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ORIGINAL RESEARCH article

# Suicidal ideation and its associated risk factors among Libyan diabetic patients in Primary Healthcare Center

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***Keywords:*** Psychiatric disorder, suicide, suicide attempt, type 2 diabetes mellitus

**Abstract:** Diabetes mellitus is a major global health concern, which has worse mental health outcomes such as suicide, however, suicide is one of the top public health priorities worldwide. The World Health Organization's objectives for suicide prevention emphasize the identification of high-risk groups especially people with comorbidity. This study aims to determine the prevalence of suicidal ideation and its associated factors among diabetic patients and correlate it with socio-demographic, lifestyle, and clinical characteristics. A cross-sectional study including diabetic Libyan patients attending diabetes outpatient clinic health centers in Tripoli, Libya from January to August 2024, using a questionnaire consisting of two parts. Part I contains data about the socio-demographic, lifestyle, and medical data and Part II uses a single item of the 9-item version of the Patient Health Questionnaire-9. Data was analyzed by Chi-square test, and logistic regression was used to identify factors. Odds ratio with 95.0% CI was used and variables with a $p<0.05$ in multivariable logistic regression were significant. A total of 395 participants was responding using systematic sampling, 62.8% of them where female, mean age of the patient was 52.98±9.30 years, 85.8% were non-smokers, mean duration of diabetic illness was 10.96±8.02, 59.0% insulin-dependent, 77.7% often committed to their drug, 61.8% had diabetes complication. The highest complication was in the eye 33.9%, 48.9% had comorbidity, 90.4% had no diet commitment, 21.8% had regular physical activity and 63.3% had difficulty to dealing ordinary life, and 26.8% of the patients had reported suicidal ideation. Female was 1.83 times (AOR=1.832 CI95%:1.26, 2.982) more likely to have suicidal ideation than males. The risk of suicidal ideation in age >50 years was 1.04 times that age ≤50 years (AOR=1.042 CI95%: 0.640, 1.698). The diabetic patients who used insulin therapy, the odds of risk higher than participants who used oral antidiabetic was 1.34 times (AOR=1.345 CI95%: 0.849, 2.131). The odds of having suicidal ideation among participants with poor glycemic control was 3.60 times higher when compared with good control diabetes participants (AOR=3.614 CI95%: 1.924, 6.783). The prevalence of suicidal ideation was 26.8% in type II diabetic patients attending Primary Healthcare Centers. There was a significant association between suicidal ideation and female gender, age, and poor glycemic control.

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## Introduction

Globally, the number of people with diabetes mellitus (DM) has quadrupled in the past three decades and DM is the ninth major reason for death [1]. About one in eleven adults have DM, 90.0% of whom have type 2 diabetes mellitus (T2DM) [2]. It was estimated that about one-sixth of the Libyan population have DM [3, 4]. DM is a complex chronic metabolic disorder reflected by increased blood glucose concentration is caused by genetics and environmental factors. This metabolic dysregulation leads to multisystem progressive complications. DM requires continual self-management and is known to pose psychological and emotional burdens [5]. While mental disorders in diabetics are more prevalent than in the general population [6]. People with DM have worse mental health outcomes than those without DM [7]. DM management causes significant challenges worldwide, with individuals often facing increased risks of mental health issues, as well as suicidal behaviors [8]. DM has been indicated to be a risk factor for suicide [9]. It has been anticipated that the risk of death by suicide is higher in patients with DM than in the general population. Then, it is essential to investigate the risk factors of suicidal behavior in patients with T2MD [10]. Suicidal thoughts and depression are associated with patients with DM, especially patients with low socio-economic circumstances and chronic illness [11, 12] Suicide ideation (SI) is considered a major psychiatric emergency in patients diagnosed with chronic illnesses. SI is a multifaceted concern that includes bio-psychosocial and cultural factors that interfere with patients' abilities [13]. With SI and suicidal behavior being a known occurrence in people experiencing multi-morbidity, research on its associated factors has been an object of increasing interest. Thus, research on suicidal crises in patients with DM has significantly expanded [14]. Suicide is a serious cause of mortality worldwide, and it is considered a psychiatric emergency and the awareness of the seriousness of suicide in society should not be discounted [15]. Suicidal thoughts come first other suicidal behaviors are associated with the risk of attempting and committing suicide [16]. However, the issue is not well considered in Libya, thus, this study aimed to determine the prevalence of SI, and its socio-demographic, clinical characteristics, life-style associated factors and correlate it with difficulty in dealing with ordinary life and death among the Libyan DM patients.

