

Suicidal Thought and Associated Factors Among Patients with Diabetes Mellitus at North-west Ethiopia: Unemployment and Depression Matters

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Abstract: Background: Suicidal thought precedes other suicidal behaviors and is associated with the risk of attempting and committing suicide. However, the issue is not well studied in developing countries in general and Ethiopia in particular. Therefore, this study is conducted to assess 'lifetime prevalence and factors affecting suicidal thoughts among diabetes mellitus patients at Felegehiwot referral hospital. Method: we conducted analytic cross-sectional study from May 21 to June 21 at diabetic follow-up clinic. A systematic random sampling technique was applied to recruit a total of 421 participants. The suicide manual of the composite international diagnostic interview was adapted to assess suicidal thoughts. The medical chart of patients was reviewed to obtain relevant data on clinical variables. The factors associated with suicidal thoughts were identified with the binary logistic regression method. The strength of association between independent variables and suicidal thought was measured with odds ratio with 95% CI and the p-value of <0.05 in multivariable logistic regression were considered statistically significant. Results: A total of 421 participants were interviewed. The lifetime prevalence of Suicidal thoughts was found to be 19.7%. Being divorced/widowed (AOR=2.38, 95% CI: 1.12, 5.02), unemployment (AOR=3.67, 95% CI: 1.19, 11.32), type 1 diabetes (AOR=2.56, 95% CI: 1.16, 5.73), comorbidity of medical illness (AOR=4.74, 95% CI: 2.26, 9.93), and comorbid depression (AOR=1.92, 95% CI: 1.09, 3.38) were associated with suicidal thought. Conclusions: Suicidal thought was found to be an important public health problem in diabetes mellitus patients. So, early identification and treatment of patients with suicidal thoughts are important. Moreover; the management of medical comorbidities, depression, and psychosocial problems should be given due consideration.

Keywords: Suicidal Thought, Diabetes Mellitus, Ethiopia

1. Background

World Health Organization (WHO) estimates that almost one million people die of suicide every year and 10 to 20 times more people attempt suicide worldwide [1]. Among adults of 15–29 years, suicide accounts for 8.5% of all deaths and ranked as the 2nd leading cause of death next to traffic accidents [2]. Despite, decades of scientific efforts to improve methods of predicting and preventing suicide [3], suicidal behaviors have greatly increased globally [4].

Internationally, suicide rates range from highs of more than 25 per 100,000 persons in Lithuania, South Korea, Sri Lanka, and Guyana to fewer than 10 per 100,000 in Portugal, the Netherlands, Spain, South Africa, Egypt [5].

Suicide ideation (SI) is defined as thinking about; planning one's death and is associated with an increased risk of attempting and committing suicide [4]. International reports show that SI prevalence among the general population ranges from 2.1% to 6.8% worldwide, and is variable, depending on socio-demographic factors, such as age, sex, marital status,

occupation, and social support [6-9]. Moreover; approximately, 90 percent of suicide cases fulfill criteria for a psychiatric disorder, particularly major depressive disorder, substance use disorders, and schizophrenia [10-17].

Chronic medical illness imposes unexplained pains, increased utilization of healthcare resources, anxiety, and depressive feelings on patients, all of which delay recovery and healing process [18]. The prevalence of depression and psychiatric diseases among adults with Type 1 diabetes mellitus or Type 2 diabetes mellitus is approximately double that observed in the general population [19, 20]. Depression harms self-care [21] and related to poorer glycemic outcomes and therefore increased the risk of complication.

An institution-based cross-sectional study conducted in wake forest university hospital, the United States of America (USA) on 91 Type 1 diabetes mellitus adolescents attending follow up visit showed that lifetime suicidal thought was 26.4% [22]. Another cross-sectional study conducted in Korea adults older than 20 years of age with both diabetes and depression by taking 17,065 subjects reported that 51.4% of participants had a suicidal thought in their lifetime. Other studies revealed that the prevalence of suicidal thoughts was 58.5% and 9% in the United States of America studies [23, 24], 20% in Jordan [8], 15% in Canada [25], and 14% in Australia [26].

A multitude of factors may also contribute to suicidal thoughts among patients with diabetes mellitus, such as unemployment, chronicity of illness, non-adherence to medication, poor glycemic control, depression, substance abuse problems, and family history of suicidal behavior [22, 27, 28]. This emphasizes the role of socio-demographic and clinical factors when assessing SI among patients diagnosed with diabetes mellitus.

