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ORIGINAL ARTICLE

Prevalence of depression in type-2 diabetes mellitus patients of Khyber Pakhtunkhwa

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ABSTRACT

Background: Diabetes Mellitus (DM) is a chronic metabolic condition and carries an increased risk of development of disease complications. The diagnoses of it raises the likelihood of incident depression. This study was aimed to determine the prevalence of depression among type-2 diabetes mellitus patients and the factors associated with it.

Methods: This was a cross-sectional study carried out at endocrinology outpatient department of Northwest General Hospital and Northwest teaching hospital from December 2022 to June 2023. Patients with diagnosis of type-2 diabetes ≥1 year participated in this study. Pregnant and postpartum women were excluded from the study. PHQ-9 scale was used to assess the level of depression of the participants. All the data was analyzed using SPSS version 26.0.

Results: Out of 256 patients that participated in the study, 49.2% were males and 50.8% were females. 80.5% of the patients had some level of depression. 26.6% had mild depression, 31.3% had moderate depression, 15.6% had moderately severe depression and 7% patients suffered from severe depression. There was a statistically significant difference between the mean depression score of the various age groups ($p<0.05$), males and females ($p<0.05$), participants who had diabetes for less than 10 years and those that had diabetes for more than 10 years ($p<0.05$), patients who had developed diabetic complications and those that did not have any complications ($p<0.05$).

Conclusion: Some level of depression was found among majority of the patients. Patients of older age groups, females, longer duration of diabetes and those who had developed diabetic complications were found to have higher level of depression.

Keywords: Diabetes Mellitus Type 2, Diabetes Mellitus, Depression

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Introduction

Hyperglycemia brought on by a lack of insulin characterizes type 2 diabetes, a chronic metabolic condition (1). Its prevalence increases with obesity (2). By the year 2030, over 438 million people are expected to be living with diabetes, worldwide, with more than 70% of them living in developing nations. The present projected global prevalence of the disease is 285 million (3). Depression is frequently discovered as a comorbid condition, especially in diabetes mellitus (4). An estimated 280 million individuals worldwide,

of all ages, experience depression. In its darkest cases, depression can result in suicide. Every year, almost 7,000,000 people commit suicide (5). The diagnosis of diabetes is a stressor that poses a risk to one's life and necessitates significant mental and physical adjustments owing to the intensity of one's anxiety (6). The likelihood of developing type-2 diabetes mellitus and the concomitant hazards of hyperglycemia, insulin resistance, and development of diabetic complications rises with depression. On the other hand, a type-2 diabetes mellitus diagnosis raises the likelihood of incident depression and can result in a more severe progression of depression. This association reveals a common etiology that involves intricate interactions in both directions across numerous factors. This process may involve changes in hippocampus structural integrity, weight gain, inflammation, and autonomic and neurohormonal dysregulation (7). Compared to the general population, people with diabetes had double the incidence of premorbid anxiety and depression (8).

Pakistan is particularly affected by the diabetes epidemic. There were 6.0 percent of men and 3.5 percent of women who had diabetes in urban regions compared to 6.9 percent of males and 2.5 percent of women in rural areas (9). The mean overall prevalence of anxiety and depressive disorders in the community population was 34 percent, according to a systematic review of mental health studies from Pakistan (10). It takes self-determination to get through the emotional shock of receiving a chronic disease diagnosis, accepting it and the collection of information regarding diabetes control and self-care to prevent disease complications (11). Depression was found to be common among females and those having long-standing and uncontrolled diabetes (12). Our study is aimed to determine the prevalence of depression among type-2 diabetes mellitus patients and the factors associated with it.

Methods

This was a cross-sectional study carried out at endocrinology outpatient department of Northwest General Hospital and Northwest teaching hospital in KPK from December 2022 to June 2023. Patients with diagnosis of type-2 diabetes greater than or equal to 1 year participated in this study. Pregnant and postpartum women were excluded from the study. Sample size was calculated to be 256 using the formula for sample size calculation (13) with a confidence interval of 95% and prevalence of 21.1% (12). After ethical approval Ref.no. IRB&EC/2023-SM/0520 was granted, questionnaires were administered in the form of interview. The questionnaire consisted of an informed consent, demographic data such as age, gender, monthly income, duration of diabetes, physical activity, development of diabetic complications and medication compliance (inquired by asking the patient) and PHQ-9 scale. The Patient Health Questionnaire-9 (PHQ-9) (14) is a major depressive disorder (MDD) module which scores each of the Nine DSM criteria as “0” (not at all) to “3” (nearly every day) and its total score ranges from 0 to 27. Scores of 5, 10, 15 and 20 represent cut points for mild, moderate, moderately severe and severe depression, respectively. Scores ≤ 4 suggest minimal depression which may not require treatment. Data was analyzed using SPSS version 26. Frequencies and percentages were calculated for all variables. Pie chart was used to illustrate frequencies. One-way ANOVA and independent sample t-test were

used to determine the differences between variables.

