



Psychosocial and clinical factors associated with depression among diabetic patients in Amhara region comprehensive specialized hospitals, Ethiopia, 2022; a multicenter prevalence study

Makda Abate Belew¹ | Rediet Akele Getu¹ | Sewunnet Azezew Getahun² | Anteneh Mengist Dessie³  | Eleni Dagnaw Abeje¹ | Abayneh Shewangzaw Engda¹ | Abyot Terefe Teshome⁴ | Muluken Yigezu Fita⁵ | Meron Asmamaw Alemayehu⁶ | Sewnet G. Workie⁷ 

¹Department of Nursing, School of Nursing and Midwifery, College of Medicine and Health Science, Debre Berhan University, Debre Berhan, Ethiopia

²Department of Midwifery, School of Nursing and Midwifery, College of Medicine and Health Science, Debre Berhan University, Debre Berhan, Ethiopia

³Department of Public Health, College of Health Sciences, Debre Tabor University, Debre Tabor, Ethiopia

⁴Department of Internal Medicine, Felege-Hiwot Comprehensive Specialized Hospital, Bahir Dar, Ethiopia

⁵Department of Public Health, College of Medicine and Health Science, Dire Dawa University, Dire Dawa, Ethiopia

⁶Department of Epidemiology, Institute of Public Health, College of Medicine and Health Science, University of Gondar, Gondar, Ethiopia

⁷Department of Public Health, School of Public Health, College of Medicine and Health Science, Debre Berhan University, Debre Berhan, Ethiopia

Correspondence

Sewnet G. Workie, Department of Public Health, School of Public Health, College of Medicine and Health Science, Debre Berhan University, Debre Berhan, 445 Ethiopia.

Email: sgetaye@gmail.com

Abstract

Background: Depression commonly coexists with diabetes leads to complications and worsens the outcome. Even though the problem affects low- and middle-income countries including Ethiopia, only a few studies have been done to show the magnitude of the problem and factors associated with it. So, the study was conducted to fill those gaps

Objective: The main objective of this study was to assess psychosocial and clinical factors associated with depression among diabetic patients in Amhara region comprehensive specialized hospitals, Ethiopia, 2022.

Methods: A hospital-based cross-sectional study was conducted in randomly selected hospitals of Amhara region from January 7 to February 10, 2022. A total of 426 diabetic patients who were on outpatient follow-up were selected using a multistage sampling technique. A p -value of ≤ 0.25 in the bivariable analysis was used to select variables for the multivariable analysis. A p -value < 0.05 within a 95% confidence interval was considered to be significantly associated factors.

Result: Out of 426 interviewed diabetes patients 203 (47.7%) had depression. Moderate physical activity (AOR = 0.50, 95% CI (0.29, 0.86)). low medication adherence (AOR = 2.10, 95% CI (1.22, 3.62)), medium medication adherence (AOR = 1.78, 95% CI (1.04, 3.06)), and high social support (AOR = 0.54, 95% CI (0.33, 0.91)) were significantly associated with depression among diabetic patients.

Conclusion: The overall prevalence of depression among diabetic patients was higher than in other developing countries. Hence, special attention to preventing

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depression and maintaining mental illness among patients with chronic illnesses, especially diabetes should be given.

KEYWORDS

Amhara region, depression, diabetes mellitus, Ethiopia

1 | BACKGROUND

Depression is a condition of feeling depressed, losing interest or pleasure in usual activities most of the day almost every day for 2 weeks. Many other symptoms such as poor concentration, feelings of excessive guilt or low self-worth, hopelessness about the future, thoughts about death or suicide, disrupted sleep, changes in appetite or weight, and feeling especially tired or low in energy could also present during depressive episodes.¹

Depression is a common worldwide public health problem, which affects an estimated 3.8% of the global population which is 280 million people in the world.^{2,3} Depression is one of the major contributors to the global burden of disease and the leading cause of death and disability worldwide including the developing countries.^{4,5} Depression commonly coexists with chronic medical conditions like diabetes mellitus (DM) and worsens their outcome.⁵

