

# Determinants of Depression in Patients of Type-II Diabetes Mellitus Presenting at a Tertiary Care Hospital

Humaira Hasnain, Gohar Khan, Asif Mujtaba, Rimsha Azhar, Ahmed Ali Wassan, Amina Zulfiqar

Department of Endocrinology, Federal Government Polyclinic, Islamabad.

## Abstract

**Background:** Depression is increasingly prevalent worldwide and often coexists with chronic physical conditions like Type-II Diabetes Mellitus (DM). Despite its significant impact on quality of life, mental health in diabetic patients is frequently overlooked.

**Objective:** To observe the frequency and determinants of depression in patients of Type-II DM presenting at a tertiary care hospital.

**Methods:** This cross-sectional study was conducted at the Department of Medicine and Endocrine, Federal Government Poly-Clinic Hospital, Islamabad from January to March 2024. After taking informed consent patients who were diagnosed with Type-II DM for more than one year were recruited in this study. Depression was assessed with Patient Health Questionnaire-9 and confirmed by interview with the psychiatrist. Association of various social, demographic and clinical factors was established with presence of depression among the study participants via relevant statistical test.

**Results:** A total of 1000 patients of Type-II DM were recruited of which 702 (70.2%) were male while 298 (29.8%) patients were female. After assessment, it was found that 600 (60%) patients did not have depression while 400 (40%) patients had significant depression. Statistical analysis revealed that female gender and poor glycemic control were significantly associated with presence of depression among the study participants ( $p$ -value  $<0.001$ ).

**Conclusion:** Current study showed a significant proportion of patients with Type 2 Diabetes to have depression. Female patients and patients with poor glycemic control were more statistically associated with depression as compared to male patients and patients with good glycemic control in the study population.

**Key words:** Depression, Type-II diabetes mellitus, risk factors.

## Introduction

Mental health problems, especially depression, have been on the rise among individuals of all age groups across the globe.<sup>1</sup> All the specialty and family practice clinics have been equally sharing the burden of this illness as the presentation of patients

may vary and this mental health condition is also comorbid with a number of physical health conditions.<sup>2</sup> Understanding of this bi-modal relationship of physical and mental health problems is significant for physicians in order to take care of overall health of patients.<sup>3</sup>

Type-II DM is a long standing condition with certain complications which impact overall quality of life of patients.<sup>4</sup> Usually physicians and management teams cater for the physical health needs associated with DM and associated mental health needs get neglected.<sup>5</sup> A number of mental health conditions including anxiety, adjustment disorder, depression, sexual disorders etc. has been found more prevalent in patients of Type-II DM as compared to the general population.<sup>6</sup> Multiple factors may be related to this phenomenon.

A recent study from Eastern Ethiopia concluded that almost half of the patients suffering from Type-II DM had depression. Being female and having a longer duration of illness were the factors

### Corresponding Author:

Humaira Hasnain

Department of Endocrinology,  
Federal Government Polyclinic Islamabad.

Email: [humaira104@hotmail.com](mailto:humaira104@hotmail.com)

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### Authors Contribution

HH & GH conceptualized the project. HH, GH, AM, RA, AAW & AZ did the data collection. HH & RA also did the literature search. AM, AAW & AZ also performed the statistical analysis. Drafting, revision & writing of manuscript were done by HH, GH & RA.

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associated with presence of depression among these patients.<sup>7</sup> Since Pakistan is a developing country and similar statistics may be expected in current population. In another study, Chinese patients having DM and pulmonary TB were studied for the presence of depression and it was revealed that monthly income and increased BMI were associated with more chances of having depression among the target population.<sup>8</sup> A study published in 2022 came up with the findings that around 1/3<sup>rd</sup> of the patients who were managed for Type-II DM at a hospital at KSA had depression. Young age, comorbid thyroid disease and neuropathy were the major determinants of depression in their study population.<sup>9</sup> A recent cross-sectional study published from Karachi found that depression and suicidal ideation were found with a frequency of 30.83% and 20.39% among patients with diabetes. Low socioeconomic status, lack of social support and physical disability were the factors associated in their study.<sup>10</sup>

This highlights the importance of identifying and managing depression among patients with diabetes. Limited local data has been available in this regard. Present study was therefore planned with the rationale to look for frequency and determinants of depression in patients of type-II DM so that health care professionals can focus on those patients for early screening, timely diagnosis and management.

