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Erectile dysfunction and associated factors among patients with diabetes in Public hospitals of Harari region, Eastern Ethiopia: modified poisson regression model

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Abstract

Background Erectile dysfunction is a common problem among patients with diabetes, often going undiagnosed and having a significant negative impact on their health. This condition necessitates accurate evaluation and early intervention. However, there is an inconsistent explanation of factors and limited evidence on the prevalence of erectile dysfunction among patients with diabetes in eastern Ethiopia. Thus, this study aimed to determine the prevalence of erectile dysfunction and its associated factors among patients with diabetes in public hospitals in the Harari Region, eastern Ethiopia.

Methods A cross-sectional study was conducted involving 339 randomly selected participants. Data were collected using the Kobo Toolbox with standardized questionnaires administered by interviewers, along with a review of the patients' medical records. Data analysis was performed using Stata version 14. The Poisson regression model with robust variance estimate was fitted to examine the association of the independent variables and erectile dysfunction. An adjusted prevalence ratio (APR) with 95% confidence intervals was reported. Statistical significance was declared at the p-value < 0.05.

Result The prevalence of erectile dysfunction was 78.28% (95% CI 73–83). Age 35–45 years [APR = 1.38; 95% CI: 1.03–1.84], and > 45 years [APR = 1.58; 95% CI 1.17–2.13], depression [APR = 1.41; 95% CI 1.06–1.86], current khat use [APR = 1.14; 95% CI 1.00-1.28], low social support [APR = 1.70; 95% CI 1.09–2.65] and medium social support [APR = 1.79; 95% CI 1.16–2.78] were factors significantly associated with erectile dysfunction.

Conclusions More than three-fourths of the participants had erectile dysfunction. Significant factors associated with erectile dysfunction included age 35 years and above, depression, current hat use, and low and medium social support level. The management of erectile dysfunction should be integrated into routine medical care in diabetic follow-up clinics, with special attention for those participants aged 35 years and above, who have depression, currently use Khat, and have low-level social support.

Keywords Erectile dysfunction, Associated factors, Diabetic mellitus, Harari, Eastern Ethiopia

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Introduction

Erectile dysfunction (ED) is the failure to achieve or maintain a rigid penile erection that is suitable for satisfactory sexual intercourse [1]. Globally, diabetes mellitus (DM) and its sequels have increased recently. In the long run, diabetes mellitus can cause complications such as peripheral artery disease, heart disease, retinopathy, nephropathy, neuropathy, obesity, cataracts, nonalcoholic fatty liver disease, and erectile dysfunction [2–4]. Erectile dysfunction is two to three times more common in those with diabetes than in those without diabetes [5, 6].

The prevalence of erectile dysfunction among patients with diabetes varies from place to place. The prevalence of ED for all age groups is between 12.9% and 20.6% in Europe [7]. According to studies, the prevalence of ED was 43.2% in Japan [8], 79.2% in Sri Lanka [9], 68% in Northern Srilanka [10], 89% in Saudi Arabia [11], 40.56% in China [12], and 75.2% in Turkey [13]. Furthermore, the prevalence of erectile dysfunction in patients with diabetes in Africa is high. The prevalence of ED in Tanzania is 55.1% [14], in Eastern Sudan is 81.1% [15], in Egypt is 80% [16], in Nigeria is 48.4–98.0% [17, 18], and in Ghana is 67.9% [19]. Several studies have examined the prevalence of erectile dysfunction (ED) among patients with diabetes mellitus (DM) in various regions of Ethiopia, with reported rates ranging from 54.3 to 85.5% [20–24]. Despite the high prevalence of ED among patients with diabetes, the condition often goes undiagnosed and untreated, as it is not considered life-threatening. Factors such as old age, duration of DM, body mass index, types of DM, complication of DM, comorbidity, alcohol consumption, smoking, physical inactivity, poor glycemic control, depression, and high blood pressure were associated with ED in patients with DM in different studies [9, 12, 15–18, 20, 22, 25–28]. However, studies conducted in patients with diabetes mellitus found no association of ED with body mass index, comorbidity, poor glycemic control, alcohol consumption, smoking, types of DM, duration of DM, and high blood pressure with ED [21, 24, 29].

Erectile dysfunction (ED) affects not only the physical aspects of patients with diabetes but also their psychosocial well-being, leading to low self-esteem, feelings of inadequacy in fulfilling a husband's role, emotional instability, and even marital dissolution [30]. When ED is present, comorbidities are common and require further investigation to enhance both the general health and sexual health of men [31]. Although ED is a treatable condition, many men feel embarrassed to disclose their situation to healthcare providers and significant others, and numerous physicians are reluctant to inquire about their patients' sexual health.