## Materials and methods

*Study design and setting:* A cross-sectional study of 395 T2DM patients attending the diabetes outpatient Clinic Qasser ben Gashier Health Centers in Tripoli, Libya was used. The study was carried out from 1st January 2024 until 1st August 2024.

*Inclusion criteria:* Both genders and aged ≥40 years old, DM duration more than one year, treated by oral hypoglycemics and insulin. *Exclusion criteria:* Non-Libyan patients, age <40 years, and >65 years old, physical and/or mental conditions that interfere with participation, DM Type I, gestational diabetes, recently or old psychiatric diagnosed patients on treatment, and refused patients to participate.

*Sample size and sampling technique:* No previous studies about the prevalence of SI, among T2DM patients in Libya have been reported. Therefore, we estimated the sample size based on the depended on suspected prevalence of SI 20.0%, [12], the following equation was used:

$$N = 4PQ/d2,\ N = 4PQ/d2 = 4x20x80/4x4 = 400\ [17]$$

A convenience sampling technique was used. Variables 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, DM complications, comorbid medical illness), lifestyle (use variables were the independent variables, glycemic control defined according to ADA recommendation, $A1_C$ <7.0% control DM, $A1_C$ ≥7.0% uncontrolled DM. The complication of DM was known by asking the patients if had a pervious diagnosis of any complication of DM by physicians during follow-up.

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*Data collection:* Data was collected through face-to-face direct interviews by the authors using a questionnaire consisting of two parts. Part I: Contains data about to the socio-demographic, lifestyle, and medical data, Part II: The study uses a single item of the 9-item version of the Patient Health Questionnaire-9 (PHQ-9) [18, 19].

*Ethical consideration:* Ethical approval for the study was taken head of the outpatient clinic Qasser ben Gashier Health Center in Tripoli, Libya, and verbal consent was taken from each participant who was informed at the beginning that publications or reports would not mention names of the participants, but will be collective and that this survey is completely voluntary and that participants had the rights to refuse to participate.

*Suicidal ideation*: SI is the thought process of having ideas, or ruminations about the possibility of completing suicide [20]. *Suicidal or death thought:* is defined as if the respondent answers the question has you ever thought of killing yourself? If the answer is yes, the respondent has suicidal thoughts [21]. *Moderate physical activity:* is defined as routine walking at least five times per week for at least 30 minutes at a time or engaging during the survey period in regular moderate (at least five times per week for at least 30 minutes at a time) by the American College of Sports Medicine Guidelines [22]. *Monthly income:* The minimum wage in Libya is approximately LYD 450 [23]. *Family monthly income:* According to minimum wage divided to <500, 500 to <1000, 1000 to <3000 and >3000 LD as a cross-sectional study conducted in Tripoli 2020 [5]. *Adherence:* The extent to which a person takes medication as prescribed. WHO defines adherence as "The extent to which a person's behavior, corresponds with agreed recommendations from a health care professional". The concept of adherence is broadly viewed as related to instructions concerning medicine intake, use of the medical devices, diet, exercise, lifestyle changes, rest, and return for scheduled appointments [24]. *Drug adherence***:** was assessed by asking the participant about their committing to medicine intake: very committed, often committed to their drug and non-committed to their drug.

*Serum glycated hemoglobin measure ($HbA1_C$):* It is used to measure blood glucose control over a few months and arrange for an estimate of how well DM has been controlled over the last 2 or 3 months. It is the goal standard of care for determining potential risk for developing complications, such as retinopathy, renal disease, cardiovascular disease, peripheral neuropathy, or stroke. Potential complications are especially true if $HbA1_C$ remains high for a long period. The goal for $HbA1_C$ in adults is <7.0% [25].

*Statistical analysis:* Data is plotted in software programs SPSS version 25 into descriptive statistics measures like frequency, percentage, mean, standard deviation, and crosstabs were used to summarize the outcome and predictor variables. A logistic regression model was fitted to assess' potential risk factors for suicidal ideation. Variables with $p<0.25$ in bivariate analysis were fitted into a multivariable logistic regression to control the effect of confounders. Odds ratio with 95% CI was employed and statistical significance was declared with a $p<0.05$ in multivariable logistic regression.

