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Anxiety and depression among people with type 2 diabetes visiting diabetes clinics of Pokhara Metropolitan, Nepal: a cross-sectional study

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ABSTRACT

Objectives To estimate the prevalence of anxiety and depression and identify the associated factors among people with type 2 diabetes mellitus (T2DM) visiting diabetes clinics of Pokhara Metropolitan, Nepal.

Design Cross-sectional study.

Setting Three diabetes clinics in Pokhara Metropolitan, Nepal, from May to July 2021.

Participants 283 people with T2DM visiting selected diabetes centres of Pokhara Metropolitan.

Outcome measures Anxiety and depression were the outcome measures. Face-to-face interviews were conducted using a structured questionnaire comprising information related to participants' sociodemographic profile and several factors along with Hospital Anxiety and Depression-Anxiety subscale and Patient Health Questionnaire-9 to assess the levels of anxiety and depression, respectively. Pearson's X^2 tests and binary logistic regression were performed to examine association between dependent and independent variables at 5% level of significance.

Results The prevalence of anxiety and depression was 31.4% (95% CI 26.2% to 37.5%) and 36.4% (95% CI 30.8% to 42.0%), respectively. Anxiety was found to be associated with a lower level of perceived social support (adjusted OR (AOR) 2.442, 95% CI 1.020 to 5.845), multiple complications (AOR 2.758, 95% CI 1.015 to 7.334) and comorbidities (AOR 2.110, 95% CI 1.004 to 4.436), severe COVID-19 fear (AOR 2.343, 95% CI 1.123 to 4.887) and sleep dissatisfaction (AOR 1.912, 95% CI 1.073 to 3.047). Economical dependency (AOR 1.890, 95% CI 1.026 to 3.482), no insurance (AOR 2.973, 95% CI 1.134 to 7.093), lower perceived social support (AOR 2.883, 95% CI 1.158 to 7.181), multiple complications (AOR 2.308, 95% CI 1.585 to 6.422) and comorbidities (AOR 2.575, 95% CI 1.180 to 5.617), severe COVID-19 fear (AOR 2.117, 95% CI 1.009 to 4.573), alcohol use (AOR 2.401, 95% CI 1.199 to 4.806) and sleep dissatisfaction (AOR 1.995, 95% CI 1.093 to 3.644) were found to be associated with depression.

Conclusion This study showed high prevalence levels of anxiety and depression among people with T2DM. Strengthening social support and focusing on people with diabetes suffering from comorbidity and complications could help to reduce their risk of mental health problems.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study used validated screening tools to assess the levels of anxiety, depression and perceived social support.

⇒ The study was conducted in the three most sought-after health facilities of Pokhara Metropolitan, and the participants were recruited via a systematic random sampling technique, ensuring that the sample represented the people living with type 2 diabetes in the metropolitan area.

⇒ Although the study was performed in one of the largest metropolitan cities of Nepal, the prevalence of anxiety and depression reported in this study might be higher than the actual prevalence present at the community level, as it was a health institution-based study conducted at the time of the COVID-19 pandemic.

INTRODUCTION

Diabetes mellitus is a systemic disease that may affect various body systems leading to blindness, kidney failure and lower limb amputation as its long-term complications.[1–3] As of 2019, nearly 1 in 10 people were living with diabetes with a prediction that globally, 578 million people will have diabetes by the year 2030.[4] Its prevalence has been skyrocketing in low/middle-income countries more than in high-income countries.[5] A systematic review from 2021 based on publications from 2000 to 2020 noted the pooled prevalence of type 2 diabetes mellitus (T2DM) in Nepal at 10% with a higher prevalence observed in studies published between the years 2015 and 2020, which was at 11.24%.[6]

Mental distress is an emotional state which manifests with the symptoms ranging from somatic symptoms such as sleep problems, headache and backache to depression, anxiety and distress.[7] Globally, the prevalence of psychological distress, primarily depression and anxiety disorders, is higher among

people living with diabetes as compared with their counterparts.[8–10] A systematic review estimated the global prevalence of depression among people with T2DM at 28%, with Asia having the highest rate of depression at 32%.[11] Similarly, another systematic review observed generalised anxiety disorder to be present among 14% of people with T2DM.[12] In Nepal, a cross-sectional study performed among people with T2DM attending tertiary care centres in Kathmandu Valley found the rate of depression to be 40.3% in the year 2013.[13] Similarly, a study conducted in a community setting of Duhabi-Bhaluwa Municipality of Sunsari District in 2019 revealed the prevalence of depression among people with T2DM to be 22.7%.[14]

