

## Frequency of Depression in Patients With Diabetes Mellitus Presenting to DHQ Kohat

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**Abstract:** Depression is a common but underrecognized comorbidity in patients with diabetes mellitus and adversely affects glycemic control, treatment adherence, and overall quality of life. **Objective:** To determine the frequency of depression in patients with diabetes mellitus presenting to DHQ Kohat. **Methods:** This study was conducted in 213 diabetic patients aged 18 to 75 years with HbA1c > 6.5%. The frequency of depression in these diabetic patients was determined. Depression was diagnosed using the PHQ-9 tool and DSM-IV. SPSS 27 was used for analysing the data. Depression was stratified by various demographic and comorbidities using the chi-square test, with a P-value set at  $\leq 0.05$ . **Results:** The mean age of the patients was  $44.62 \pm 16.45$  years. There were 133 (62.4%) male and 80 (37.6%) female patients. The frequency of depression was 37.6% ( $n = 80$ ). Depression was significantly associated with female gender, lower economic background, poor glycemic control, hypertension and prolonged diabetes duration. **Conclusion:** The frequency of depression in patients with diabetes mellitus in our study was 37.6%, and it was notably associated with female gender, lower economic background, poor glycemic control, hypertension and prolonged diabetes duration.

**Keywords:** Depression, Diabetes Mellitus, PHQ-9, Comorbidity

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### Introduction

Patients with diabetes mellitus (DM) have irregularities in insulin production, insulin action, or both that often lead to chronic hyperglycemia. Insulin's role is as an anabolic hormone that causes metabolic irregularities in glucose and protein metabolism. Such abnormalities result from a lack of insulin or from the inability of target tissues, such as skeletal muscle, to respond to insulin due to changes in insulin receptors and/or effector enzymes/genes. Type and duration of DM contribute to symptom severity; however, the early-stage T2DM are often asymptomatic. The symptoms of DM are polyuria, polydipsia, and weight loss and vision impairment among adults with hyperglycemia 2. Ketoacidosis and less commonly reported nonketotic hyperosmolar syndrome often lead to coma and death in people with uncontrolled diabetes (1, 2).

Some of them go through the stages of mourning, likewise the denial, anger, depression and acceptance. Individuals with DM are often affected by depressive conditions, which is a prevalent and overwhelming psychiatric disorder. Many DM patients also suffer from depression, as per some reports (3, 4). The coexistence of depression and diabetes severely influences the medical outcome of individuals. Symptoms of depression are related to hyperglycemia, micro and macrovascular difficulties and considerably increased mortality within individuals with DM. Patients usually experience low quality of life, making it difficult for them to manage their diabetes and adhere to treatment guidelines (5). A study reported the rate of depression (21.3%) among DM patients (6).

Several screening tools have been developed that permit the rapid and reliable diagnosis of depression and are not costly to implement (7). If depression screening fails to lead to adequate care via an established treatment route, the potential negative effects of not providing an evidence-based intervention may overshadow the benefit of screening for depression. Diabetic complications often raise the likelihood of depression (8-10).

Individuals with DM are very susceptible to acquiring depression. Depression in diabetic patients has not been frequently discussed in past available literature, due to which there is a gap in establishing the association between these two. Therefore, the purpose of this study is to determine the frequency of depression among diabetic patients presenting to DHQ Kohat. These study findings will also serve as a starting point for future researchers who are interested in conducting a more comprehensive study in Pakistan. Those interested in learning more about the link between depression and DM can also profit from this research. Moreover, findings of this study may encourage clinicians to screen, diagnose and treat diabetes for depression at an earlier stage.

### Methodology

The present cross-sectional study was conducted in the Department of General Medicine at DHQ Hospital, Kohat, from April 2024 to October 2024, after obtaining an ethical certificate from the hospital. For this study, a sample of 213 patients was selected. The sample was calculated using the OpenEPI web-based calculator, based on the previous frequency of depression in diabetic patients (21.3%), a 95% confidence interval, and a margin of error of 5.5%. Non-probability consecutive sampling was used.

Included patients were 18 to 75 years old, of either gender, presenting with diabetes mellitus. Diabetes mellitus was defined as a haemoglobin A1c level of 6.5% or higher or a history of antidiabetic medication use. Patients who were on antidepressant drugs, had end-stage kidney disease and were pregnant were excluded.