Results

Out of 256 patients that participated in the study, 49.2% (126) were males and 50.8% (130) were females. 35.5% of the participants were 50 years of age or below and the mean age of the participants was 55.66±11.605. 35.9% (92) of the patients had monthly income less than 30,000 and 32.4% (83) had monthly income more than 61, 000. 51.2% (131) of the patients had diabetes for less than 10 years and 48.8% (125) had it for more than 10 years. 31.3% (80) of the patients had physical activity greater than 30min/day while 14.5% (37) reported to be inactive. 74.2% (190) of the patients were compliant and 25.8% (66) were non-compliant. 27.3% (70) of the patients had neuropathy, 11.3% (29) had nephropathy, 4.7% (12) had cardiovascular disease, 18.8% (48) had retinopathy, 2.7% (7) had diabetic foot while 35.2% (90) of patients had no diabetic complication (Table 1).

19.5% (50) of the patients had minimal depression. 80.5% (206) of the patients had some level of depression. 26.6% (68) had mild depression, 31.3% (80) had moderate depression, 15.6% (40) had moderately severe depression and 7% (18) patients suffered from severe depression (Table 2).

The ANOVA results suggest that there are significant differences in depression level among the various age groups ($F(2, 253) = 9.422$, $p<0.05$). Since the Levene's statistic is not significant, equal variances are assumed. To check for individual differences between groups, post-hoc comparisons were assessed using Gabriel test. The test indicated that the mean depression score for patients of age group 50 years or less was significantly different from patients of age group 51-60 years and 60 years and above. Mean score of patients of age group 51-60 years was significantly different from patients of age group 50 years or less. Mean score of patients of age group 60 and above was significantly different from patients of age group 50 years or less. There was no statistically significant different between patients of age group 60 and above and the age group 51-60 years. (Table 3.1 and 3.2)

An independent sample t-test was conducted to determine if a difference existed between the mean depression scores of the participants based on their gender and clinical characteristics. There was a statistically significant difference between the mean depression score of males (n=126, M=8.20, SD=5.151) and females (n=130, M=12.10, SD=5.711), participants who had diabetes for less than 10 years (n= 131, M=8.69, SD=5.798) and those that had diabetes for more than 10 years (n=125, M=11.74, SD=5.340), patients who had developed diabetic complications (n=166, M=11.9, SD=5.356) and those that did not have any complications (n=90, M=7, SD=5.152). No statistically significant difference was observed between the mean depression score of participants who were compliant (n=190, M=10.57, SD=5.715) and those that were non-compliant (n=66, M=9.06, SD=5.836) (Table 4).

Table 1: Frequency and percentages of demographic and clinical variables of the study (N=256)

Variable	Frequency	Percent
Age		
≤50y	91	35.5
51-60y	80	31.3
>60y	85	33.2
Gender		
Male	126	49.2
Female	130	50.8
Monthly income		
≤30,000	92	35.9

31,000-60,000	81	31.6
≥61,000	83	32.4
Duration of DM		
<10 years	131	51.2
>10 years	125	48.8
Physical activity		
Inactive	37	14.5
<20min/day	57	22.3
20-30min/day	82	32.0
>30min/day	80	31.3
Variable	**Frequency**	**Percent**
Medication compliance		
Yes	190	74.2
No	66	25.8
Diabetic complications		
Neuropathy	70	27.3
Nephropathy	29	11.3
Cardiovascular disease	12	4.7
Retinopathy	48	18.8
Diabetic foot	7	2.7
None	90	35.2

Table 2: Frequency of level of depression among Type 2 diabetes mellitus patients

Depression Level	Frequency	Percent
Minimal depression	50	19.5
Mild depression	68	26.6
Moderate depression	80	31.3
Moderately severe depression	40	15.6
Severe depression	18	7.0

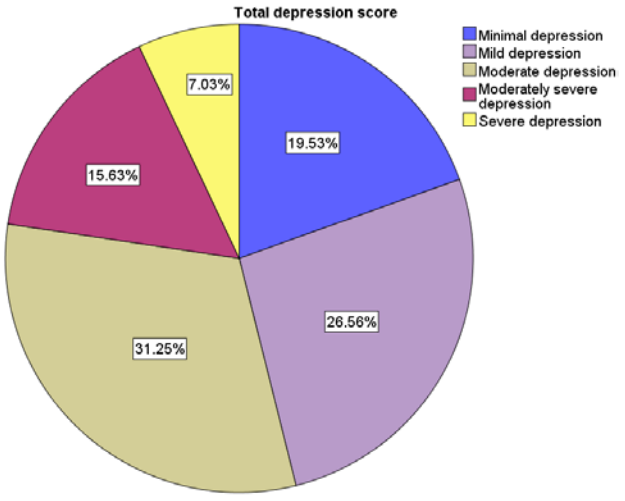

Figure 1: Pie chart showing frequency of level of depression among type-2 diabetes mellitus patients