## Results

*Socio-demographic characteristics of the participants:* In **Table 1**, the survey comprised 395 respondents, with a 99.0% response rate. The average age (±SD) of respondents was 52.98±9.30 years, and the age distribution reveals that 277 (70.1%) were in the age range of 50 years or older and 29.9% in the age of <50 years. Among respondents, 248 (62.8%) were females, 309 (78.2%) were married, 129 (32.7%) had a primary education level, 330 (83.5%) lived in flats, and 164 (41.5%) were housewives, and 33 (84.3%) had more than three family members in their family. Regarding smoking status, 389 patients (73.2%) had no history of smoking at all. In terms of monthly income, 168 (42.5%) reported less than 1000 LD income **(Figure 1)**.

*Clinical characteristics of T2DM:* The mean duration of DM was 10.96±8.021 years, and 271 (68.6%) their DM duration was ≥5 years. Regarding their DM medication; 233 (59.0%) were on insulin. DM complication

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was presented in 240 (60.8%), 193 (46%) of participants had a comorbid medical illness of which hypertension was the commonest one was 138 (32.9%), the control status of DM was 110 (27.8%) reported in the study sample. More than half of the participants had good DM drug adherence 307 (77.7%) **(Table 2)**.

**Table 1:** Socio-demographic characteristics among Libyan patients with type II diabetes mellitus

| Variable | Frequency | Percentage |
|---|---|---|
| **Gender** | | |
| Male | 147 | 37.2 |
| Female | 248 | 62.8 |
| **Social level** | | |
| Married | 309 | 78.2 |
| Single | 36 | 9.1 |
| Divorced | 40 | 2.5 |
| Widow | 10 | 10.1 |
| **Occupation** | | |
| Government employee | 144 | 36.5 |
| Unemployed | 13 | 3.3 |
| Housewife | 164 | 41.5 |
| Non-government employee | 37 | 9.4 |
| Retired | 37 | 9.4 |
| **Accommodation type** | | |
| Flat | 330 | 83.5 |
| Non flat | 65 | 16.5 |
| **Family member** | | |
| ≤ 3 members | 62 | 15.7 |
| > 3 members | 333 | 84.3 |
| **Smoking** | | |
| No smoking | 339 | 85.8 |
| Smoker | 56 | 14.2 |

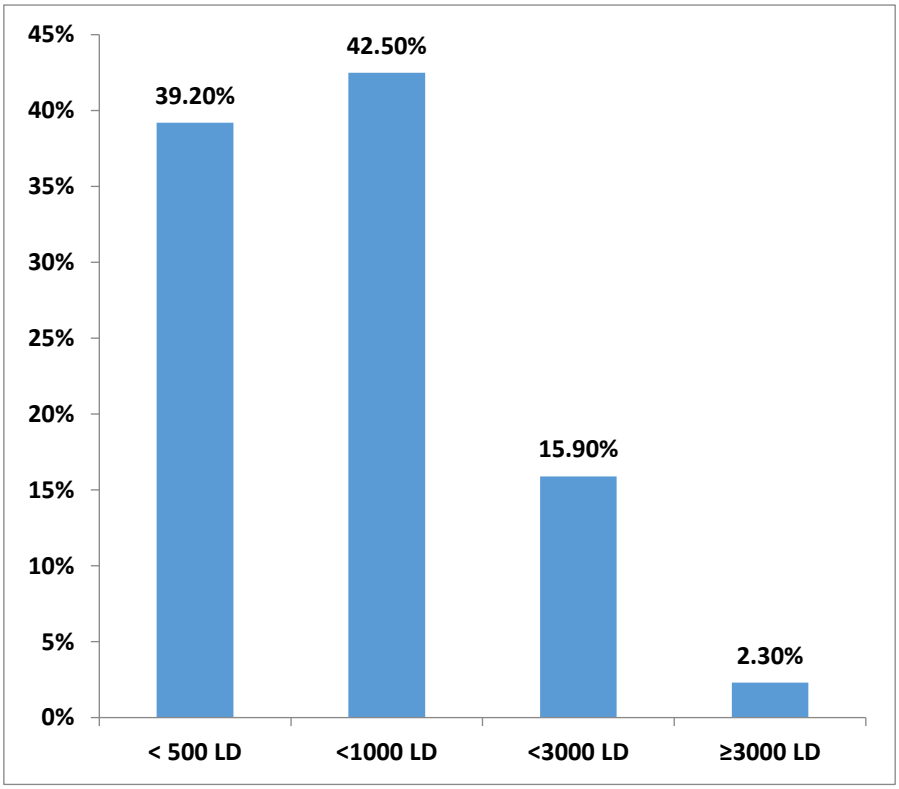


**Figure 1:** Monthly income distribution of the participants

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**Table 2:** Clinical characteristics among Libyan patients with type II diabetes mellitus