However, little is known about suicidal thought and associated factors in diabetic patients in Ethiopia and this study aimed to assess the prevalence and determining factors of suicidal thoughts among people on follow up for diabetes mellitus, northwest Ethiopia, 2017.

2. Methods

2.1. Study Design and Period

The design of the study was an institution based analytical cross-sectional and the study was conducted from May 21 to June 21, 2017.

2.2. Study Setting

This study was conducted at a diabetic follow up clinic of Felegehiwot Referral Hospital which is found in Bahir Dar; the Capital City of Amhara Region, 565 km away from Addis Ababa the Capital City of Ethiopia in the northwest direction. More than 5.5 million people are getting service in the catchment area of the hospital [29].

2.3. Source Population

The source population for the study was diabetes patients attending follow up treatment at the Diabetes outpatient

clinic of Felegehiwot Referral Hospital.

2.4. Study Population

Diabetic patients who attended follow up at the clinic during the data collection period. Inclusion Criteria

Diabetic Mellitus patients aged 18 years and older who have been on follow up treatment for DM were recruited into the study.

2.5. Exclusion Criteria

Patients seriously ill and unable to communicate were not given the chance to be included.

2.6. Sample Size Determination and Sampling Technique

The sample size required for the study was 423 which was determined using single population proportion formula, assuming an estimated prevalence of 50% since there is no published study on the prevalence of suicidal thought in DM patients in Ethiopia and Africa, 5% margin of error, 95% confidence level and 10% non-response rate. Sampling interval (K) was calculated by dividing the number of diabetic patients with follow up per month (1384) to the sample size (423) and K was found to be 3. The first study participant was selected from three of the participants attending follow up visits by a lottery method then every third of respondents in the waiting room at the diabetic outpatient unit of Felegehiwot referral hospital were included to sample by using systematic random sampling.

2.7. Variable

Presence or absence of suicidal thought was the dependent variable whereas socio-demographic variables, clinical and illness-related factors (duration of illness, treatment regimen, glycemic control, medication adherence, Diabetes type, Diabetes complications, body mass index (BMI), comorbid medical illness, and comorbid depression), psychosocial factors and substance use variables were the independent variables.

2.8. Operational Definitions

Suicidal thought: is defined as if the respondent answers the question have you ever thought of killing yourself? If the answer is yes, the respondent has suicidal thoughts [30].

Depression: Score ≥ 5 on patient health questionnaire-9 depression scale [31].

Adherence to medication: low-adherence if the score is < 6 , medium adherence if the score is 6 and 7, and high adherence if the score is 8 on 8-Item Morisky medication adherence scale [32-35].

Comorbid medical illness: The presence of other diagnosed medical disorders in addition to diabetes mellitus.

Social support: individuals who scored ≥ 9 (moderate and strong) on the Oslo 3-item social support scale [36].

Glycemic control: Glycemic control was assessed using a fasting blood glucose level of the previous visit from the medical chart of patients. Reading ≤ 130 mg/dl was considered

as good control and FBG level >130mg/dl was considered as a poor control [37].

Current substance use: use of at least one of the specified substance within the last 3 months [38].

Moderate physical activity: was defined as routine walking at least five times per week for at least 30 min at a time or engaging during the survey period in regular moderate (at least five times per week for at least 30 min at a time) by the American College of Sports Medicine Guidelines [39].

2.9. Data Collection Procedure and Instruments

The English version of the questionnaire was translated to the Amharic language by experts and it was reviewed by psychiatry professionals and pretested on a sample of 21 (5%) of sample size on diabetic patients at Addisalem hospital, which is 5 kilometers far from the study setting. Data were collected by four BSc psychiatry nurses and supervised by two MSc in mental health professional after three days of training was given for data collectors and supervisors. WHO's composite international diagnostic interview (CIDI) suicide manual has been adapted to assess suicidal thoughts among patients with diabetes mellitus. Suicidal thought: "Have you ever thought of killing yourself? CIDI was used in a different institution-based study in Ethiopia [40-42].

Depression has assessed with Patient Health Questionnaire-9; a nine-item self-report instrument that has been validated in the general hospital setting in Ethiopia [31]. Medication adherence was assessed using the 8-item Morisky medication adherence scale which is the latest version of the scale and has a good internal consistency, Cronbach $\alpha=0.83$ [43]. The Oslo-3-item social support scale was used to assess the social support of participants [36]. Socio-demographic, substance-related, and clinical variables not mentioned above were assessed by developing a questionnaire from different published literature.