In Ethiopia, the burden of diabetes and its associated complications, including erectile dysfunction (ED), is substantial. However, the factors contributing to ED among patients with diabetes have been inconsistently explored by researchers. There is a need for more recent evidence to understand better the full extent and impact of erectile dysfunction in this population. Identifying the factors associated with ED in patients with diabetes will aid in developing strategies and interventions for screening and treatment, ultimately improving their overall quality of life. Therefore, this study aimed to determine the prevalence of erectile dysfunction and its associated factors among patients with diabetes attending follow-up visits at public hospitals in the Harari Region of eastern Ethiopia.

Methods and materials

Study design, setting, and period

We conducted a cross-sectional study in public hospitals in the Harari Region of eastern Ethiopia from January 20 to February 20, 2023. This region is located 526 km east of Addis Ababa and is divided into nine woredas, with three being rural and six being urban. Within the Harari Region, there are two public hospitals, two private hospitals, two governmental hospitals, nine public health centers, and twenty health posts. The Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH) and Jugol Hospital are the two public hospitals that offer multidimensional care to patients requiring highly qualified and specialized healthcare services. Our study was conducted at the diabetes clinics of Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH) and Jugol Hospital.

Population and eligibility criteria

All adult men diagnosed with diabetes who attended follow-up visits at public hospitals in the Harari Region of eastern Ethiopia during the study period were included. Participants had to be at least 18 years old and had received treatment for diabetes for at least one year. However, individuals who were severely ill or mentally impaired were excluded from the study.

Sample size determination and sample procedure

The sample size was determined using a single population proportion formula, taking into account the following assumptions: a proportion (P) of ED (72.2%) from the previous study carried out in the Hawassa, Ethiopia [27], 95% confidence level and a margin error of 5%. The calculated sample size was 308, adding a 10% (30.8 31) non-response rate, the final sample size became 339. To select the study participants, we first identified the number of patients with diabetes expected to attend follow-up visits during the study period from the HMIS registration book. We then employed a computer-generated simple random sampling method to select the study

participants. We aimed to minimize bias and enhance the validity of our findings through this process.

Data collection method and procedure

Data were collected through face-to-face exit interviews and chart reviews using a standardized questionnaire that addressed sociodemographic factors, clinical information, medication use, mental health, and treatment-seeking behaviors of patients with erectile dysfunction (ED). The data collection was conducted in an electronic format using Kobo Toolbox. The questionnaire was adapted from previous studies and modified to suit the local context [32]. The International Index of Erectile Function served as the model for the ED questionnaire (IIEF-5). IIEF-5 is a popular multidimensional self-report instrument created in tandem with the sildenafil clinical trial program. The first worldwide conference on ED consultation approved IIEF-5 as the "gold standard" measure for evaluating the efficacy of ED. In terms of pinpointing the problem, it has a 98% sensitivity and an 88% specificity [32].

Oslo −3 Social Support Scale (OSSS-3) was employed to measure the level of social support of the study participants. This tool consists of three items designed to assess how readily patients can obtain assistance from friends, family, and neighbors when needed [33].

The depression-related questionnaire was adapted from the PHQ-9 tool, a valid and reliable tool for identifying major depressive episodes in individuals with chronic diseases in outpatient settings. This tool is particularly useful in resource-limited environments, enabling early diagnosis and appropriate treatment for affected patients. The severity of depression is measured by a total score ranging from 0 to 27, based on nine items with scores from 0 (not at all) to 3 (almost every day) [34].

Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) was a tool used to assess the use of at least one specific substance (alcohol, chat, and tobacco products) for non-medical purposes [35]. Physical activity was measured using the International Physical Activity Questionnaire −7 (IPAQ-7), a standardized tool for measuring physical activity for patients with chronic illnesses [36].

The medical records of study participants were reviewed to document additional potential clinical factors. The survey was originally drafted in English, then translated into Amharic and Afaan Oromo, and subsequently translated back into English to ensure consistency. Data collection was conducted by five trained nurses under the supervision of two supervisors, using Kobo Toolbox software. To ensure data quality, pre-testing, and careful monitoring were implemented. A pretest was administered in Haramaya City to 5% of the sample.

Measurement

Erectile dysfunction: Individuals who scored between 1 and 21 points on the IIEF-5 criteria were classified as having ED. Those who scored 22 to 25 were considered not to have ED. Furthermore, scores were categorized as follows: 1 to 7 points indicated severe ED, 8 to 11 points indicated moderate ED, 12 to 16 points indicated mild to moderate ED, and 17 to 21 points indicated mild ED [32].

Body mass index (kg / m2): Body mass index was derived by dividing weight (kg) by the square of height (m) and the classification was carried out according to the criteria of the World Health Organization criteria [37].

Depression: Depression was assessed using the PHQ-9 tool, with scores classified as follows: none (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (20–27) [34].