Diabetes care mainly consists of self-care aimed to prevent acute and chronic complications. The person living with diabetes is responsible for balancing their food intake, physical activities and monitoring blood glucose levels as much as possible.[15] Mental health complications, mainly anxiety and depression, complicate living with diabetes and its management in several ways. The presence of depression and anxiety could worsen the prognosis of diabetes by reducing the patients' ability to self-care and increasing non-compliance to treatments while increasing the risk of serious short-term and long-term complications such as blindness, amputations, stroke, decreased quality of life and even premature death.[16 17] Additionally, severe anxiety disorders largely overlap with symptoms of hypoglycaemia which requires immediate treatment. However, people with diabetes might fail to differentiate the feelings of hypoglycaemia with anxiety. The pre-existing anxiety over injections or blood draws might lead to panic disorders or patients' refusal to monitor their glucose levels.[18] Similarly, fear of hypoglycaemia is a common source of anxiety and depression for people with diabetes and can lead them to maintain blood glucose levels above target levels.[18] The presence of diabetes is a chronic life-threatening stressor that requires significant mental and physical support and care to cope with elevated feelings of fear and distress.[19] Even in the current context of the COVID-19 pandemic, people with diabetes are taken as one of the vulnerable populations at risk of infection and mortality.[20] Thus, the COVID-19 pandemic might have aggregated their existing fear and distress, worsening their mental well-being. Considering this circumstance, there are more serious concerns stressed over the mental health and well-being of this vulnerable population.[21 22]

There is a lack of ample information about the rates of anxiety and depression among people with diabetes along with its associated risk factors in South Asia, particularly in Nepal, due to the limited studies published to date considering the mental health aspect of the people with diabetes. Thus, this study aimed to assess the prevalence and factors associated with anxiety and depression among people with T2DM visiting diabetes clinics of Pokhara Metropolitan, one of the rapidly urbanising cities of Nepal, with an expectation that this study will provide valuable insights into mental health issues of this vulnerable population in developing nations similar to Nepal.

METHODS
Study design
This was a health facility-based cross-sectional study executed among people with T2DM residing at Pokhara Metropolitan who visited the selected healthcare institutions between May and July 2021.

Participants
All people with T2DM with at least 6 months' history of diagnosis, attending the selected diabetes clinics, were eligible participants. On the other hand, people with T2DM who were not residents of Pokhara Metropolitan for at least 6 months from the date of data collection were excluded.

Sample size determination and sampling technique
The sample size was determined using Cochran's formula for estimation of a proportion ($n = z^2 pq / d^2$). A community-based cross-sectional study conducted in the eastern part of Nepal reported the prevalence of depression among people with T2DM to be 22.7%.[14] So, using this past prevalence at 5% allowable error and 95% CI, the initially estimated sample size was 264 people with T2DM, which was optimised to 291 after adjusting 10% non-response rate.

Two government health institutions (Urban Health Promotion Center and Shishuwa Hospital) and one private clinic (Pokhara Super Speciality Health Clinic) were selected purposively. Urban Health Promotion Center and Shishuwa Hospital are the primary contact points for Social Health Insurance (SHI) and provide free diabetes-related services under the SHI scheme and also provide referral services. Thus, these were some of the most sought-after government institutions with an estimated 250–300 people with T2DM visiting monthly. Pokhara Super Speciality Health Clinic was one of the well-known tertiary endocrine referral centres of Pokhara with an average of 500 people with diabetes visiting monthly. The people with T2DM visiting these three healthcare institutions were selected randomly using the technique based on systematic random sampling. For this, every kth patient ($800/291 = 2.74 \approx 3$), that is, the third patient waiting in the queue on the day of data collection, was enrolled as a participant. If the selected patient refused to participate or fell under exclusion criteria, then the patient next in the queue was approached for participation.

Data collection
Face-to-face interview technique was used for data collection. The people with T2DM meeting inclusion criteria were approached and provided with the study details. Informed consent was taken from the participants before initiating the interviews. Considering participants' privacy, Pokhara Super Speciality Health Clinic provided

the researcher with a separate room next to the doctors' cabin. Likewise, a small private space was provided at the corner of the doctors' cabin in Urban Health Promotion Center and Shishuwa Hospital, where the patients were directed for data collection.

The data were collected using a set of closed-ended questions consisting of three sections. The first section consisted of questions regarding sociodemographic profile of the participants including Multidimensional Scale of Perceived Social Support[23] translated into Nepali language[24] intending to measure the level of perceived social support. The second section consisted of questions regarding patients' health conditions, diabetes-related attributes and lifestyle-related factors including COVID-19-related variables such as COVID-19 status, vaccination and fear associated with COVID-19 based on the Modification of the Fear Scale of COVID-19.[25] The third section consisted of the nine-item Patient Health Questionnaire (PHQ-9)[26] intended to measure the level of depression followed by the Hospital Anxiety and Depression Scale-anxiety subscale (HADS-A)[27] intended to measure the level of anxiety.