Each patient gave their consent to participate in the study after being informed of the study objectives and benefits. Demographic data were collected, including gender, age, BMI, educational status, profession, socioeconomic status, and residence area. Comorbidities were also recorded. All the patients were assessed for depression, which was determined with the PHQ-9 tool (Questionnaire). It involved 9 items with a 4-point Likert scale and scored each of the 9 DSM-IV benchmarks for



depression. The answers range from 0 (not) to 3 (nearly every day). A PHQ-9 score of  $\geq 5$  was considered to indicate depression.

Data collection was performed through a structured process. A standardised proforma was used to record demographic and clinical information. This included age, gender, calculated body mass index, highest education level attained, current profession, self-reported socioeconomic status, and area of residence, classified as either urban or rural. Clinical parameters such as the duration of diabetes, history of hypertension, and smoking status were also documented. A physical examination was conducted as part of the routine clinical assessment.

Data was analysed using SPSS 27. Frequencies and percentages were used for gender, depression, smoking history, hypertension, poor glycemic control, education status, profession, socioeconomic status, and residence area. Mean and Standard deviation were calculated for age and duration of diabetes mellitus. Depression was stratified by age, duration of diabetes mellitus, gender, hypertension, poor glycemic control, smoking history, education status, profession, socioeconomic status, and

residence area. A post-stratification chi-square test was used; p-values  $\leq 0.05$  were considered significant.

## Results

In this study, 213 patients with diabetes were included. Their mean age was  $44.62 \pm 16.45$  years, and the mean duration of diabetes was  $5.64 \pm 1.98$  years. The majority were male (62.4%) (Table 1)

Regarding comorbidities, hypertension was present in 83 cases (39.0%) (Table 2). Depression was found in 80 (37.6%) cases (Table 3). Analysis of associated factors revealed several significant associations. Female gender was significantly associated with depression; fifty-one (63.8%) of the depressed patients were female ( $p = 0.0001$ ). Lower socioeconomic status was also associated with depression ( $p = 0.001$ ). Hypertension was also significantly higher in patients with depression ( $p = 0.0001$ ). Poor glycemic control was also significantly associated with depression ( $p = 0.001$ ). Longer duration of diabetes ( $>6$  years) was associated with a higher frequency of depression ( $p = 0.01$ ) (Table 4).

**Table 1: Demographic characteristics**

Demographics		n	%
Gender	Male	133	62.4%
	Female	80	37.6%
Socioeconomic status	Low	61	28.6%
	Middle	124	58.2%
	High	28	13.1%
Education status	Educated	96	45.1%
	Uneducated	117	54.9%
Profession	Office job	99	46.5%
	Business	78	36.6%
	Labor	21	9.9%
	Other	15	7.0%
Area of residence	Urban	147	69.0%
	Rural	66	31.0%

**Table 2: Comorbidities**

Comorbidities		n	%
Hypertension	Yes	83	39.0%
	No	130	61.0%
Smoking history	Yes	80	37.6%
	No	133	62.4%
Poor glycemic control	Yes	75	35.2%
	No	138	64.8%

**Table 3: Frequency of depression**

Depression	n	%
Yes	80	37.6%
No	133	62.4%

**Table 4: Association of depression with demographics and comorbidities**

Demographics & comorbidities	Depression				P value	
	Yes		No			
	n	%	n	%		
Age distribution (Years)	18 to 35	34	42.5%	44	33.1%	0.38
	36 to 50	16	20.0%	30	22.6%	
	51 to 75	30	37.5%	59	44.4%	
Gender	Male	29	36.2%	104	78.2%	0.0001
	Female	51	63.8%	29	21.8%	
Socioeconomic status	Low	33	41.2%	28	21.1%	0.001
	Middle	43	53.8%	81	60.9%	
	High	4	5.0%	24	18.0%	
Education status	Educated	30	37.5%	66	49.6%	0.08
	Uneducated	50	62.5%	67	50.4%	
Profession	Office job	37	46.2%	62	46.6%	0.73

