Depression among diabetic patients visiting a diabetes center in Nepal

Durga Prasad Pahari¹, Radhika Upadhyay², Chandra Kala Sharma²

¹Tribhuvan University, Institute of Medicine, Maharajgunj Medical Campus, Kathmandu.
²Tribhuvan University, Institute of Medicine, Nursing Campus Maharajgunj, Kathmandu.

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Introduction

Depression is a major co-morbidity associated with diabetes. This study aims to assess the prevalence and determine factors associated with depression among diabetic patients visiting a diabetes center in Lalitpur, Nepal.

Methods: This is a cross-sectional study of diabetic patients visiting a diabetes center in Kathmandu, Nepal. 203 diabetic patients were recruited in a period of two months. A validated and reliable Beck Depression Inventory Scale was used to identify and classify depression. Diabetes status was self-reported. Prevalence of depression, socio-demographic and diabetes related characteristics were calculated using frequency and percentages. Association was analyzed using chi-squared test. Statistical significance was determined at \( p<0.05 \). Bivariate logistic regression was performed to identify unadjusted odds ratio with 95% CI. Then, multivariate logistic regression model was designed for those variables significant at bivariate level to calculate adjusted odds ratio with 95% CI.

Results: The prevalence of depression among diabetic patients was 34% (Mild - 17.7%, Moderate - 13.8% and Severe - 2.5%). Diabetic patients with secondary or above educational level were less than half likely to be affected by depression compared to patients with no formal school education [AOR:0.42]. Similarly, diabetic patients on insulin therapy were twice likely to be affected by depression compared to patients on oral hypoglycemic agents [AOR: 2.08] and patients having other comorbidity along with diabetes were also twice likely to be affected by depression [AOR:2.18]. Patients with stressful life events in the past were twelve times more likely to have depression compared to patients with no such events in the past [AOR: 12.33].

Conclusion: More than one third of the diabetic patients have some degree of depression. Factors such as no schooling, being on insulin therapy, having other comorbid conditions along with diabetes and stressful life events in the past among diabetic patients kept them at higher risk of depression. These factors should be focused in program for prevention and control of depression among diabetic patients in Nepal.

Key words: Diabetic patients, Depression, Beck Inventory Scale, Associated factors.

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The BDI scores and cases were categorized into “no depression (0-13)”, “mild depression (14-19)”, “moderate depression (20-28)” and “severe depression (29-63). The Nepali version of TUTH BDI scale at cut off score 13/14 has sensitivity 0.93 and specificity 0.78 [7].

Structured interview schedule in Nepali version was used to gather required information from the participants through face to face interview technique at outpatients setting. BDI Score was used to explore the prevalence of depression. Data were entered and analyzed on SPSS version 17. Status of depression, socio-demographic and diabetes related characteristics were calculated using frequency and percentages. Confidence Interval at 95% was calculated to estimate prevalence of depression among diabetic patients. Bivariate analysis was performed using cross tabulation and association was identified using chi-squared test. Statistical significance was determined at p<0.05. Bivariate logistic regression was performed on factors with significant p value to identify unadjusted odds ratio with 95% CI. Then, multivariable logistic regression model was used to control confounding and calculate adjusted odds ratio with 95% CI. The adjusted variables were marital status, educational level, blood sugar level, treatment modality of diabetes, presence of co-morbidity, family support and stressful life events in the past.

Research proposal was approved by research committee of Nursing Campus Maharajgunj. Official request letter was submitted to administration of diabetes thyroid and endocrinology care centre and written permission was taken to conduct research. The purpose and the procedure of the study was explained to the participants including the autonomy during the process of informed written consent with each participants.

Results

Among the 203 study participants, 60.6% of them were between age 40-60 years and 83.3% were from inside Kathmandu valley and belonged to relatively advantage Janajati ethnic group (54.7%). Most of the participants (89.1%) were married and 53.2% lived in joint family. The distribution of participants according to their socio-demographic characteristics is given in Table 1.