| Variable | Frequency | Percent |
|---|---|---|
| **Diabetes duration** | | |
| ≤ 5 years | 124 | 31.4 |
| > 5 years | 271 | 68.6 |
| **Diabetic medication** | | |
| oral antidiabetic | 162 | 41 |
| insulin | 233 | 59 |
| **Diabetes complication** | | |
| present | 240 | 60.8 |
| absent | 155 | 39.2 |
| **Control stats of diabetes** | | |
| controlled | 110 | 27.8 |
| uncontrolled | 285 | 72.2 |
| **Associated disease** | | |
| no disease | 203 | 48.3 |
| hypertension | 138 | 32.9 |
| heart disease | 11 | 02.6 |
| thyroid disease | 14 | 03.3 |
| others | 29 | 06.9 |
| **Diabetic adherence treatment** | | |
| good | 307 | 77.7 |
| poor | 88 | 22.3 |

*Lifestyle character of T2DM*: Moderate physical activity was reported in 86 (21.8%) of the participants, and healthy diet in 38 patients (9.6%), sleep disturbance presents in 193 patients (48.9%), weight change either decreased or increased in 197 patients (49.9%), **Table 3**.

**Table 3:** Lifestyle character of type II diabetes among patients with type II diabetes mellitus

| Variable | Frequency | Percent |
|---|---|---|
| **Moderate physical activity** | | |
| Yes | 86 | 21.8 |
| No | 309 | 78.2 |
| **Diet** | | |
| Healthy diet | 09.6 | 38.0 |
| Unhealthy diet | 357 | 90.4 |
| **Sleep disturbance** | | |
| present | 193 | 48.9 |
| Absent | 202 | 51.1 |
| **Weight change** | | |
| Present | 197 | 49.9 |
| Absent | 198 | 50.1 |

*Prevalence of SI:* The prevalence of suicidal thoughts among the participants was 26.8%. Death thought was present in 26.8%, with 04.0% having it every day, 59 patients (14.0%) having it several times, and 30 patients (07.1%) having it more than half of the day **(Figure 2)**. Moreover, the individuals who found it difficult to deal with ordinary life was 21.8%.

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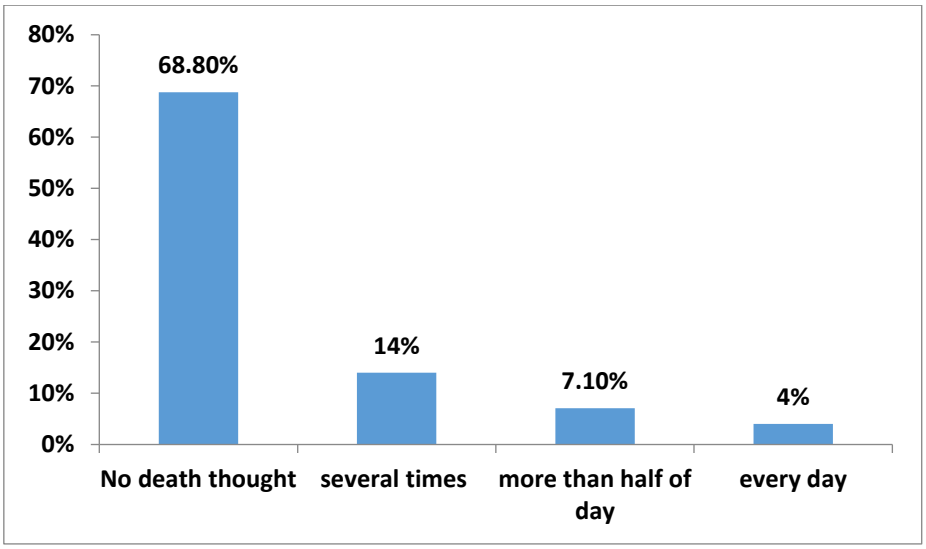


**Figure 2:** Death thought among Libyan patients with type II diabetes mellitus

*Factors associated with SI among T2DM:* **Table 4** shows that being female was 1.83 times (AOR=1.832 CI95%: 1.26, 2.982)) more likely to have SI when compared to male. The risk of SI more in >50 years was 1.04 times than ≤50 years (AOR=1.042 CI95%: 0.640, 1.698). Also, higher in flat accommodation type was 1.77 higher than non-flat (AOR=1.770 CI95%: 1.009, 3.106).