An estimated 536.6 million adults aged 20–79 were diabetic in 2021 globally which is projected to reach 783.2 million by the year 2045.⁶ In Africa, there were an estimated 19 million diabetics in 2019, which is projected to reach 47 million adults in 2045. While South Africa had the leading number of DM patients in Africa with 4.6 million patients Ethiopia ranked fourth with 1.7 million cases following Nigeria, and the Democratic Republic of Congo.⁷

Depression affects every 1 of 4 individuals who have diabetes, which makes it almost twice as prevalent among diabetic patients than among those without diabetes.^{8,9} Depression and diabetes are believed to have a bidirectional relationship.¹⁰ Patients with diabetes are vulnerable to developing diabetes-related distress which is a significant risk factor for depression.⁸ Studies showed that the magnitude of depression among people with diabetes mellitus in Sub-Saharan Africa ranges from 5.7% in Ethiopia to 87% in Tanzania.^{11,12}

Factors that are associated with depression among diabetic patients are age, sex, duration of DM, social support, physical exercise adherence, medication adherence, type of diabetes treatment, level of fasting blood sugar, diabetic complications, comorbidity, and type of DM as per the works of literature reviewed.^{13–22}

Even though there are various studies conducted on the prevalence of depression and the associated factors among diabetic patients globally and regionally, the magnitude of the problem is underestimated among DM patients due to underdiagnosis, especially in developing nations like Ethiopia.²³ Since depression is more prevalent among DM patients than the general population, the suicide rate also tends to be higher among people with DM. So, the magnitude and the factors affecting depression should be assessed thoroughly.²⁴

This study is important to know the magnitude of comorbid diabetes and depression and its associated factors in a broader prospect in the region by including variables that were not assessed in the previous studies such as type of current DM management, and self-blood glucose monitoring. It could further help to develop strategies to take action on modifiable factors and take preventive actions against depression among patients with diabetes mellitus in Comprehensive Specialized Hospitals in Amhara region, Ethiopia.

2 | METHODS

2.1 | Study area and period

This study was conducted in four selected comprehensive specialized hospitals (Felege Hiwot, Debre Berhan, Dessie, and Tibebe Ghion comprehensive specialized hospitals) in Amhara region, Ethiopia from January 7 to February 10, 2022. Around 18,573 DM patients attend outpatient follow-ups in the eight Comprehensive Specialised Hospitals.

2.2 | Study design and population

A hospital-based analytic cross-sectional study was employed.

2.3 | Populations and eligibility criteria

All Diabetic patients who had outpatient follow-up Amhara region Comprehensive specialized hospitals were the source population of the study. All diabetic patients who came to follow up during the data collection period were study populations.

All adult patients with diabetes mellitus attending their follow-up in Comprehensive Specialised Hospitals in Amhara region during the data collection period were included.

2.4 | Study variables

The dependent variable of the study was the presence of depression and the independent variables included; socio-demographic variables, Behavioral & psychosocial variables (medication adherence, dietary adherence, adherence to physical exercise, attending diabetes education, adherence to a regular visit, alcohol consumption, and

social support) and Clinical variables (duration of diabetes, comorbidities (CVD, Renal disease), complications of diabetes, self blood glucose monitoring, fasting blood glucose control, treatment modality, and body mass index).

2.5 | Sample size determination

A single population proportion formula was used to calculate the sample size. by assuming a 95% confidence level, and 5% margin of error, and a proportion of depression among diabetes patients $p = 0.213$ which was taken from a study conducted in Tirunesh Beijing Hospital.²² The final sample size was 426 after considering 10% contingency and 1.5 design effects.

2.6 | Sampling technique and procedure

The study used a multistage sampling technique. Initially, four comprehensive specialized hospitals were selected using a lottery method from a total of eight hospitals in Amhara region. Around 2230 patients with diabetes mellitus had outpatient follow-ups in the selected hospitals, which were identified from the chronic disease follow-up clinic registry book. The data was collected using a systematic sampling technique with a sampling interval of every five patients.