Table 1: Socio-demographic characteristics of the study participants (n= 203)

| Variables             | Frequency | Percentage |
|-----------------------|-----------|------------|
| Age                   |           |            |
| 21-60 years           | 12        | 5.9        |
| 41-60 years           | 123       | 60.6       |
| Above 60 years        | 68        | 33.5       |
| Sex                   |           |            |
| Male                  | 102       | 50.2       |
| Female                | 101       | 49.8       |
| Address               |           |            |
| Inside Kathmandu Valley | 169   | 83.3       |
| Outside Kathmandu Valley | 34    | 16.7       |
| Ethnicity             |           |            |
| Dalit                 | 3         | 1.5        |
| Disadvantaged Janajatis, Madhesi and religious minorities | 17 | 8.4 |
| Relatively advantaged Janajatis | 111 | 54.7 |
| Upper caste group     | 72        | 35.5       |
| Marital Status        |           |            |
| Married               | 181       | 89.1       |
| Unmarried             | 6         | 3.0        |
| Widow                 | 16        | 7.9        |
| Family type           |           |            |
| Nuclear               | 95        | 46.8       |
| Joint                 | 108       | 53.2       |
| Occupation            |           |            |
| Retired               | 57        | 28.1       |
| House wife            | 53        | 26.1       |
| Business              | 45        | 22.2       |
| Services              | 37        | 18.2       |
| Others                | 11        | 5.4        |
| Economic Status       |           |            |
| Rich                  | 112       | 55.2       |
| Average               | 78        | 38.4       |
| Poor                  | 13        | 6.4        |
| Educational Level     |           |            |
| Illiterate            | 43        | 21.2       |
| Literate              | 5         | 2.4        |
| Primary               | 17        | 8.4        |
| Secondary             | 24        | 11.8       |
| SLC                   | 27        | 13.3       |
| Intermediate          | 32        | 15.8       |
| Bachelors             | 39        | 19.2       |
| Masters               | 16        | 7.9        |

The overall prevalence of depression with 95% CI was 34% (27.5%-41.0%). The level of depression with 95% CI was mild 17.7% (12.7%-23.7%), moderate 13.8% (9.4% – 19.3%) and severe 2.5% (0.8%-5.7%). (Table 2)

Table 2: Depression among diabetic patients (n= 203)

| Depression among diabetic patients | Frequency | Percentage (95% CI) |
|-----------------------------------|-----------|---------------------|
| Prevalence of Depression          |           |                     |
| No depression                     | 134       | 66.0 (59.0-72.5)    |
| Depression                        | 69        | 34.0 (27.5- 41.0)   |
| Level of depression               |           |                     |
| No depression (0-13)              | 134       | 66 (59.0 - 72.5)    |
| Mild depression (14-19)           | 36        | 17.7 (12.7 - 23.7)  |
| Moderate depression (20-28)       | 28        | 13.8 (9.4 - 19.3)   |
| Severe depression (29-63)         | 5         | 2.5 (0.8 - 5.7)     |
| Total                             | 203       | 100.0               |

Among the socio-demographic characteristics, depression was associated with marital status and educational level of the study participants. (Table 3)
Table 3: Association of socio-demographic characteristics with depression among diabetic patients (n=203)

| Characteristics | No Depression n (%) | Depression n (%) | P value |
|-----------------|---------------------|------------------|---------|
| **Sex**         |                     |                  |         |
| Male            | 70 (68.6%)          | 32 (31.4%)       | 0.428   |
| Female          | 64 (63.4%)          | 37 (36.6%)       |         |
| **Age group**   |                     |                  |         |
| 20–40 years     | 8(66.7%)            | 4 (33.3%)        | 0.223   |
| 41-50 years     | 39 (78%)            | 11 (22%)         |         |
| 51-60 years     | 45(61.6%)           | 28 (38.4%)       |         |
| Above 60 years  | 42(61.8%)           | 26 (38.2%)       |         |
| **Address**     |                     |                  |         |
| Inside Kathmandu valley | 114 (67.5%)   | 55 (32.5%)       | 0.332   |
| Outside Kathmandu valley | 20 (58.8%)   | 14 (41.2%)       |         |
| **Ethnicity**   |                     |                  |         |
| Disadvantaged Janjatis and Dalits | 14(70.0%)  | 6 (30.0%)        | 0.545   |
| Relatively advantaged Janajatis | 76(68.5%)  | 35 (31.5%)       |         |
| Upper caste group | 44(61.1%)           | 28 (38.9%)       |         |
| **Marital status** |                 |                  |         |
| Married         | 124(68.5%)          | 57 (31.5%)       | 0.031*  |
| Unmarried or widower/widower | 10(45%)         | 12 (55%)         |         |
| **Occupation**  |                     |                  |         |
| Services        | 26(70.3%)           | 11(29.7%)        | 0.354   |
| Business        | 31(68.9%)           | 14 (31.1%)       |         |
| House wife      | 37(69.8%)           | 16 (30.2%)       |         |
| Retired         | 33(57.9%)           | 24 (42.1%)       |         |
| Others          | 5(45%)              | 6 (55%)          |         |
| **Family type** |                     |                  |         |
| Nuclear         | 63(66.3%)           | 32 (33.7%)       | 0.930   |
| Joint           | 71(65.7%)           | 37 (34.3%)       |         |
| **Economic status** |                 |                  |         |
| Average         | 47(60.3%)           | 31 (39.7%)       | 0.066   |
| Poor            | 64(62.2%)           | 7 (37.8%)        |         |
| Rich            | 81(72.3%)           | 31 (27.7%)       |         |
| **Education level** |                 |                  |         |
| No schooling    | 26(54%)             | 22 (46%)         | 0.042*  |
| Primary         | 9(52.9%)            | 8 (47.1%)        |         |
| Secondary or above | 99(71.7%)           | 39 (28.3%)       |         |