The PHQ-9 consists of nine items measuring depressive symptoms corresponding to diagnostic criteria for major depressive disorder. Each item was scored on a 4-point Likert scale (0–3) with scores ranging from 0 to 27, with higher scores reflecting greater depression severity.[26] The PHQ-9 has been translated into Nepali language and has shown a sensitivity of 0.94 and specificity of 0.80 to measure depression at the cut-off of ≥10.[28] The HADS-A consists of seven items measuring anxiety symptoms. Each item is scored on a 4-point Likert scale (0–3) with total scores ranging from 0 to 21 with higher scores reflecting greater anxiety and a cut-off point of ≥8 illustrating anxiety.[27] The HADS has been translated into Nepali language where the HADS-A subscale was found to have a good internal consistency with Cronbach's alpha of 0.76.[29] The data collection tool used in the present study is included in the online supplemental file 1.

Data processing, management and analysis

The collected data were entered in EpiData V.3.1 and exported to SPSS V.22 for statistical analysis. The data were summarised in terms of frequencies and proportions.

Bivariate analysis was carried out by applying χ^2 tests to identify the factors associated with anxiety and depression at 95% CI and 5% level of significance, that is, p value of <0.05. The variables found to be significant in bivariate analysis were considered for multivariate analysis using binary logistic regression to determine the adjusted effect of each factor on the dependent variable. Prior to multivariate regression analysis, the multicollinearity between the independent variables was tested using the variance inflation factor (VIF) test, with a VIF greater than five taken as an indication of multicollinearity between the independent variables. The Hosmer-Lemeshow test for goodness-of-fit was also performed.

Patient and public involvement

None.

RESULTS

A total of 291 people with T2DM were approached for data collection, of which 283 provided complete responses to all the questions, while 8 participants left in the middle of the data collection. Thus, the response rate of 97.25% for all questions was acquired, and 283 total samples were analysed for this study. The prevalence of anxiety and depression was found to be 31.4% and 36.4% among people with T2DM, respectively (table 1). Moreover, around one-third (36%) of the participants reported having experienced suicidal ideation in the past 2 weeks on PHQ-9, of which six participants (2.1%) reported experiencing suicidal ideation nearly every single day.

The age of the participants in this study ranged from 33 to 88 years, with a mean age of 56.17±11.81 years. Almost half of the participants (56.9%) were male. A large majority (91.5%) of the participants reported living with their family, and nearly half of them (42.8%) reported being economically dependent. More than half of the participants (54.8%) reported to have no insurance coverage for their treatment. Likewise, one in six participants (14.5%) reported having a lower level of perceived social support (table 2).

Out of all 283 participants, almost half (46.3%) reported to have lived with diabetes for more than 4 years of their life. A quarter (25.1%) of the participants reported

Table 1	Prevalence of anxiety and depression (n=283)					
Outcome	**n (%)**	**95% CI**	**Outcome**	**n (%)**	**95% CI**
Anxiety status			Depression status		
Present	89 (31.4)	26.2% to 37.5%	Present	103 (36.4)	30.8% to 42.0%
Absent	194 (68.6)	62.5% to 73.8%	Absent	180 (63.6)	58.0% to 69.2%
Anxiety level			**Depression level**		
No anxiety	194 (68.6)	62.5% to 73.8%	No depression	180 (63.6)	57.6% to 68.6%
Mild anxiety	62 (21.9)	16.6% to 27.2%	Mild depression	71 (25.1)	20.1% to 30.7%
Moderate anxiety	19 (6.7)	3.9% to 9.9%	Moderate depression	22 (7.8)	4.6% to 11.0%
Severe anxiety	8 (2.8)	1.1% to 5.3%	Severe depression	10 (3.5)	1.8% to 5.7%

Table 2 Sociodemographic profile of the participants (n=283)	
Variables	**n (%)**
Age group	
<40 years	30 (10.6)
40–50	65 (23.0)
50–60	77 (27.2)
≥60 years	111 (39.2)
Gender	
Male	161 (56.9)
Female	122 (43.1)
Ethnicity	
Brahmin/Chhetri	107 (37.8)
Janajaties	122 (43.1)
Dalit	33 (11.7)
Religious minorities	21 (7.4)
Type of family	
Nuclear	143 (50.5)
Joint/extended	140 (49.4)
Living companion	
Alone	24 (8.5)
With family	259 (91.5)
Marital status	
Married	232 (82.0)
Unmarried/divorced	13 (4.6)
Widow/widower	38 (13.4)
Education	
Illiterate	49 (17.3)
Literate by informal education	42 (14.8)
Literate by formal education	192 (67.8)
Economic dependency	
Dependent	121 (42.8)
Independent	162 (57.2)
Health insurance	
Full coverage	42 (14.8)
Partial coverage	86 (30.4)
No insurance	155 (54.8)
Perceived social support	
Low	41 (14.5)
Moderate	130 (45.9)
High	112 (39.6)