2.10. Data Processing and Analysis

Data was entered into Epi-info version 7 and analyzed using SPSS version 20. Descriptive statistics (frequency, mean, median, standard deviation, percentages, and crosstabs) were used to summarize the outcome and independent variables. The association between suicidal thought and explanatory variables was investigated using binary logistic regression. All independent variables with p-value <0.25 in bivariate logistic regression were fitted into a multivariate logistic regression model to control the effect of confounders and identify factors associated with suicidal thought. The strength of the association between suicidal thought and factors interpreted using ORs with 95% CI and P-value <0.05 was considered statistically significant.

3. Results

3.1. Socio-demographic Characteristics of the Participants

From 423 participants intended to be included in this study, complete data was obtained from 421, making the response

rate of this study to be 99.5%. More than half of the respondents were males 227 (53.9%). The mean age (\pm SD) of the respondents was 38.0 (\pm 13.9) years and it ranges from 18 to 76 years. Among respondents, 353 (83.6%) were orthodox Christian in religion (60.8%) were married. About 192 (45.6%) of respondents didn't have the education and 196 (46.6%) of respondents were farmers. The median (\pm IQR) value of reported monthly income of the respondents was 900 (\pm 1350) ETB with a range of 450 to 20,000 ETB (Table 1).

Table 1. Descriptions of Socio demographic characteristics among patients with diabetes mellitus on follow up at Felegehiwot referral hospital (n=421), Bahirdar, Ethiopia, 2017.

Variable	Frequency	Percentage
Age group		
18-24	74	17.6
25-34	116	27.6
35-44	97	23
45-54	77	18.3
\geq 55	57	13.5
Sex		
Male	227	53.9
Female	194	46.1
Marital status		
Married	256	60.8
Single	93	22.5
Widowed/divorced	72	16.7
Religion		
Orthodox	352	83.6
Muslim	51	12.1
Protestant	18	4.3
Occupation		
Government employee	71	16.9
Private employee	58	13.8
Unemployed	28	6.7
Farmer	196	46.6
Student	26	6.2
Others	42	10
Educational status		
Non educated	192	45.6
Grade1-8	93	22.1
Grade9-12	58	13.8
Diploma and above	78	18.5
Monthly income		
<735	159	37.8
735-1176	96	22.8
>1176	166	39.4
With whom patient is living		
With family	375	89
Alone	46	11
Social support		
Poor	242	57.5
Moderate	128	30.4
Strong	51	12.1

3.2. Clinical and Illness-related Characteristics of the Respondents

About 184 (43.7%) of participants were on the injectable form (insulin), 57 (13.5%) were on combined oral hypoglycemic and insulin treatment regimen, and: the rest 180 (42.8%) were on oral hypoglycemic agents. More than half of the study participants 257 (61%) had been living with diabetes for less than 5 years, the rest 164 (39%) had been

diagnosed for the illness before five years.

Concerning comorbidity, 56 (13.3%) of participants had a comorbid medical illness, of which hypertension was the commonest one, 44 (78.6%). Only 18 (4.3%) of the study participants had complications of illness diagnosed by a medical practitioner with evidence from a medical chart of patients. Regarding adherence to anti-diabetic medication 85 (20.2%), 167 (39.7%) and 169 (40.1%) of participants had low, intermediate, and high adherence respectively. About 205 (48.7%) of respondents had a fluctuation of their blood glucose level beyond the normal values as measured by fasting blood sugar in the previous visit. The prevalence of comorbid depression in the study was found to be 38.7% (Table 2).

Table 2. Clinical characteristics of diabetic patients attending Felegehiwot referral Hospital, Diabetic Clinic (n=421), Bahirdar, Northwest Ethiopia, July 2017.