Among the diabetes related characteristics, blood sugar level, treatment modality of diabetes, presence of co-morbid diseases, family support and stressful life events were significantly associated with depression. (Table 4)

Table 4: Association of diabetes related characteristics and depression (n=203)

| Characteristics | No Depression n (%) | Depression n (%) | P value |
|-----------------|---------------------|------------------|---------|
| **Duration of diabetes** |                     |                  |         |
| 1-3 years       | 44(74.6%)           | 15 (25.4%)       | 0.133   |
| 4-9 years       | 30(56.5%)           | 23 (43.5%)       |         |
| 10 years or more| 60 (65.6%)          | 31 (34.4%)       |         |
| **PP sugar level** |                     |                  |         |
| Below 200 mg/dl | 93 (72.1%)          | 36 (27.9%)       | 0.016*  |
| 200 mg/dl and above | 41 (55.4%)         | 33 (44.6%)       |         |
| **Fast blood sugar level** |                 |                  |         |
| Below 125 mg/dl | 74 (72.5%)          | 28 (27.5%)       | 0.048*  |
| 125 mg/dl and above | 60 (59.4%)         | 41 (40.6%)       |         |
| **BMI** |                     |                  |         |
| 16-18 | 4(80%) | 1(20%) | 0.546 |
| 19-25 | 79(68.1%) | 37(31.9%) | |
| 26-30 | 45(64.3%) | 25(35.7%) | |
| >30 | 6(50%) | 6(50%) | |
| **HBA1C level** |                     |                  |         |
| 4.5-7% | 43(63.2%) | 25 (36.8%) | 0.055 |
| >7% | 91(67.4%) | 44 (32.6%) | |
| **Exercise duration** | (hrs/week) | | |
| 0 | 29(59.2%) | 20 (40.8%) | 0.671 |
| 0.5-3 | 41(66.1%) | 21 (33.9%) | |
| 4-10 | 59(69.4%) | 26 (30.6%) | |
| 11-16 | 5(71.4%) | 2 (28.6%) | |
| **Treatment modality of diabetes** | | | |
| Oral Hypoglycemic agents | 86(72.9%) | 32 (27.1%) | 0.014* |
| Insulin therapy | 48(56.5%) | 37 (43.5%) | |
| **Presence of co-morbid diseases** | | | |
| No any co morbid disease | 34(87.2%) | 5 (12.8%) | 0.001* |
| Having co-morbid disease/s | 100 (61%) | 64(39%) | |
| **Family support** | | | |
| Yes | 133(67.9%) | 63 (32.1%) | 0.003* |
| No | 1(14.3%) | 6 (85.7%) | |
| **Stressful life events** | | | |
| Yes | 1(12.5%) | 7 (87.5%) | 0.001* |
| No | 133(68.2%) | 62 (31.8%) | |
| **Family history** | | | |
| Positive | 3(37.5%) | 5(62.5%) | 0.082 |
| Negative | 131(67.2) | 64(32.8%) | |

Among the socio-demographic and diabetes related factors, the factors which showed significant association with depression (marital status, educational level, blood sugar level, treatment modality of diabetes, presence of co-morbid diseases, family support and stressful life events) were taken into logistic regression analysis and adjusted and unadjusted odds ratio with 95% CI were calculated. After controlling confounding, secondary and above schooling
level compared to no schooling [AOR: 0.42 (0.19-0.90)], patients in insulin therapy compared to hypoglycemic agents [AOR: 2.08 (1.06-4.05)], patients having other comorbid diseases compared to not having them [AOR: 2.18 (1.13-4.22)] and patients having stressful life events compared to not having them in the past [AOR: 12.33 (1.23–123.27)] were found statistically significant with depression in the final model. (Table 5)