**Table 4:** Associations between some factors and suicidal ideation among type II diabetic Libyan patients

| Variable | Co-variable | No suicidal ideation | Suicidal ideation | AOR (95%CI) | P value |
|---|---|---|---|---|---|
| Gender | male | 118 | 29 | 1.832 (1.26, 2.982) | 0.014 |
| | female | 171 | 77 | | |
| Age group | ≤ 50 years | 87 | 31 | 1.042 (0.640, 1.698) | 0.059 |
| | > 50 years | 202 | 75 | | |
| Accommodation type | flat | 248 | 82 | 1.770 (1.009, 3.106) | 0.045 |
| | non flat | 41 | 24 | | |

*Education level:* Regarding education level, the SI reported a higher university education level 1.77 times when compared with another education level (AOR=1.771 CI95%: 0.572, 5.487). Social status is an important to risk factor in SI as in this report the divorced participants is a higher risk of SI than other statuses 3.48 times (AOR=3.484 CI95%: 0.630, 19.284) while monthly income decreased the risk of SI **(Table 5)**.

**Table 5:** Associations between some factors and suicidal ideation among type II diabetic Libyan patients

| Variable | Co-variable | No suicidal ideation | Suicidal ideation | AOR (95%CI) | P value |
|---|---|---|---|---|---|
| **Education level** | illiterate | 40 | 25 | 1.141 (0.347, 3.749) | 0.828 |
| | primary | 96 | 33 | 1.695 (0.560, 5.129) | 0.350 |
| | secondary | 79 | 25 | 1.658 (0.550, 4.994) | 0.369 |
| | university | 60 | 17 | 1.771 (0.572, 5.487) | 0.322 |
| | postgraduate | 14 | 6 | 0 | 0 |
| **Social level** | married | 238 | 71 | 2.450 (1.1971, 5.013) | 0.014 |
| | single | 22 | 14 | 1.131 (0.433, 2.956) | 0.801 |
| | divorced | 21 | 19 | 3.484 (0.630,1 9.284) | 0.153 |
| | widow | 8 | 2 | 0 | 0 |

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*Duration of DM:* regarding DM duration reported odds of risk factors higher in >5 years' duration of DM than ≤5 years was 1.04 times (AOR=1.042 CI95%: 0.640, 1.698). Elsmore, the diabetic patients who used insulin therapy the odds risk higher than participants who used oral antidiabetic was 1.34 times (AOR=1.345 CI95%: 0.849, 2.131). The adherent to diabetic treatment had higher odds when compared with non-adherent 2.6 times (AOR=2.671 CI95%: 1.619, 4.409). Moreover, the odds of having SI among participants with poor glycemic control was 3.6 times higher when compared with good control DM participants (AOR=3.614 CI95%: 1.924, 6.783), **Table 6**.

**Table 6:** Associations between some factors and suicidal ideation among Libyan type II diabetics

| Variable | Co-variable | No suicidal ideation | Suicidal ideation | AOR (95%CI) | P value |
|---|---|---|---|---|---|
| Duration of Diabetes | ≤ 5 years | 87 | 31 | 1.042 (0.640, 1.698) | 0.869 |
| | > 5 years | 202 | 75 | | |
| Diabetic treatment | oral antidiabetic | 124 | 38 | 1.345 (0.849, 2.131) | 0.206 |
| | insulin | 165 | 68 | | |
| Diabetic treatment adherence | adherent | 239 | 68 | 2.671 (1.619, 4.409) | 0.000 |
| | nonadherent | 50 | 38 | | |
| Control stats | controlled | 97 | 13 | 3.614 (1.924, 6.783) | 0.000 |
| | uncontrolled | 193 | 93 | | |

The most important lifestyle reported higher odds risk factors, first physical activity was the participants who had a sedentary life the risk of SI was increased than in participants who had moderate physical activity the odds were 1.6 times (AOR=1.642 CI95%: 0.915, 2.947). The odds of SI among participants with weight disturbance from increased or decreased in their weight was 1.2 times higher as compared to participants with participants their weight no disturbance (AOR=1.17695% CI: 0.753, 1.836), **Table 7**.