Variable	Frequency	Percentage
Type of DM		
Type1	58	13.8
Type 2	363	86.2
Duration since DM dx		
<5 years	257	61
>=5 years	164	39
Current DM treatment		
Insulin	184	43.7
Insulin and oral agents	57	13.6
Oral hypoglycemic agents	180	42.8
Co morbid medical illness		
Yes	56	13.3
No	365	86.7
Type of co morbid medical illness		
HTN	44	78.57
HIV	6	10.63
Asthma	3	5.4
Renal diseases	3	5.4
Complication due to DM		
Yes	18	4.3
No	401	5.2
Glycemic control		
Poor	205	48.7
Good	216	51.3
Medication adherence		
low	85	20.2
Medium	167	39.7
High	169	40.1
Moderate physical activity		
Yes	292	69.4
No		
Co morbid depression		
Yes	163	38.7
No	258	61.3
Body mass index (kg/m2)		
< 18.5	40	9.5
18.5-24.9	333	79.1
≥ 25.00	48	11.4
Family history of suicidal attempt		
Yes	15	3.6
No	406	96.4

3.3. Substance Use Characteristics of Respondents

About 136 (32.3%) of the respondents had a history of substance use within the past three months before data collection time. Among these; the majority, 123 (90.5%)

reported that they were using alcohol and 11 (8%) of them were smoking a cigarette, but only two of the respondents (1.5%) had used chat within the past three months (Table 3).

Table 3. Substance use characteristics of study participants at Felegehiwot Referral Hospital, Bahir Dar, Northwest Ethiopia, July 2017 (n=421).

Variables	Frequency	Percentages
Ever use of substance		
Yes	209	49.6
No	212	50.4
Ever use of alcohol		
Yes	193	45.8
No	228	54.2
Ever cigarette smoking		
Yes	12	2.85
No	409	97.15
Ever chat chewing		
Yes	3	7.1
No	418	92.9
Current substance use		
Yes	136	32.3
No	285	67.7
Current alcohol use		
Yes	123	29.2
No	298	70.8
Current cigarette smoking		
Yes	11	2.6
No	410	97.4
Current chat chewing		
Yes	2	0.5
No	419	99.5

3.4. Prevalence of Suicidal Thoughts Among Patients with Diabetes Mellitus in North-west Ethiopia

Eighty- three (19.7%) of the respondents had reported a history of suicidal thought in their lifetime (Figure 1). The proportion of suicidal thought by sex showed that 44 (53%) were male and 39 (47%) female. From those who have suicidal thoughts 28 (33.7%) were also suicidal in the past year (Table 4). The cross-tabulation of suicidal thought across categories of diabetes type shows that about 21 (36%) of type 1 DM and 62 (17%) of type 2 DM patients had a suicidal thought in their lifetime.

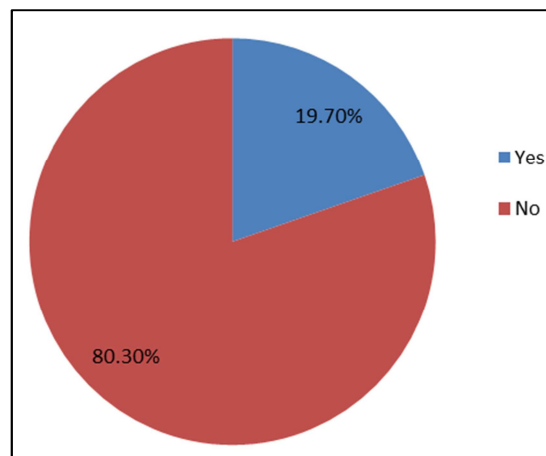


Figure 1. Prevalence of suicidal thought among patients with diabetes mellitus on follow up at Felegehiwot referral hospital (n=421), Bahirdar, Ethiopia, 2017.

Table 4. Frequency distribution of suicidal ideation among diabetes mellitus patients at outpatient department of Felegehiwot Referral Hospital, Bahirdar, Ethiopia, July 2017 (n=421).

Variable	Frequency	Percentage
Ever suicidal ideation		
Yes	83	19.7
No	338	80.3
Duration of suicidal ideation	28	33.7
≤12 months	55	66.3
>12 months		
Suicidal ideation in DM types		
Type 1 DM	21	25.3
Type 2 DM	62	74.7
Suicidal ideation 1 month		
Yes	7	1.7
No	417	98.3
Ever plan of suicide		
Yes	45	10.7
No	376	89.3
Ever suicidal attempt		
Yes	32	7.6
No	389	92.4
Ever suicidal attempt		
Type1	8	25
Type 2	24	75
Duration of suicidal attempt		
≤12 months	12	36.4
>12 months	20	63.6
Frequency of suicidal attempt		
Once	25	78.1
Two times	5	15.6
More than two times	2	6.3
Reasons for suicidal attempt		
Family conflict	6	18.75
Economic problem	6	18.75
Death in family	2	6.25
Related to DM	12	37.5
Others	6	18.75
Methods of attempt		
Hanging	15	46.89
Poisoning	13	40.61
Sharp tools	2	6.25
Insulin overdose	2	6.25

Table 5. Bivariate and multivariable Logistic Regression analysis showing the Associations between some of the factors and suicidal ideation among Diabetic patients at Felegehiwot Referral Hospital, Bahir Dar, Ethiopia, 2017 (n=421).