2.7 | Data collection tools and procedures

Data collection tools used for the study were adapted from different works of literature.^{14,25-31} The data collection tool contains sociodemographic data, clinical and dietary adherence questions, social support, and data extraction checklists. Eight trained data collectors (BSc nurses) and four supervisors (MSc nurses) were engaged in the study.

The presence of depression was determined using the nine-item patients' health questionnaire (PHQ9).³² patients with a PHQ score of five and above were considered as having depression.³³

The dietary adherence was assessed using the nine-item perceived dietary adherence questionnaire (PDAQ).³⁴ MMAS-8 was used to measure patients' self-reported adherence to diabetic medication.^{35,36} To assess the level of social support Oslo 3 social support scale was used by asking the patients to rate the level of support they received from family and friends.³⁷ The 10-item AUDIT questionnaire was used for alcohol consumption assessment.^{38,39}

Complications related to diabetes mellitus, comorbidity status, duration of DM, type of DM management, and self-blood glucose monitoring were collected from patients' medical records using a checklist.

The participant's Body Mass Index (BMI) was categorized into normal weight (18.5–24.9 Kg/m²), underweight (<18.5 Kg/m²), overweight (25–29.9 Kg/m²), and obesity (≥30 Kg/m²).³⁹

2.8 | Data processing and analysis

After the questionnaires were checked for their completeness, data entry was done using Epi data™ version 3.1. Statistical Package for Social Science (SPSS)™ version 26 was used for data cleaning and analysis. The data were checked by visualizing, calculating frequencies, and sorting. Based on the nature of the distribution of the data descriptive analysis such as frequency, percent, mean, and standard deviation were calculated.

To assess the association of each explanatory variable with the dependent variable, bivariable logistic regression was employed. A p-value of <0.25 was considered as a cut point to select variables for the multivariable analysis. Variables with a p-value of <0.05 with a 95% confidence interval were considered as significantly associated factors with depression in the multivariable logistic analysis.

Hosmer Limshaw's goodness of fit test was used to assess the fitness of the logistic regression model and it shows the model was a good fit with a p-value of 0.42 and Omnibus tests of model coefficient tests <0.001. Multicollinearity between the variables included in the multivariable logistic regression was checked using Variance Inflation Factors (VIF) and tolerance. The VIF was less than 10 for all variables, which suggests there is no significant collinearity between the independent variables.

The results from the analysis were reported using simple text, and tables.

3 | RESULTS

3.1 | Socio-demographic status of the patients

Among the 426 diabetic patients who participated in the study 208 (48.8%) were male. Patients who were less than 50 years old were 151 (35.4%). The number of married participants was 305 (71.6%). The number of diabetic patients who were unable to read and write was 94 (22.1%) and participants who can read and write were 63 (14.8%). Among the total 426 diabetic patients, 331 (77.7%) live in the urban residence. (Table 1).

3.2 | Behavioral and psychosocial characteristics

The number of patients who adhere to self-blood glucose monitoring was 68 (16.0%). About 179 (42%) of the patients had high medication adherence while the other 144 (33.8%), and 103 (24.2%) had moderate and low medication adherence respectively. Concerning the patient's level of adherence to physical activities, 96 (22.5%) had low physical adherence while 156 (36.6%) had medium and 174 (40.8%) had high adherence. Concerning the Alcohol use of the patients 320 (75.1%) were found to be non-alcoholics. Patients who got diabetic education and advice were 276 (64.8%). The number of patients who had received high social support was 125 (29.3%) while

TABLE 1 Sociodemographic variables of the participants. (*n* = 426).

Variable categories		Frequency	Percent (%)
Sex of the patient	Male	208	48.8
	Female	218	51.2
Age	<=50	151	35.4
	51–60	124	29.1
	61–70	105	24.6
	>71	46	10.8
Marital status	Single	42	9.9
	Married	305	71.6
	Divorced	34	8.0
	Widowed	45	10.6
Level of education	No formal education	94	22.1
	Can read and write	63	14.8
	Complete primary school	78	18.3
	Complete secondary school	43	10.1
	Preparatory school	59	13.8
	College or university	89	20.9
Occupational status	Government employee	91	21.4
	Retired	84	19.7
	Housewife	85	20.0
	Daily laborer	20	4.7
	Merchant	72	16.9
	Farmer	74	17.4
Residence	Urban	331	77.7
	Rural	95	22.3

the other 191 (44.8%) and 110 (25.8%) received a moderate and low level of social support. (Table 2).