**Table 7:** Associations between some factors and suicidal ideation among type II diabetic Libyan patients

| Variable | Co-variable | No suicidal ideation | Suicidal ideation | AOR (95%CI) | P value |
|---|---|---|---|---|---|
| Physical activity | present | 69 | 17 | 1.642 (0.915, 2.947) | 0.094 |
| | absent | 220 | 89 | | |
| Weight disturbance | present | 141 | 56 | 1.176 (0.753, 1.836) | 0.477 |
| | absent | 148 | 50 | | |
| | absent | 289 | 0 | | |

## Discussion

To the best of our knowledge, the current study is the first of its kind that assessed suicidal thoughts among patients with DM in Libya. The prevalence of SI was found to be 26.8 with a 95.0% confidence interval. This prevalence of suicidal thoughts was in line with a previous study in Jordan 20.0% [13], in Pakistan 20.38% [11], while suicidal thought and associated factors among North-west Ethiopia were 19.7% [14]. The results of a German representative population-based study was 21.8% [14]. On the contrary, the findings were lower than the findings in South Korea (51.4%) [21]. On the other hand, it is higher than in Australia (14.0%) [22]. The Korea National Health and Nutrition Examination Survey from 2007 to 2012 was 17.6% [27]. In 18 studies, a systemic review, in which the prevalence of SI was 15.4% [28]. These differences might be due to the socio-cultural difference in which suicidal behaviors are stigmatized in our society and under-reporting might occur. Additionally, SI has been linked to females having a significantly greater prevalence of SI than males. The odds of suicidal thought among the participants who were female was 1.83 times higher risk

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(AOR=1.832 CI95%: 1.26, 2.982) as in a previous study [28] and a cross-sectional study in Ethiopia [29]. In addition, some of the risk factors for suicidal thoughts included female, older age (>50 years), marital status, accommodation type, longer duration of DM (≥5 years), level of education, poor glycemic level, treatment of DM, medication adherence, weight changing and physical inactivity are all associated risk factors in female participants were 1.83 times (AOR=1.832 CI95%: 1.26, 2.982) more likely to have SI when compared to males. This is supported by some studies conducted in Nigerian teaching hospitals [30] and at the Yazd Diabetes Research Center in Iran [31]. The odds of suicidal thoughts among participants who were divorced/widowed was 3.48 times higher risk (AOR=3.484 CI95%: 0.630, 19.284) as compared to married participants. This is in line with findings in Korea and Ethiopia [16]. Loss of marital relationships is a major stressful life event and might disrupt social and emotional functioning which will expose them to suicidal thoughts. Currently, SI is significantly more prevalent among patients who had injected insulin, had a duration of DM ≥5 years, and had poor glycemic control compared with those without DM. The current study's findings were consistent with a cross-sectional, nationally representative survey in South Korea [32]. Participants with old age were 1.04 times (AOR=1.042 CI95%: 0.640, 1.698) more likely to have suicidal thoughts than others. This is supported by the findings reported previously in South Korea [27]. The odds of suicidal thoughts among participants with high education levels was 1.08 times (AOR=1.771 CI95%: 0.572, 5.487) higher as compared to those who had no education; however, it is against a study conducted in Nigeria [30]. In the present study, diabetic patients with insulin therapy were 1.34 times (AOR=1.345 CI95%: 0.849, 2.131) more likely to have suicidal thoughts than diabetic patients who used oral antidiabetic therapy. This is supported by a study in Ethiopia [16]. This might have been associated with the chronicity of the illness with socio-economic burden of therapy and the suicidal effect of exogenous insulin administration. Since the study was an institution-based cross-sectional, it is difficult to know causal interpretations between suicidal thought and explanatory variables. Social desirability bias is a potential limitation since suicidal thought is stigmatized by most societies, especially in developing countries like Libya.

*Conclusion:* This study shows that the prevalence of suicidal ideation among type II diabetes mellitus Libyan patients is high. This may indicate that the associated risk factors of diabetes mellitus have a significant role in suicidal ideation. Thus, an early intervention is needed to reduce suicidal ideation and improve the quality of life of diabetic patients.

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