Explanatory variable	Suicidl ideatin		COR (95% CI)	AOR (95% CI)
	Yes	No		
Marital status				
Married	35	221	1.00	1.00
Single	21	72	1.84 (1.01, 3.36)	0.90 (0.34, 2.08)
Divorced/widowed	27	45	3.79 (2.09, 6.87)	2.38 (1.12, 5.02)*
Occupation status				
Employed*	23	106	1.00	1.00
Unemployed	11	17	2.98 (1.23, 7.20)	3.67 (0.99, 11.32)
Farmer	35	161	1.00 (0.56, 1.79)	1.07 (0.47, 2.40)
Student	9	17	2.44 (0.97, 6.16)	2.54 (0.67, 9.62)
Others*	5	37	0.62 (0.22, 1.76)	0.44 (0.12, 1.67)
With whom patient is living				
Family	64	311	1.00	1.00
Alone	19	27	3.42 (1.79, 6.52)	1.60 (0.68, 3.72)
Type of DM				
Type 1	21	37	2.76 (1.51, 5.03)	2.56 (1.16, 5.73)*
Type 2	62	301	1.00	1.00
Current DM treatment type				
Insulin	34	150	1.05 (0.62, 1.79)	0.89 (0.45, 1.78)
Insulin and oral agents	17	40	1.97 (0.99, 3.89)	2.46 (0.910, 5.53)

3.5. Factors Associated with Lifetime Suicidal Thought Among People with Diabetes Mellitus

In bivariate analysis socio-demographic variables; marital status, occupation, living arrangement, income and clinical variables such as type of diabetes, Current diabetes treatment regimen, medication adherence, the presence of comorbid medical illness, comorbid depression, family history of suicidal attempt and family history of suicide were found to have a p-value <0.25. These variables were fitted into a multivariate binary logistic regression model to control the effect of confounders.

In the multivariable regression analysis of factors for suicidal thought, the model adequately fits the data as the p-value from Hosmer and Lemeshow test was 0.906 and only marital status, unemployment, type of DM, comorbid depression and comorbid medical illness were found to be factors associated with suicidal thought.

The odds of having suicidal thought among respondents who are divorced/widowed was 2.4 times higher as compared to married study participants (AOR=2.38, 95% CI: 1.12-5.02). In this study, a type 1 diabetic patient was 2.6 times more likely to have suicidal thoughts than type 2 diabetic patients (AOR=2.56, 95% CI: 1.16-5.73). Comorbid medical illness was found to be a significant factor for suicidal thoughts. The odds of having suicidal thought among participants with comorbid medical illness was 4.7 times higher as compared to those without comorbid medical illness (AOR=4.74, 95% CI: 2.26-9.93). The presence of comorbid depression was also another factor for suicidal thoughts. Patients with comorbid depression were about two times more likely to have suicidal thoughts compared to those who have no depression (AOR=1.92, 95% CI: 1.09-3.38) (Table 5).

Explanatory variable	Suicidal ideation		COR (95% CI)	AOR (95% CI)
	Yes	No		
Oral agents only	32	148	1.00	1.00
Comorbid illness				
Yes	27	29	5.12 (2.83, 9.33)	4.74 (2.26, 9.93)**
No	56	306	1.00	1.00
Depression				
Yes	44	119	2.07 (1.28, 3.37)	1.92 (1.09, 3.38)*
No	39	219	1.00	1.00

*P-value<0.05.

**P-value<0.01.

Model chi-square=3.412, df=8 and sig=0.906.

*Employed are both Government and Private employed.

*Others are merchants and housewife.

4. Discussion

The present study is the first of its kind that assessed suicidal thought among people with diabetes mellitus in Ethiopia. The lifetime occurrence of suicidal thoughts was found to be 19.7% with a 95% confidence interval of (16.20, 23.00). This prevalence of suicidal thought was in line with a study in Jordan which is 20% [8].