3.3 | Clinical characteristics of the patients

Among the total 426 patients, 376 (88.3%) had type 2 diabetes mellitus. Concerning the duration of diabetes, 121 (28.4%) were less than 5 years, 191 (44.8%) for 5–10 years, and 114 (26.8%) for greater than 10 years. The number of patients who had one or more comorbidities was 152 (35.7%). Of the participants, 79 (18.5%) had diabetes-related complications. The patients who had poor glycemic control were 250 (58.7%) patients. Among the participants 322 (75.6%) use oral hypoglycemic agents, 83 (19.5%) insulin therapy and 21 (4.9%) takes both oral hypoglycemic agents and insulin. (Table 3).

TABLE 2 Behavioural characteristics of the participants. (*n* = 426).

Variable categories		Frequency	Percent (%)
Self-blood glucose monitoring	Not adhere	358	84.0
	Adhere	68	16.0
Medication adherence	Low	179	42.0
	Medium	144	33.8
	High	103	24.2
Physical exercise adherence	Low	96	22.5
	Moderate	156	36.6
	High	174	40.8
Alcohol	Not alcoholics	320	75.1
	Alcoholics	106	24.9
Diabetic education	No	150	35.2
	Yes	276	64.8
Perceived dietary adherence	Good	246	57.7
	Poor	180	42.3
Social support	High	125	29.3
	Moderate	191	44.8
	Low	110	25.8

TABLE 3 Clinical characteristics of participants. (*n* = 426).

Variable categories		Frequency	Percent (%)
Type of DM	Type 1	50	11.7
	Type 2	376	88.3
Duration of diabetes	<5 year	121	28.4
	5–10 year	191	44.8
	>10 year	114	26.8
Presence of comorbidity	No	274	64.3
	Yes	152	35.7
Diabetes-related complication	No	347	81.5
	Yes	79	18.5
Glycemic control	Poor	250	58.7
	Good	176	41.3
Body mass index of patients	Normal	211	49.5
	Underweight	6	1.4
	Overweight	153	35.9
	Obese	56	13.1
DM treatment the patient currently takes	Oral hypoglycemic agent	322	75.6
	Insulin therapy only	83	19.5
	Both oral and insulin	21	4.9

TABLE 4 Prevalence of depression among participants. ($n = 203$).

Variable categories	Frequency	Percent (%)
Mild	111	54.7
Moderate	47	23.2
Moderately severe	36	17.7
Severe	9	4.4

3.4 | Prevalence of depression among diabetic patients

The prevalence of all levels of depression among patients with diabetes mellitus was 203 (47.7%) (95%CI (42.9%, 52.4%)). Overall, there were 111 (54.7%) mild, 47 (23.2%) moderate, 36 (17.7%) moderately severe, and 9 (4.4%) severe cases of depression. (Table 4).

3.5 | Factors associated with depression among diabetic patients

Variables with a p -value of <0.25 in the bivariable analysis were selected to be included in the multivariable analysis. Level of physical activity, type of DM, kind of treatment the patient is currently taking for DM, diabetes-related complications, level of medication adherence, level of social support, duration of DM, self-blood glucose monitoring, alcohol, and age were included in the multivariable logistic regression. Moderate physical activity, low medication adherence, medium medication adherence, and high social support were significantly associated with depression among patients with diabetes mellitus with a p -value of <0.05 with a 95% confidence interval.

Patients with diabetes mellitus who had moderate physical activity had 50% decreased odds of depression than patients who had low physical activity (AOR = 0.50, 95% CI (0.29, 0.86)). The odds of depression among diabetic patients who have low medication adherence is 2.10 times higher than patients with high medication adherence (AOR = 2.10, 95% CI (1.22, 3.62)). Patients who had medium medication adherence were 1.78 times more likely to develop depression than diabetic patients with high medication adherence (AOR = 1.78, 95% CI (1.04, 3.06)). Diabetic patients who had high social support had decreased odds of depression by 46% than diabetic patients who had low social support (AOR = 0.54, 95% CI (0.33, 0.91)). (Table 5).