Table 3 Health and lifestyle-related characteristics of the participants (n=283)	
Variables	**n (%)**
Duration of illness	
≤4 years	152 (53.7)
>4 years	131 (46.3)
Use of insulin	
Yes	33 (12.0)
No	250 (88.0)
Presence of complications	
None	212 (74.9)
Single	47 (16.6)
Two or more	24 (8.5)
Presence of comorbidities	
None	126 (44.5)
Single	84 (29.7)
Two or more	73 (25.8)
Difficulty following a recommended diet	
Too difficult	63 (22.3)
A bit difficult	100 (35.3)
Not difficult at all	120 (42.4)
History of mental illness	
Yes	16 (5.7)
No	267 (94.3)
Ever tested for COVID-19	
Tested negative	31 (11.0)
Tested positive	28 (9.9)
Never tested	224 (79.1)
COVID-19 vaccination	
Complete	28 (9.9)
Incomplete	65 (23.0)
Didn't receive	190 (67.1)
COVID-19 fear	
Low	105 (37.1)
Moderate	96 (33.9)
Severe	82 (29.0)
Alcohol use	
Yes	75 (26.5)
No	208 (73.5)
Tobacco use	
Yes	55 (19.4)
No	228 (80.6)
Sleep satisfaction	
Satisfied	180 (63.6)
Not satisfied	103 (36.4)

having experienced complications related to diabetes, whereas more than half (55.5%) reported having other comorbidities existing before they got diagnosed with diabetes. Nearly three out of four (71.0%) participants reported having a fear of COVID-19 infection (table 3).

In bivariate analysis, participants' family type, living companionship and perceived level of social support

were the sociodemographic factors found to be associated with anxiety. Similarly, living companionship, economic dependency, insurance coverage for diabetes care and perceived level of social support were the

Table 4 Association of sociodemographic variables with anxiety and depression (n=283)

Sociodemographic variables	Anxiety			Depression		
	Presence n (%)	Absence n (%)	χ^2 (p value)	Presence n (%)	Absence n (%)	χ^2 (p value)
Age group						
<40 years	11 (12.4)	19 (9.8)	1.006 (0.800)	13 (12.6)	17 (9.4)	5.741 (0.125)
40–50	19 (21.3)	46 (23.7)		16 (15.5)	49 (27.2)	
50–60	22 (24.7)	55 (28.4)		28 (27.2)	49 (27.2)	
≥60 years	37 (41.6)	74 (38.1)		46 (44.7)	65 (36.1)	
Gender						
Male	54 (60.7)	107 (55.2)	0.758 (0.384)	59 (57.3)	102 (56.7)	0.010 (0.920)
Female	35 (39.3)	87 (44.8)		44 (42.7)	78 (43.3)	
Ethnicity						
Brahmin/Chhetri	42 (47.2)	65 (33.5)	4.953 (0.175)	38 (36.9)	69 (38.3)	2.889 (0.409)
Janajaties	33 (37.1)	89 (45.9)		44 (42.7)	78 (43.3)	
Dalit	9 (10.1)	24 (12.4)		10 (9.7)	23 (12.8)	
Religious minorities	5 (5.6)	16 (8.2)		11 (10.7)	10 (5.6)	
Type of family						
Nuclear	53 (59.6)	90 (46.4)	4.226 (0.040)*	59 (57.3)	84 (46.7)	2.953 (0.086)
Joint/extended	36 (40.4)	104 (53.6)		44 (42.7)	96 (53.3)	
Living companion						
Alone	13 (14.6)	11 (5.7)	6.278 (0.012)*	15 (14.6)	9 (5.0)	7.719 (0.005)*
With family	76 (85.4)	183 (94.3)		88 (85.4)	171 (95.0)	
Marital status						
Married	72 (80.9)	160 (82.2)	1.433 (0.489)	78 (75.7)	154 (85.6)	5.464 (0.065)
Unmarried/divorced	6 (6.7)	7 (3.6)		8 (7.8)	5 (2.8)	
Widow/widower	11 (12.4)	27 (13.9)		17 (16.5)	21 (11.7)	
Education						
Illiterate	15 (16.9)	34 (17.5)	1.880 (0.391)	21 (20.4)	28 (15.6)	2.419 (0.298)
Literate by informal education	17 (19.1)	25 (12.9)		18 (17.5)	24 (13.3)	
Literate by formal education	57 (64.0)	135 (69.6)		64 (62.1)	128 (71.1)	
Economic dependency						
Dependent	41 (46.1)	80 (41.2)	0.582 (0.446)	55 (53.4)	66 (36.7)	7.493 (0.006)*
Independent	48 (53.9)	114 (58.8)		48 (46.6)	114 (63.3)	
Health insurance						
Full coverage	9 (10.1)	33 (17.0)	2.498 (0.287)	8 (7.8)	34 (18.9)	11.287 (0.004)*
Partial coverage	27 (30.3)	59 (30.4)		26 (25.2)	60 (33.3)	
No insurance	53 (59.6)	102 (52.6)		69 (67.0)	85 (47.5)	
Perceived social support						
Low	20 (22.5)	21 (10.8)	15.898 (<0.001)*	25 (24.3)	16 (8.9)	18.458 (<0.001)*
Moderate	48 (53.9)	82 (42.3)		51 (49.5)	79 (43.9)	
High	21 (23.6)	91 (46.9)		27 (26.2)	85 (47.2)	

*Statistical significance at p<0.05.

sociodemographic factors found to be associated with depression at 5% level of significance (table 4).