## Methods

This cross-sectional study was conducted at Department of Medicine and Endocrine, Federal Government Poly-Clinic Hospital, Islamabad from January to March 2024. A sample size of 1000 was statistically calculated by using the population prevalence proportion of depression among patients of Type-II DM as 42.3%.<sup>11</sup> Non probability consecutive sampling was used to collect the samples.

After taking informed consent all the patients of Type-II DM between the ages of 18 years and above suffering from DM for more than one year were recruited. Patients with unknown psychiatric history or substance use disorders were not recruited. Those on any prescribed or non-prescribed medications which could alter the mood were excluded from this study. Individuals with any uncontrolled medical illness along with Type-II DM or those with any neoplastic or autoimmune disease were also excluded. Individuals with any recent bereavement or loss (with in last 6 months) or those who had any traumatic (physical or mental) incident were also not recruited in the study.

All the patients of type-II DM who met the criteria were included in the final analysis. Diagnosis of Type-II DM and duration of disease for more than one year was confirmed by detailed history taking. Control of diabetes was assessed by HbA1c by consultant medical specialist on the basis of set international criteria. HbA1C of  $\leq 7\%$  was reported as good glycemic control and  $> 7 - \leq 9\%$  as poor control.<sup>12</sup> Body mass index of the patients was calculated and categorized as per WHO criteria.<sup>13</sup> Validated Urdu version of Patient Health Questionnaire-9 (PHQ-9) was used to collect data from all the study participants and those who scored 6 or more were considered as having significant depression.<sup>14</sup> A consultant Psychiatrist reviewed the patient only in case of any ambiguity in clinical picture of the patient.

Statistical analysis was done by SPSS 24.0. Frequency and percentage were calculated for the qualitative variables whereas mean and standard deviation was calculated for the quantitative variables. Chi-square test was used to look for the association of various socio-demographic and clinical variables with presence of depression among the study participants. The  $p$ -value less than or equal to 0.05 was considered significant to establish association of various variables with depression among patients of Type-II DM.

## Results

A total of 1000 patients of Type-II DM who reported in the hospital were included in the study. Among them, 702 (70.2%) were male while 298 (29.8%) patients were female. Mean age of study participants was  $47.83 \pm 8.43$  years. Table-1 summarized the basic social, demographic and clinical characteristics of patients of Type-II DM recruited in this study. After assessment, it was found that 600 (60%) patients did not have depression while 400 (40%) patients had significant depression.

**Table 1: Characteristics of patients of type-II DM recruited in study.**

| Characteristics               |                     | n   | %    |
|-------------------------------|---------------------|-----|------|
| Gender                        | Male                | 702 | 70.2 |
|                               | Female              | 298 | 29.8 |
| Depression                    | No                  | 600 | 60.0 |
|                               | Yes                 | 400 | 40.0 |
| Diabetes control              | Good                | 711 | 71.1 |
|                               | Poor                | 289 | 28.9 |
| Body mass index               | Normal              | 815 | 81.5 |
|                               | Overweight or obese | 185 | 18.5 |
| Duration of Diabetes Mellitus | 1-5 years           | 770 | 77.0 |
|                               | > 5 years           | 230 | 23.0 |

Table-2 showed the results of statistical analysis. It was revealed that female gender and poor glycemic control were the factors significantly associated with presence of depression among the study participants ( $p$ -value  $<0.001$ ).

**Table-2: Association of various factors with presence of depression among patients managed for type-II DM.**

| Factors Studied  |                  | No Depression<br>n (%) | Depression<br>n (%) | p-value |
|------------------|------------------|------------------------|---------------------|---------|
| Age              | < 40 years       | 458 (76.3)             | 286 (71.5)          | 0.087   |
|                  | 40 years or more | 142 (23.7)             | 114 (28.5)          |         |
| Gender           | Male             | 467 (77.8)             | 235 (58.7)          | <0.001  |
|                  | Female           | 133 (22.2)             | 165 (41.3)          |         |
| Body Mass Index  | Normal           | 498 (83)               | 317 (79.3)          | 0.136   |
|                  | Overweight/obese | 102 (17)               | 83 (20.7)           |         |
| Diabetic control | Good             | 489 (81.5)             | 222 (55.5)          | <0.001  |
|                  | Poor             | 111 (18.5)             | 178 (44.5)          |         |
| Duration of DM   | 1-5 years        | 471 (78.5)             | 299 (74.7)          | 0.169   |
|                  | > 5 years        | 129 (21.5)             | 101 (25.3)          |         |