On the contrary, the finding was lower than the findings from an institution based cross-sectional study conducted at wake forest university, South Carolina, the USA which is 26.4% [22] and 51.4% in South Korea [44]. It was also lower than from the result of a study conducted in Pittsburg hospital; USA among youths with IDDM, which is 58.5% [23]. On the other hand, it is higher than a study conducted in New York, USA 9% [24], Canada 15% [25], and Australia 14% [26].

These differences might be due to the socio-cultural difference in which suicidal behaviors are stigmatized in our society and under-reporting might occur. It might also be due to the sample size used in the USA study is smaller than the current study. An additional explanation for this difference might be the age of participants in USA study is younger than the current study that may increase the prevalence of suicidal thought and variation in study design could also account for the discrepancy (prospective cohort study in the USA) and interview schedule for children was the tool in one of the USA studies. In addition to this, some of the risk factors for suicidal thoughts were older age, longer duration of diabetes mellitus, medication non-adherence, and substance use in previous studies, but not risk factors in our study so might bring the difference.

The odds of suicidal thought among participants who were divorced/widowed was 2.4 times higher as compared to married participants. This is consistent with findings from studies in Korea [44] and community [42] and institution-based studies in Ethiopia [40]. Loss of marital relationships is a major stressful life event and might disrupt social and emotional functioning which will expose to suicidal thoughts.

Participants with comorbid medical illnesses were 4.7 times more likely to have suicidal thoughts than those without comorbid medical illnesses. This is supported by studies conducted in Jordan [8], South Korea [44], Brazil [45] and the USA [46]. Reasons may be due to chronic intractable

pain secondary to a comorbid medical illness, pill burdens, disruption of relationships, and loss of occupational status that may predispose the individual to socioeconomic difficulties and stress. The depressive effect of antihypertensive drugs might further increase suicidal thoughts.

The odds of suicidal thoughts among participants with comorbid depression were 1.92 times higher as compared to those who had no depression. This is supported by a study in the USA [27]. The possible reason may be depression will lead to a decrease in serotonin levels. Studies have shown an association between serotonin decrease and suicidal behavior [9, 47]. It may also be due to the direct impact of depression on patients which makes them socially withdrawn, hopeless and worthless, feeling guilty.

In this study type 1, diabetic patients were 2.6 times more likely to have suicidal thoughts than type 2 diabetic patients. This is supported by another study in the USA [48]. This might have been associated with the genetic basis of the illness and the age of participants younger in type 1 DM. It might also be due to the chronicity of the illness and suicidal effect of exogenous insulin administration in type 1 DM. Since the study was an institution based cross-sectional, it is difficult to know causal interpretations between suicidal thought and explanatory variables. Recall bias might also be the limitation of this study. Social desirability bias is also a potential limitation since suicidal thought is stigmatized by most society especially in developing countries like Ethiopia.

5. Conclusion

Suicidal thought was high in DM patients with follow up. This suggests that suicidal thought is important public health problem. There are various factors associated with this high prevalence of suicidal thoughts in this study. These include being widowed and divorced, unemployment, the presence of comorbid medical illness, comorbid depression, and having a clinical diagnosis of type 1 DM. Early management of medical comorbidities, depression, and psychosocial problems should be given due attention.

Abbreviations

BMI: Body mass index, CIDI: Composite international

diagnostic interview, DM: Diabetes mellitus, IDDM: Insulin-dependent diabetes mellitus, NIDDM: Non-insulin-dependent diabetes mellitus, OR: Odds ratio, PHQ-9: Patient health questionnaire-9, SPSS: Statistical package for social science, UOG: University of Gondar, USA: United States of America, WHO: World health organization.

Declarations

Ethics Approval and Consent to Participate

All processes followed were per the ethical principles after ethical approval was received from the responsible committee of the institutional review board of the University of Gondar. Verbal informed consent was obtained from all study participants since participation in the study pose no more than a minimal risk to the participants and this was also approved by the ethical committee of the above institution. Because the participation of patients in this study was entirely voluntary, confidential, and private information like name, image, video, and address were protected and ethics committee approved this procedure.

Consent for Publication

Not applicable.

Availability of Data and Materials

The authors approve that all data underlying the findings are completely accessible without limitation and also pertinent data are included in the manuscript.

Competing Interests

The authors announce that as we have no competing interests.

Authors' Contributions

MN and MB contributed to the design, conduct, and analyzing the research and in the manuscript preparation. AB contributed to the review of the manuscript. All authors read and approved the manuscript.

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