Insulin use, presence of complications and comorbidities, history of clinically diagnosed mental distress, fear associated with COVID-19, alcohol use and sleep satisfaction were found to be associated with both anxiety and depression status at p<0.05. In addition, depression was also found to be associated with difficulty experienced by people with T2DM to follow dietary recommendations and use of tobacco products (table 5). The people with T2DM experiencing anxiety were found to be twice more likely to be depressed (unadjusted OR 2.758, 95% CI 1.641 to 4.635) as compared with their counterparts (table 5).

Table 5 Association of health and lifestyle-related variables with anxiety and depression (n=283)

Health and lifestyle-related variables	Anxiety			Depression		
	Presence n (%)	Absence n (%)	χ^2 (p value)	Presence n (%)	Absence n (%)	χ^2 (p value)
Duration of illness						
≤4 years	45 (50.6)	107 (55.2)	0.518 (0.472)	49 (47.6)	103 (57.2)	2.453 (0.117)
>4 years	44 (49.4)	87 (44.8)		54 (52.4)	77 (42.8)	
Use of insulin						
Yes	17 (19.1)	16 (8.2)	6.977 (0.008)*	20 (19.4)	13 (7.2)	9.459 (0.002)*
No	72 (80.9)	178 (91.8)		83 (80.6)	167 (92.8)	
Presence of complications						
None	53 (59.6)	159 (82.0)	16.502 (<0.001)*	63 (61.2)	149 (82.8)	16.345 (<0.001)*
Single	23 (25.8)	24 (12.4)		26 (25.2)	21 (11.7)	
Two or more	13 (14.6)	11 (5.7)		14 (13.6)	10 (5.6)	
Presence of comorbidities						
None	24 (27.0)	102 (52.6)	17.118 (<0.001)*	28 (27.2)	98 (54.4)	22.617 (<0.001)*
Single	32 (36.0)	52 (26.8)		35 (34.0)	49 (27.2)	
Two or more	33 (37.0)	40 (20.6)		40 (38.8)	33 (18.3)	
Difficulty following a recommended diet						
Too difficult	24 (27.0)	39 (20.1)	1.686 (0.430)	34 (33.0)	29 (16.1)	13.326 (<0.001)*
A bit difficult	29 (32.6)	71 (36.6)		37 (35.9)	63 (35.0)	
Not difficult at all	36 (40.4)	84 (43.3)		32 (31.1)	88 (48.9)	
History of mental illness						
Yes	9 (10.1)	7 (3.6)	4.839 (0.028)*	10 (9.7)	6 (3.3)	4.992 (0.025)*
No	80 (89.9)	187 (96.4)		93 (90.3)	174 (96.7)	
Ever tested for COVID-19						
Tested negative	14 (15.7)	17 (8.8)	3.368 (0.186)	9 (8.7)	22 (12.2)	0.850 (0.654)
Tested positive	7 (7.9)	21 (10.8)		10 (9.7)	18 (10.0)	
Never tested	68 (76.4)	156 (80.4)		84 (81.6)	140 (77.8)	
COVID-19 vaccination						
Complete	11 (12.4)	17 (8.8)	1.005 (0.605)	9 (8.7)	19 (10.6)	2.508 (0.285)
Incomplete	21 (23.6)	44 (22.7)		29 (28.2)	36 (20.0)	
Didn't receive	57 (64.0)	133 (68.6)		65 (63.1)	125 (69.4)	
COVID-19 fear						
Low	22 (24.7)	83 (42.8)	10.325 (0.006)*	27 (26.2)	78 (43.3)	8.614 (0.013)*
Moderate	32 (36.0)	64 (33.0)		39 (37.9)	57 (31.7)	
Severe	35 (39.3)	47 (24.2)		37 (35.9)	45 (25.0)	
Alcohol use						
Yes	31 (34.8)	44 (22.7)	4.625 (0.033)*	39 (37.9)	36 (20.0)	10.733 (0.001)*
No	58 (65.2)	150 (77.3)		64 (62.1)	144 (80.0)	
Tobacco use						
Yes	23 (25.8)	32 (16.5)	3.405 (0.065)	27 (26.2)	28 (15.6)	4.753 (0.029)*
No	66 (74.2)	162 (83.5)		76 (73.8)	152 (84.4)	
Sleep satisfaction						
Satisfied	45 (50.6)	135 (69.6)	9.540 (0.002)*	52 (50.5)	128 (71.1)	12.039 (0.001)*
Not satisfied	44 (49.4)	59 (30.4)		51 (49.5)	52 (28.9)	