Current use and ever use of a substance: Individuals were classified as current users if they had used at least one specific substance (alcohol, khat, shisha, tobacco, or illicit drugs) for nonmedical purposes within the last three months. Those who had used any of these substances for nonmedical purposes at least once in their lifetime were categorized as users.

Khat (Catha edulis) is a flowering plant and its leaves contain psychoactive compounds, particularly cathinone, and cathine, which have stimulant effects when chewed. Users often experience increased energy, heightened alertness, and euphoria. Khat use can lead to various health issues, including anxiety, insomnia, and potential dependence [35].

Social support level: The level of social support is classified using the Oslo-3 scale, which had a total of 14 scores. The categories are as follows: poor support (3–8 scores), moderate support (9–11 scores), and strong support (12–14 scores) [33].

Inactive physical activity (IPA): is defined by the IPAQ-7 score not meeting HEPA criteria, which includes engaging in less than three days of vigorous activity lasting at least 20 min per day, fewer than five days of moderate-intensity activity or walking lasting at least 30 min per day, or less than five days of any combination of walking, moderate-intensity, or vigorous-intensity activities that totals less than 1500 metabolic equivalent (MET) minutes per week [36].

Health-enhancing physical activity (HEPA): is defined as engaging in vigorous-intensity activity for at least three days, achieving a minimum of 1500 MET-minutes per week, or participating in any combination of walking, moderate-intensity, or vigorous-intensity activities for seven or more days, totaling at least 3000 MET-minutes per week [36].

Data processing and analysis

Data were exported to Stata version 14.0 (College Station, Texas 77845 USA) for analysis after being retrieved in advanced Excel format from the Kobo Toolbox database. Cross-tabulation was performed to uncover the data and clear missing values. For categorical variables, relative frequency and percentage were used, while mean and standard deviation were used to characterize continuous variables. The potential candidate variables for the final model were selected based on P values < 0.25 in the bivariate analysis.

Logistic regression is a widely used technique in cross-sectional studies with binary outcomes to estimate odds ratios (OR), which are a measure of association comparable to relative risk (RR). But when the result is common (> 10%), the OR overestimates the RR, which complicates the interpretation of the data. The prevalence ratio (PR) is suggested as an association metric in such instances [38, 39]. Poisson regression with robust variance rather than logistic regression helps directly estimate PR and facilitates the interpretation of results as prevalence ratios rather than ORs [40]. Therefore, the Poisson regression analysis model with a robust variance estimate was fitted to identify factors associated with erectile dysfunction. The results are presented as adjusted prevalence ratios (APRs) with 95% CI.

Table 1 Socio-demographic characteristics of diabetes mellitus patients on follow-up visits at Public hospitals of Harari Region, Eastern Ethiopia: 2023 ($n = 336$)

Variables	Categories	Frequency (%)
Age in years	< 35	79(23.5)
	35– 45	61(18.2)
	> 45	196(58.3)
Mean (± SD)	**48.2 (SD ± 14.9) years**	
Residence area	Urban	136(40.5)
	Rural	200 (59.5)
Marital status	Single	45 (13.4)
	Married	220 (65.5)
	Divorced	15 (4.5)
	Separated	28 (8.3)
	Widowed	28 (8.3)
Educational Status	No formal Education	78(23.2)
	Primary (grade 1–8)	82 (24.4)
	Secondary (grade 9–12)	95(28.3)
	College and above	81 (24.1)
Occupational Status	Farmer	68(20.2)
	Merchant	56(16.7)
	Gov`t Employee	105(31.5)
	Retired	59(17.6)
	Unemployed	34(10.2)
	Others	14(4.2)
Monthly income (in ETB)	≤ 2500	118(35.1)
	> 2500	218(64.9)

Others: Daily laborer; Driver; religious leader; NGO: *__ETB__; Ethiopian Birr

The explanatory variables were examined for multicollinearity before taking them into multivariate models using a correlation matrix for the regression coefficients, standard errors, and variance inflation factor value. Possible interactions between covariates were tested. The Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used to test the fitness of the model.

Ethical considerations

The Institutional Health Research Ethics Review Committee (Ref. IHRERC / 010/2023) of Haramaya University College of Health and Medical Sciences was granted ethical approval. Supporting and ethical letters were delivered to the administrative departments of both hospitals. Before data collection, the objective and method of the study were explained. Informed, voluntary, and consent was obtained from study participants. Participants were guaranteed the right to refuse participation, and their confidentiality was ensured throughout the study.

Results

Sociodemographic characteristics

The study included 336 patients with diabetes on follow-up visits, with a response rate of 99.1%. The mean age of the participants with (SD) was 48.2 (±14.9) years. Two hundred twenty (65.1%) of the participants were married and more than one-fourth (28.3%) of the participants attained secondary education or higher. Around 31.5% of the participants were government employees, 59.5% were urban residents, and 64.9% had a monthly income greater than 2500 Ethiopian Birr (ETB) (Table 1).

