking for simple homemade food, but the majority did have a craving for sweets.

LIMITATIONS:

The most common limitation faced was that most people needed to be made aware of their body's glucose status so their glucose level was checked, which took a lot of time.

They were unaware of the main risk factors and ignorant about their health issues. This increased the chances of a recall bias in this study.

Most of the people were not willing to take part in the research. So all the patients of Mayo Hospital could not be included, which might have increased the probability of bias in this research results.

There were very few and limited resources from previous studies. Very little investigations have been

conducted on the association between diabetes and obesity. This appears strange as it is a growing epidemic in the world and needs utmost attention during present times.

CONCLUSION:

This study will help focus on the risks and habits leading to diabetes, and hence control them. This is the basic necessity of this time for healthy survival. This research concluded that diabetes is more prevalent in overweight and obese people. People are mostly unaware of the importance of physical activity and its role in controlling diabetes. There is a need to stress on the control of the risk factors. It is mandatory to make people more aware and more concerned about their health and the need for regular checkups.

The theory **"prevention is better than the cure"** can control the majority of cases of type 2 diabetes. Awareness and counseling can lead to better preparation for actively avoiding and treating this epidemic.

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