Continued

Table 5 Continued

Health and lifestyle-related variables	Anxiety			Depression		
	Presence n (%)	Absence n (%)	χ² (p value)	Presence n (%)	Absence n (%)	χ² (p value)
Depression						
Present	47 (52.8)	56 (28.9)	15.109 (<0.001)*	–	–	–
Absent	42 (47.2)	138 (71.1)		–	–	
Anxiety						
Present	–	–	–	47 (45.6)	42 (23.3)	15.109 (<0.001)*
Absent	–	–		56 (54.4)	138 (76.7)	

*Statistical significance at p<0.05.

For multivariate analysis, the VIF test among the independent variables was performed, where the highest reported VIF was 1.610, indicating that there was no issue of multicollinearity. Lower level of perceived social support (adjusted OR (AOR) 2.442, 95% CI 1.020 to 5.845), presence of a single (AOR 2.081, 95% CI 1.002 to 4.414) and multiple complications (AOR 2.758, 95% CI 1.015 to 7.334), presence of a single (AOR 2.127, 95% CI 1.059 to 4.272) and multiple comorbidities (AOR 2.110, 95% CI 1.004 to 4.436), severe fear of COVID-19 infection (AOR 2.343, 95% CI 1.123 to 4.887) and sleep dissatisfaction (AOR 1.912, 95% CI 1.073 to 3.047) were found to be associated with anxiety (table 6).

Economic dependency (AOR 1.890, 95% CI 1.026 to 3.482), lower level of perceived social support (AOR 2.883, 95% CI 1.158 to 7.181), no insurance coverage (AOR 2.973, 95% CI 1.134 to 7.093), presence of multiple complications (AOR 2.308, 95% CI 1.585 to 6.422), presence of a single (AOR 2.262, 95% CI 1.108 to 4.619) and multiple comorbidities (AOR 2.575, 95% CI 1.180 to 5.617), difficulty following the recommended diet (AOR 2.387, 95% CI 1.100 to 5.182), severe fear of COVID-19 (AOR 2.117, 95% CI 1.009 to 4.573), alcohol use (AOR 2.401, 95% CI 1.199 to 4.806) and sleep dissatisfaction (AOR 1.995, 95% CI 1.093 to 3.644) were found to be associated with depression (table 7).

DISCUSSION

In this study, around one-third of the people with T2DM were found to have anxiety (31.4%) and depression (36.4%). This rate of prevalence is slightly lower than the prevalence observed by a recent study conducted among people with T2DM admitted in the tertiary hospital of Chitwan District in 2019, where anxiety and depression were reported among 57.8% and 49.7% of the participants, respectively.[30] This variation in anxiety and depression might be due to the fact that the past study was conducted in hospital-admitted patients. On the other hand, this prevalence is higher than the prevalence of depression (22.7%) among patients with T2DM as observed by a community-based study in Duhabi-Bhaluwa

Municipality in the year 2016.[14] However, the current prevalence of depression is in line with past prevalence observed among people visiting diabetes centres in Lalitpur Metropolitan in 2019, where 35.6% of the people with diabetes were found to have depression.[31] These variations in the prevalence might be due to the difference in geographical location, study settings and time factors. In the global context, a similar rate of anxiety and depression has been noted among this vulnerable population in countries of different economies such as China,[32] Saudi Arabia,[33 34] Mexico,[35] Malaysia,[36] Pakistan[37] and India.[38]

There was a statistically significant relationship existing between the perceived level of social support and the anxiety and depression status of the people, as the people with a lower level of perceived social support had twice the odds of anxiety and depression than those with a higher level of perceived social support. Similar findings were shared by studies from Saudi Arabia and Ethiopia, where higher odds of anxiety and depression were seen among people with lower social support.[34 39] As good social support has been observed as a protective factor against anxiety and depression, studies suggest that strengthening social support in these people can improve their psychological well-being.[40 41] Social support plays an important role in the management of diabetes. Poor social support may lead to delays in healthcare-seeking behaviour as well as increased emotional distress.[34 39 42] This might further inflect an undesirable effect on the persons' physical and mental well-being. Thus, social support in people with diabetes could be strengthened to reduce the risk of mental distress, which could be done through frequent engagement of family members in diabetes care settings and formation of peer support groups at the diabetes centres as well as at community levels.