	Business	30	37.5%	48	36.1%	
	Labor	6	7.5%	15	11.3%	
	Other	7	8.8%	8	6.0%	
Area of residence	Urban	57	71.2%	90	67.7%	0.58
	Rural	23	28.8%	43	32.3%	
Hypertension	Yes	52	65.0%	31	23.3%	0.0001
	No	28	35.0%	102	76.7%	
Smoking history	Yes	25	31.2%	55	41.4%	0.14
	No	55	68.8%	78	58.6%	
Poor glycemic control	Yes	46	57.5%	29	21.8%	0.0001
	No	34	42.5%	104	78.2%	
Duration of diabetes (Years)	2 to 6	38	47.5%	87	65.4%	0.01
	> 6	42	52.5%	46	34.6%	

## Discussion

The frequency of depression in the current study was 37.6%. This frequency aligns with studies conducted in Pakistan, Kumar et al. reported depression in 33.6% patients, while Riaz et al. reported depression in 42.3% patients (11, 12). Another study reported 30% depression in diabetic patients (13). The consistency in Pakistani studies proves that depression is a critical public health problem in diabetic patients. The depression rate is significantly higher than the 5.8% depression rate reported by Accinelli et al (14). This disparity can be related to regional differences and the study population. Accinelli et al. used ICD-10 criteria, whereas the present study used screening scales such as PHQ-9 and DSM-IV. Screening tools often exhibited higher prevalence rates.

In the present study, females constituted the majority (63.8%) in the depressed group, indicating a significant association. This finding is in agreement with Kumar et al. and Nasir et al., as they found depression to be more common in females (11, 15). The study conducted on Type 1 diabetes patients also reported higher depression scores in females (12). Accinelli et al. validated in their research that female gender is the only factor which is associated with depression (14). The consistent pattern suggests that biological, hormonal, and cultural risk factors may contribute to depression in diabetic women.

Regarding socioeconomic status, there was a significant association between depression and a lower economic background. This observation aligns with Kumar et al., who derived their sample from a government hospital that primarily treats patients from lower socioeconomic strata (11). This finding implies that depression in people with diabetes from lower economic strata is common due to their financial conditions, burden of treatment, and not being able to afford the proper nutrition required for diabetes.

The association between hypertension and depression was also significant in the present study. This finding is similar to Sana et al., who identified hypertension as a risk factor, reporting an odds ratio of 2.206 (16).

A longer duration of diabetes in this study was significantly associated with depression. This finding is supported by Sana et al., who found a positive correlation between diabetes duration and diabetes.<sup>16</sup> In contrast, Kumar et al. found depression was more common in those who were recently diagnosed with diabetes (<5 years); this finding can be attributed to the initial psychological shock and lifestyle modification for diabetes.<sup>11</sup> These findings point towards a U-shaped risk, where the initial Diagnosis of diabetes can cause depression, which lowers with adjustment and then rises again with prolonged duration of managing diabetes.

In the present study, smoking was not associated with depression. In contrast, Sana et al. reported smoking as a possible risk factor for depression, with an odds ratio of 2.191 (16). Nicotine elevates mood during depression, and it can become addictive. Withdrawal from nicotine can put the patient back into a state of depression.

Poor glycemic control was strongly associated with depression. Depression can lead to poor devotion to diet, medication, and monitoring glucose levels, which leads to worsening glycemic control.

The present study contributes to the literature by validating the high burden of depression in a local diabetic population. It highlighted lower

socio-economic status and hypertension, along with poor glycemic control, female gender and prolonged disease duration as potential risk factors for depression in diabetes. Local physicians must address these risk factors while screening for depression in this population.

## Conclusion

From this study, it is concluded that depression had a high frequency in diabetic patients (37.6%). Furthermore, the study also found a notable association of depression with several factors such as female gender, prolonged diabetes duration, hypertension, poor glycemic control and lower economic strata.

## Declarations

### Data Availability statement

All data generated or analysed during the study are included in the manuscript.

### Ethics approval and consent to participate

Approved by the department concerned. (IRB)

### Consent for publication

Approved

### Funding

Not applicable

## Conflict of interest

The authors declared no conflict of interest.

## Author Contribution

### SAU (PGR)

*Manuscript drafting, Data analysis, Data Collections and Revisions*

### AM (Professor)

*Conception of Study, Study Design, and Drafting Article.*

### AJK (Professor of Family Medicine)

*Critical Input and Review*

### IK (PGR)

*Study Design, Manuscript Review, and Critical Input.*

### WA (PGR)

*Literature Review*

### MHK (Lecturer Family Medicine)

*Literature Review*

*All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.*

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