Table 3.1: One-Way ANOVA result

Age groups	Mean	Std. Deviation	Test of homogeneity of variances		ANOVA	
			Levene's statistics	Sig.	F	Sig.
≤50y	8.23	5.426	0.17	0.98	9.422	0.00
51-60y	11.84	5.653				
>60y	10.71	5.705				

Table 3.2: Post-hoc analysis showing difference in mean depression score among different age groups

Variable	Age groups		Mean difference	Sig.
Depression score	≤50y	51-60y	-3.607*	0.00
		>60y	-2.475*	0.01
	51-60y	≤50y	3.607*	0.00
		>60y	1.132	0.47
	>60y	≤50y	2.475*	0.01
		51-60y	-1.132	0.47

Table 4: Gender, Clinical characteristics and mean depression score

Variable	N	Depression score	
		Mean ± SD	p-value
Gender			
Male	126	8.20±5.151	0.00
Female	130	12.10±5.711	
Duration of diabetes			
<10 years	131	8.69±5.798	0.00
>10 years	125	11.74±5.340	
Medication compliance	190	10.57±5.715	0.067
Yes	66	9.06±5.836	
No			
Diabetic complications	166	11.9±5.356	0.00
Yes	90	7.00±5.152	
No			

Discussion

80.5% of patients who participated in this study were found to have some level of depression. These findings show a higher prevalence of depression among diabetes

patients and are similar to a study conducted in Tanzania that found that the prevalence of depression among type 2 diabetes mellitus patients was 87%, (15) and 73% of the patients had some level of depression in the study conducted in Saudi Arabia (16). The prevalence of depression was reported to be 73.6% in Peshawar Pakistan (17). In contrast, the studies conducted in Pakistan, reported the prevalence of depression among diabetes patients in a hospital in Karachi to be 49.2%, (18) and the prevalence of depression among type 2 diabetes patients was reported to be 47.9% in Faisalabad Pakistan, (19). A study conducted in Palestine found the prevalence of depression among diabetic patients to be 40%, (20) and the prevalence of depression was found to be 48.9% in Ethiopia (21). and 19.4% in Nigeria (22). The studies conducted in Saudi Arabia found the prevalence of depression among diabetes mellitus patients to be 36.6% (23) and 37% (24). The difference in the prevalence of depression among diabetes patients in our study and those reported by other studies could be due to the difference in the scales used by these studies for the assessment of depression.

Patients of older age groups had higher level of depression in this study. The prevalence of depression was found to be higher among young diabetes mellitus patients (23) while other studies found no association of depression with age. (15, 20)

Female diabetic patients in our study were found to have higher level of depression. This finding is similar to the studies that also showed a higher prevalence of depression among female diabetic patients. (18, 19, 20, 21, 22) Other studies, however, found no association of depression with female gender (15, 25).

This study found no association between medication compliance and depression. Other studies found a significant association between depression and medication compliance suggesting higher rates of depression among non-compliant patients (20, 23, 24, 25). This variation could be explained by the fact that majority of the non-compliant patients in this study had a short duration of diabetes and hence their quality of life had not been affected by diabetes yet as compared to the patients who had longer duration of diabetes and had developed complications.

Duration of diabetes was also found to be associated with depression in this study. Patients having diabetes for a longer duration (≥10years) had higher level of depression. These findings are supported by studies reporting increased odds of having depression in patients who have had diabetes for long duration (18, 21). Other studies found no association of depression with duration of diabetes (15, 20).

Patients who had developed diabetic complications had higher level of depression in this study and the most common complication was found to be peripheral neuropathy. These findings are supported by other studies which show that patients with diabetic complications had higher levels of depression (16, 18, 19, 24, 25).

Conclusions

Some level of depression was found among majority of the patients. Patients of older age groups, females, longer duration of diabetes and those who had developed diabetic complications were found to have higher level of depression. There was no association between medication compliance and depression.

It is important to include psychological assessment and support during consultations with diabetic patients. Mental health

awareness programmes for diabetic patients should be initiated for both the patients and the doctors.

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B. Active Participation in Active Methodology
C. Interpretation/ Analysis and Discussion