In this study, the presence of comorbidities as well as complications related to diabetes were observed as important factors associated with anxiety and depression among people with T2DM. This is in line with a past study from Nepal, where people with diabetes having comorbid conditions had twice the odds of depression

Table 6 Factors associated with anxiety among people with diabetes (n=283)

Factors	UOR	95% CI	P value	AOR*	95% CI	P value
Type of family						
Nuclear	1.701	1.023 to 2.829	0.041†	1.458	0.784 to 2.711	0.233
Joint/extended	Ref			Ref		
Living companion						
Alone	2.846	1.221 to 6.633	0.015†	1.108	0.405 to 3.034	0.842
With family	Ref			Ref		
Perceived level of social support						
Low	4.127	1.902 to 8.955	<0.001†	2.442	1.020 to 5.845	0.045†
Moderate	2.537	1.401 to 4.591	0.002†	1.839	0.986 to 3.520	0.060
High	Ref			Ref		
Use of insulin						
Yes	2.627	1.259 to 5.481	0.010†	1.299	0.565 to 3.166	0.565
No	Ref			Ref		
Presence of complications						
None	Ref			Ref		
Single	2.875	1.499 to 5.512	0.001†	2.081	1.002 to 4.414	0.049†
Two or more	3.545	1.501 to 8.387	0.004†	2.758	1.015 to 7.334	0.044†
Presence of comorbidities						
None	Ref			Ref		
Single	2.615	1.399 to 4.890	0.003†	2.127	1.059 to 4.272	0.034†
Two or more	3.506	1.848 to 6.652	<0.001†	2.110	1.004 to 4.436	0.048†
History of mental illness						
Yes	3.005	1.082 to 8.350	0.035†	2.132	0.680 to 6.687	0.194
No	Ref			Ref		
COVID-19 fear						
Low	Ref			Ref		
Moderate	1.886	1.001 to 3.553	0.049†	1.491	0.731 to 3.039	0.272
Severe	2.809	1.478 to 5.340	0.002†	2.343	1.123 to 4.887	0.023†
Alcohol use						
Yes	1.822	1.051 to 3.160	0.033†	1.639	0.881 to 3.047	0.119
No	Ref			Ref		
Sleep satisfaction						
Satisfied	Ref			Ref		
Not satisfied	2.237	1.335 to 3.748	0.002†	1.912	1.073 to 3.047	0.028†
Depression						
Present	2.758	1.641 to 4.635	<0.001†			
Absent	Ref			–	–	–

*Logistic regression model adjusted for all variables in the table except depression, Nagelkerke R^2=0.310, Hosmer-Lemeshow X^2=9.793, p=0.280.
†Statistical significance at p<0.05.
AOR, adjusted OR; UOR, unadjusted OR.

as compared with their counterparts.[43] Likewise, a study from Ethiopia observed that people who worried about diabetes complications had a sixfold increase in odds of depression.[44] Similarly, people with a history of diabetes-related complications were found to have higher odds of anxiety in Mexico.[35] Studies from different parts of the world suggest that the greater the number of additional illnesses present among people with T2DM, the greater the risk of anxiety and depression.[14 45 46] The presence of comorbidity and/or complication creates an additional financial burden due to increased treatment costs, physical burden and chronic pain as well as social burden among the people with T2DM.[14 46 47] Thus, these might be contributing factors that impact their psychological well-being as it was also found that economic dependency and absence of health insurance securities were other

Table 7 Factors associated with depression among people with diabetes (n=283)

Factors	UOR	95% CI	P value	AOR*	95% CI	P value
Living companion						
Alone	3.239	1.363 to 7.695	0.008†	1.586	0.553 to 4.548	0.391
With family	Ref			Ref		
Economic dependency						
Dependent	1.979	1.210 to 3.236	0.007†	1.890	1.026 to 3.482	0.041†
Independent	Ref			Ref		
Perceived level of social support						
Low	4.919	2.295 to 10.543	<0.001†	2.883	1.158 to 7.181	0.023†
Moderate	2.032	1.163 to 3.551	0.013†	1.345	0.696 to 2.599	0.379
High	Ref			Ref		
Use of insulin						
Yes	3.095	1.468 to 6.528	0.003†	1.265	0.905 to 3.171	0.061
No	Ref			Ref		
Presence of complications						
None	Ref			Ref		
Single	2.928	1.535 to 5.587	0.010†	1.628	0.739 to 3.587	0.227
Two or more	3.311	1.397 to 7.851	0.007†	2.308	1.858 to 6.422	0.046†
Presence of comorbidities						
None	Ref			Ref		
Single	2.500	1.367 to 4.573	0.003†	2.262	1.108 to 4.619	0.025†
Two or more	4.242	2.274 to 7.915	<0.001†	2.575	1.180 to 5.617	0.017†
Health insurance coverage						
Full	Ref			Ref		
Partial	1.842	0.751 to 4.517	0.182	1.792	0.613 to 4.691	0.287
None	3.410	1.483 to 7.842	0.004†	2.973	1.134 to 7.093	0.027†
Difficulty following recommended diet						
Too difficult	3.224	1.701 to 6.112	<0.001†	2.387	1.100 to 5.182	0.028†
A bit difficult	1.615	1.005 to 2.865	0.046†	1.112	0.555 to 2.230	0.764
Not difficult at all	Ref			Ref		
History of mental illness						
Yes	3.118	1.099 to 8.848	0.033†	2.587	0.835 to 9.025	0.139
No	Ref			Ref		
COVID-19 fear						
Low	Ref			Ref		
Moderate	1.977	1.087 to 3.594	0.025†	1.496	0.731 to 3.060	0.270
Severe	2.375	1.282 to 4.402	0.006†	2.117	1.009 to 4.573	0.042†
Alcohol use						
Yes	2.437	1.420 to 4.184	0.001†	2.401	1.199 to 4.806	0.013†
No	Ref			Ref		
Tobacco use						
Yes	1.929	1.063 to 3.500	0.031†	1.001	0.461 to 2.174	0.998
No	Ref			Ref		
Sleep satisfaction						
Satisfied	Ref			Ref		
Not satisfied	2.414	1.460 to 3.993	0.001†	1.995	1.093 to 3.644	0.025†