### Table 5: Factors affecting depression among diabetic patients from regression analysis (n= 203)

| Characteristics                  | Unadjusted odds ratio (95% CI) | P value | Adjusted odds ratio (95% CI) | P value |
|----------------------------------|--------------------------------|---------|-----------------------------|---------|
| Marital status                   |                                |         |                             |         |
| Married                          | 1                              |         | 1                           |         |
| Unmarried or Widow/ Widower      | 2.61 (1.06-6.39)                | 0.036*  | 1.39 (0.46-4.15)            | 0.554   |
| Education Level                  |                                |         |                             |         |
| No Schooling                     | 1                              |         | 1                           |         |
| Primary                          | 1.05 (0.34-3.81)                | 0.931   | 0.76 (0.20-2.85)            | 0.695   |
| Secondary                        | 0.46 (0.23-0.91)                | 0.027*  | 0.42 (0.19-0.90)            | 0.026*  |
| PP sugar level                   |                                |         |                             |         |
| Below 200 mg/dl                  | 1                              |         | 1                           |         |
| 200 mg/dl and above              | 2.07 (1.14-3.78)                | 0.017*  | 1.77 (0.87-3.59)            | 0.111   |
| Fast Blood sugar level           |                                |         |                             |         |
| Below 125 mg/dl                  | 1                              |         | 1                           |         |
| 125 mg/dl and above              | 1.80 (1.002-3.25)               | 0.049*  | 1.25 (0.62-2.52)            | 0.526   |
| Treatment modality of diabetes   |                                |         |                             |         |
| Oral hypoglycemic agents         | 1                              |         | 1                           |         |
| Insulin therapy                  | 2.07 (1.14-3.73)                | 0.409*  | 2.08 (1.06-4.05)            | 0.032*  |
| Presence of co-morbid diseases   |                                |         |                             |         |
| No                               | 1                              |         | 1                           |         |
| Yes                              | 2.10 (1.16-3.79)                | 0.014*  | 2.18 (1.13-4.22)            | 0.020*  |
| Family support                   |                                |         |                             |         |
| Yes                              | 1                              |         | 1                           |         |
| No                               | 12.66 (1.49-107.45)             | 0.020*  | 9.41 (0.95-92.72)           | 0.055   |
| Stressful life events            |                                |         |                             |         |
| Yes                              | 15.01 (1.80-124.70)             | 0.012*  | 12.33 (1.23-123.27)         | 0.032*  |
| No                               | 1                              |         | 1                           |         |

**Discussion**

The study showed quite high prevalence of depression among Nepali diabetic patients. The overall prevalence was 34% in which 17.7% were mild, 13.8% were moderate and 2.5% were severely depressed. Similar studies reported slightly higher prevalence from South India (37.5%), North India (41%) and Saudi Arabia (49.6%) respectively [8-10].

This study at bivariate analysis found among socio-demographic characteristics, marital status and education level were significantly associated with depression while in multivariable logistic regression analysis only secondary and above level education was found to have significantly low depression compared to no schooling. A study in Saudi Arabia also showed marital status significantly associated with depression [10] while a study done in Nigeria showing contrasting findings to this study that income and family size associated with depression among diabetic patients [11]. This may be because of not enough power of this study to detect the association. Previous studies showed comorbid conditions and increased fasting glucose level were significantly associated with depression [8,12]. Also, family support influences the psychosocial outcomes in diabetes patients [13]. A study in Ethiopia also showed similar findings that negative life events and poor social support were significantly associated with depression among diabetic patients [14]. Our findings on the association of treatment modality with depression is supported by a previous study which showed oral hypoglycemic therapy is potentially safer and caters less risk of depression in comparison to intensive management using multiple daily injections [15].

This study was limited to patients visiting a privately run care center in Kathmandu valley so these patients may not represent all diabetic patients in Nepal. Despite this limitation, the magnitude and associated factors identified by this study might be useful for programs to control depression among diabetes patients in Nepal.

**Conclusion**

More than one third of the diabetic patients had some degree of undiagnosed depression. Factors like no schooling, being on insulin therapy, having comorbid conditions and stressful life events increased the chances of developing depressive symptoms. Mental health counselling and education is an immediate priority for those with depressive symptoms and can benefit from regular glucose monitoring and screening of depression.

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**Conflict of interest**

None declared.

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