## Discussion

Current study was conducted in a tertiary care hospital of Islamabad which serves for the patients of large catchment area including both rural and urban population. Around 40% of the study participants were screened positive for presence of depressive symptoms on PHQ-9. This finding is comparable to the similar results in recent studies conducted at Eastern Ethiopia,<sup>7</sup> Saudi Arabia<sup>9</sup> and a local study at Karachi<sup>10</sup> with frequencies of depression found to be 48.9%, 36.6% and 30.83%, respectively.

In current study female gender and glycemic control were the factors related more to the presence of depression. Females have hormonal related predisposing factors as well as difficult social roles which may be responsible for these findings.<sup>15</sup> Depression and glycemic control have a bidirectional relationship and each serves as a barrier to the management of other via complex mechanisms. Among the variables studied; age, duration of diabetes and body mass index were not found to have statistically significant association with depression.

A cross-sectional study conducted during COVID-19 pandemic that studied determinants of both anxiety and depression among patients of Bangladesh suffering from Type-II DM. Frequency of anxiety and depression were 29.8 and 22.7% in that study. It was found that elderly males, obesity and physical inactivity were the factors contributing

towards both conditions.<sup>16</sup> As this study was conducted during the pandemic; multiple confounding factors might have an impact on the results.

A prospective cross-sectional study carried out at military hospital of KSA revealed that around 48.2% patients suffering from Diabetes (both Type 1 and II) had depression. Female gender, psychosocial stressors and presence of complications of diabetes were among the factors associated with depression in their population and those who had regular physical activity were at less risk.<sup>17</sup> Association of female gender being similar but higher frequency of depression as compared to current study may be due to inclusion of Type-I diabetes and complications of Diabetes in the factors studied.

A systematic review and meta-analysis was published based on studies performed in Ethiopia on patients of Type-II DM. It was revealed that around 34.6% patients who suffer from Type-II DM have depression. Older age, female gender, longer duration of diabetes and poor compliance with treatment were the factors associated with depression in their analysis.<sup>18</sup> Association of female gender was consistent with our study however age and duration of diabetes were not associated with presence of depression in current study participants ( $p$ -value  $>0.05$ ). Social setup in this part of the world where elderly have increased social support may be one of the protective factors but this needs further exploration.

A study published in 2023 from a rural area of India on similar subject showed that 49% of the patients suffering from Type-II DM had depression. Having comorbidities and poor glycaemic control were factors associated with depression in their study participants.<sup>19</sup> Inclusion/exclusion criteria of current study was strict so it was tried not to include patients with comorbid medical illnesses therefore association of depression with presence of comorbid illnesses could not be ascertained. Study from India also established association of socio-economic class with presence of depression which could not be done in current study as sample was from a public sector hospital and most of the patients belonged to lower socio-economic class.

Due to the cross-sectional design, this study cannot establish a causal relationship between Type-II DM and depression. Additionally, the sample was limited to patients already connected with medical services, introducing selection bias and limiting the generalizability of the findings. Some individuals may develop depression later in the course of the illness; thus, a longitudinal cohort study starting at the time of diagnosis and tracking

patients over time would provide more robust insights.

## Conclusion

Current study showed that a significant proportion of patients with Type-II DM; specifically females and those with poor glycemic control have depression. This information may help health care providers of this region to practice early and focused screening of at risk patients with validated tools for depression. Early diagnosis and timely management of depression may help in improving glycemic control, prevention of complications and improving overall quality of life.

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**Availability of Data:** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Ethical Approval:** The Ethical Committee of Federal Government Poly-Clinic Hospital, Islamabad approved the study via letter no. FGPC.1/12/2023/Ethical Committee.

**Conflict of Interest:** None declared.

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