4 | DISCUSSION

This study aimed to assess the prevalence of depression and psychosocial and clinical factors associated with it among patients with diabetes mellitus in Amhara region comprehensive specialized

hospitals, in Ethiopia. The prevalence of depression among patients with diabetes mellitus was 47.7% (95%CI (42.9%, 52.4%)) which was in line with studies conducted in Ethiopia, Harar town,⁴⁰ Ambo,¹⁷ Addis Ababa black lion hospital,⁴¹ and Jimma.⁴²

The result was lower than a study conducted in Tanzania,¹² which might be explained by the difference in culture, socio-demographic characteristics, and behavioral characteristics of the patients between the two studies.

The result was higher than in studies conducted in different parts of Ethiopia Bahir Dar,¹³ Gondar,¹⁶ Dessie,¹¹ Addis Ababa,²² Mekelle,⁴³ Adama,¹⁵ Hawassa,⁹ and Mizan Tepi.⁴⁴ It was also higher than other studies conducted in Dubai,²¹ Vietnam,⁴⁵ Sudan,¹⁸ Botswana,⁴⁶ Spain,²⁰ and Saudi Arabia.^{19,47} The higher prevalence of depression among diabetic patients in the Amhara region might be due to the poor quality of care of the patients, low socioeconomic capacity, and lower knowledge of patients about depression in the study area.⁴⁸ The difference might also be due to the difference in sociodemographic characteristics, study setup, and sample size.

Diabetic patients who had moderate physical activity had 50% decreased odds of depression than patients who had low physical activity which is consistent with studies conducted in Ethiopia in Dessie,¹¹ Addis Ababa Tirunesh Beijing Hospital,²² and Hawassa,⁹ Spain,²⁰ and Portugal.⁴⁹ This result might be due to the effect of adequate physical exercise to reduce inflammations and its relieving effect on oxidative and physiological stresses. It also reduces depressive symptoms by enhancing the patient's self-esteem, social engagement, and physical perception.^{50,51}

The odds of depression among diabetic patients who had low and medium medication adherence were 2.10, and 1.78 times higher than patients who had high medication adherence respectively. This is consistent with studies conducted in Ethiopia in Mekelle,⁴³ Adama,¹⁵ and Portugal.⁴⁹ This association might be due to the effect of poor medication adherence causing diabetic complications and those complications lead to further anxiety and depression.⁵² The other reason might be due to low and medium medication adherence shows the patient's glycemic control to be poor which further enhances the depressive symptoms of the patient.⁵³

Diabetic patients who had high social support had reduced odds of depression by 46% than diabetic patients who had low social support. The result is supported by studies conducted in Ethiopia in public hospitals in Harar,⁴⁰ Addis Ababa,²² Bahir Dar,¹³ Hawassa,⁹ and Spain.²⁰ The result might be due to the effect of strong social support to reduce diabetes distress and depression by increasing patients' ability to maintain their treatment regimen, improving their coping strategies, reducing family-related stress, and improving the overall quality of life of diabetic patients.^{7,54}

Thus policymakers, health care providers, and diabetic patients should work towards reducing and managing the burden of depression among patients with chronic diseases, especially diabetes. Future research is also needed to explore the behavioral, social, and religious factors that could affect diabetic patients.

TABLE 5 Bivariable and multivariable regression output psychosocial and clinical factors associated with depression among diabetic patients in Amhara region comprehensive specialized hospitals, Ethiopia, 2022. ($n = 426$).