*Logistic regression model adjusted for all variables in the table except anxiety, Nagelkerke R^2=0.358, Hosmer-Lemeshow X^2=10.073, p=0.260.
†Statistical significance at p<0.05.
AOR, adjusted OR; UOR, unadjusted OR.

risk factors for depression among this vulnerable group in this study. Special care should be provided to people with diabetes who are suffering from complications and comorbid conditions. In addition, it is also essential to ensure certain financial protection, proper health counselling and routine mental health screening services targeting this vulnerable population.

In bivariate analysis, we observed that insulin users had twice the odds of experiencing anxiety and thrice the odds of experiencing depression as compared with those not using insulin. Similar observations were shared by the past studies from Nepal, where one study found that insulin users had twice the odds of depression as compared with oral medicine users, and another study found a ninefold increase in depression among insulin users as compared with non-insulin users.[14 48] Insulin therapy does not only involve painful injections and regular glucose measurement but also is perceived to be used in severe cases. This perception might influence psychological distress among insulin users.[8 14 49 50] However, in multivariate analyses, this statistical relationship between insulin use and both anxiety and depression was ruled out in our study. This might be attributed to a small proportion of insulin users enumerated by chance in our random sample.

We observed that the participants who were not satisfied with the duration and quality of their sleep had almost twice the odds of being anxious and depressed than those who were satisfied with their sleep. Similar to this finding, a study from China observed that people with diabetes with poor sleep quality had almost twice the odds of anxiety and depression.[32] Short sleep duration could influence psychological distress even in the general population. People with diabetes suffer from frequent urination, which might affect their quality of sleep and sleep satisfaction, leading to discomfort, agitation and stress in the long run.[46]

The severe fear of COVID-19 infection was found to be associated with both anxiety and depression. A study from Germany noted that people with diabetes tend to perceive a higher susceptibility to COVID-19 infection, think more about its severe course and even die from COVID-19 than the general population. However, the same study revealed that there was no increase in anxiety and depressive symptoms among individuals with diabetes.[51] In contrast, another study from Germany noted that the rate of anxiety and depression increased at the time of the COVID-19 outbreak.[52] As COVID-19 is an emerging public health concern with limited understanding about its psychological impact on patients with chronic illness who are deemed as a vulnerable group, there is a need for further studies for a better understanding of its association with psychological well-being among this vulnerable population. The fear of COVID-19 pandemic has been found to have a significant relationship with anxiety and depression. While adjusting its effect, we also observed that the presence of COVID-19 pandemic does not invalidate the relationship of anxiety and depression with other factors.

Limitations

Despite being one of the few studies to assess the status and risk factors for anxiety and depression among people with T2DM in Nepal, this study is not free from its limitations. As the study was executed during the COVID-19 pandemic, the observed rate of anxiety and depression might be slightly overestimated due to the effect of the pandemic, requiring further studies. Although a larger sample size would have benefited the precision of the CI, due to the time constraints and the lockdown imposed during the COVID-19 pandemic, the research team failed to cover a larger sample and only covered the minimum required sample size. The patients sampled were from selected health institutions which might have introduced some selection bias. As this study was a health institution-based study, the prevalence of anxiety and depression might be slightly higher than the actual prevalence present at the community level.

CONCLUSION

The study revealed nearly one-third of the people with T2DM experienced anxiety of varying severity, and nearly two-fifths experienced depressive symptoms. Among the various factors, the level of perceived social support, presence of comorbidity and complications, severe fear of COVID-19 infection and sleep dissatisfaction were the associated risk factors for anxiety and depression. Integrating mental health counselling services with present diabetes-related care and support systems is essential to ease patients' physiological well-being. Further studies based on a qualitative perspective could provide valuable insights into the way social support and other associated factors are influencing the mental well-being of this vulnerable population.

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