Variable categories		Depression		COR (95% CI)	AOR (95% CI)
		Yes	No		
Physical activity	Low	55	41	1	1
	Moderate	60	96	0.47 (0.28, 0.78)	0.50 (0.29, 0.86)*
	High	88	86	0.76 (0.46, 1.26)	0.81 (0.47, 1.38)
Type of DM	Type 1	26	24	1	1
	Type 2	177	199	0.82 (0.46, 1.48)	1.22 (0.48, 3.13)
The kind of current DM treatment	oral & insulin	13	8	1	1
	OHIA	144	178	0.50 (0.20, 1.23)	0.55 (0.21, 1.42)
	Insulin only	46	37	0.76 (0.29, 2.04)	0.91 (0.28, 2.90)
DM complication	No	169	178	1	1
	Yes	34	45	0.80 (0.49, 1.30)	0.75 (0.44, 1.27)
Medication adherence	High	38	65	1	1
	Medium	79	65	2.08 (1.24, 3.49)	1.78 (1.04, 3.06)*
	Low	86	93	1.58 (0.96, 2.60)	2.10 (1.22, 3.62)*
Social support	Low	60	50	1	1
	Medium	80	111	0.60 (0.37, 0.96)	0.75 (0.43, 1.33)
	High	63	62	0.85 (0.51, 1.42)	0.54 (0.33, 0.91)*
Duration of diabetes	<5 year	54	67	1	1
	5–10 year	88	103	1.06 (0.67, 1.68)	1.11 (0.68, 1.82)
	>10 year	61	53	1.43 (0.85, 2.39)	1.51 (0.85, 2.71)
Self-blood glucose	Adhere	36	32	1	1
	Not adhere	167	191	0.78 (0.46, 1.31)	0.81 (0.46, 1.42)
Alcohol	No	146	174	1	1
	Yes	57	49	1.39 (0.89, 2.15)	1.41 (0.88, 2.25)
Age	≤50	72	79	1	1
	51–60	60	64	1.03 (0.64, 1.66)	1.01 (0.59, 1.73)
	61–70	50	55	1.00 (0.61, 1.64)	0.95 (0.54, 1.68)
	>70	21	25	0.92 (0.48, 1.79)	0.89 (0.41, 1.94)

*Significantly associated factors with p -value ≤ 0.05

5 | CONCLUSION AND RECOMMENDATION

The prevalence of depression among patients with diabetes mellitus in Amhara Region Comprehensive Specialised Hospital was higher than findings from other developing and developed nations. Physical activity, medication adherence, social support, and adherence to physical activity were significantly associated with depression among diabetic patients. Hence, strong social support for the patients should be improved by involving the families of the patients

in the patient management process. Medication adherence should be strengthened by providing adequate counseling for the patients. Adequate physical activities should be recommended for patients with diabetes. Future research shall also assess the problem with a more appropriate study design by adding more variables such as family history of depression, and by separating the patients based on the type of DM. Overall patients, their families, physicians, and the health bureaus should emphasize preventing and managing depression among patients with chronic disease, especially with patients with diabetes mellitus.

6 | STRENGTHS AND LIMITATIONS OF THE STUDY

The main strength of the study is using primary data and standard questionnaires to assess the variables.

Like any other study, the current study has its limitations. The main limitation was social desirability bias, it was highly likely due to the patient's need for social acceptability and respect. Even though we have tried to minimize it by using standard questionnaires and trained data collectors, we couldn't fully remove it due to the nature of the study. The other limitation of the study is that important variables such as the family history of depression were not included in the study. Important confounders such as COVID-19 were not addressed in the study.

AUTHOR CONTRIBUTIONS

All the listed authors have participated starting from the conception of the topic to proposal writing, data collection, analysis, result and discussion writing, manuscript preparation, and revision. All authors listed have read and approved the final manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The datasets used for the current study are not publicly available to maintain the confidentiality of the patient's data.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the institutional review board (IRB) of Bahir Dar University, College of Medicine, and Health Sciences. A formal letter was submitted to the selected hospitals. Informed written consent was taken from each participant and identifying information was excluded to maintain confidentiality. Patients with severe depression were linked to psychiatry clinics.

TRANSPARENCY STATEMENT

The lead author Sewnet Getaye Workie affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Anteneh Mengist Dessie  <http://orcid.org/0000-0002-5919-9670>
Sewnet G. Workie  <https://orcid.org/0000-0002-2676-6958>

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