Substance use, physical activity, and social support level factors

More than half of the participants (55.4%) reported having used a substance at least once in their lifetime, and of these, 93% were current users. In a similar vein, 186 (55.4%) of the participants were ever use Khat, and of these, 173 (93%) were current Khat users.

One hundred fifty-one (44.1%) of the participants smoked cigarettes at least once in their lifetime and 17% of the participants were current smokers. Among current smokers, 84% were daily smokers and started smoking at the mean age (±SD) of 24.4 (±5.7) years. One hundred thirty-two (39.3%) of the study participants were ever alcohol users and 37.7% were current users. Regarding physical activity, 213 (63.4%) of the participants claimed that they participated in different healthy enhancing physical activities (Table 2).

Factors related to clinical and mental health

Among 336 study participants, three-fourths (74.1%) had type 2 diabetes mellitus and 34.2% were obese or

Table 2 Behavioral, physical activity, and social support level of diabetes mellitus patients on follow-up visits at public hospitals of Harari Region, Eastern Ethiopia ($n=336$), 2023

Variables	Categories	Frequency	Percentage (%)
Ever khat use	No	150	44.6%
	Yes	186	55.4%
Current khat use	No	13	7%
	Yes	173	93%
Ever alcohol	No	204	60.7%
	Yes	132	39.3%
Current alcohol	No	74	56.1%
	Yes	58	43.9%
Ever cigarette smoker	No	185	55.9%
	Yes	151	44.1%
Current cigarette smoker	No	94	623%
	Yes	57	37.7%
Ever shisha smoker	No	239	71.1%
	Yes	97	28.9%
Current shisha smoker	No	59	60.8%
	Yes	38	39.2%
Physical Activity	HEPA	138	41.1%
	IPA	198	59.9%
Social Support	Low	94	27.9%
	Medium	206	61.3%
	Strong	36	10.7%

HEPA: Health Enhancing Physical Activity; **IPA**: Inactive Physical Activity

overweight. The mean (±SD) duration of being diabetes was 9.4 (±5.7) years. Two hundred and fifty-nine (79.9%) participants had controlled their blood glucose levels. About 68 (63.6%) participants have comorbid hypertension. Around 81% of the study participants have depression (Table 3).

Prevalence of erectile dysfunction

Of a total of 336 study participants, 92 respondents were excluded from the analysis because they had not participated in sexual activity within the last six months. The mean (±SD) score on the International Index of Erectile Function test (ILEF-5) was 14.8 (±6.4). The current study found that the prevalence of ED among patients with DM at the follow-up visit was 78.28% (95% CI: 73 −83%). Among the participants with erectile dysfunction (ED), 20.9% experienced severe ED, 24.6% had moderate ED, 34.1% had mild to moderate ED, and 20.4% exhibited mild ED.

In terms of treatment-seeking behavior, 138 participants (56.6%) believed that medications were an effective treatment for erectile dysfunction (ED). Conversely, 150 participants (61.5%) thought counseling was not an effective option. Only 22 patients (9%) had discussed their ED with their physician. Additionally, 23% expected their physician to inquire actively about ED, 15% did not recognize it as a problem, 9% felt shy discussing it with their physician, and 4.5% believed that ED was not a treatable condition.

Table 3 Clinical factors and mental related factors of diabetes mellitus patients on follow-up visits at Public hospitals of Harari Region, Eastern Ethiopia: 2023 ($n=336$)

Variables	Categories	Frequency	Percentage (%)
Duration of diabetes in years	< 5	85	25.3%
	5–9	102	30.4%
	≥ 10	149	44.3%
Types of Diabetics	Type I	87	25.9%
	Type II	249	74.1%
Medication type	OHIO	186	55.4%
	Insulin	92	27.4%
	Combined	58	17.2%
Diabetic complication	Yes	80	23.8%
	No	256	76.2%
Complication types	Nephropathy	24	30.4%
	Hypoglycemia	16	20.3%
	Ophthalmologic	19	24%
	Neuropathy	7	8.9%
	Foot ulcer	13	16.5%
Comorbidity	Yes	107	31.9%
	No	229	68.1%
Types of comorbidities	Hypertension	68	63.6%
	CHF	12	11.2%
	CLD	14	13.1%
	CKD	12	11.2%
Body Mass Index (kg/m^2)	Normal weight	155	46.2%
	Underweight	66	19.6%
	Obese/overweight	115	34.2%
Depression	No	65	19.4%
	Yes	271	80.6%
Glycemic Status	Controlled	259	79.9%
	Uncontrolled	65	20.1%
Blood pressure	Normal	287	85.4%
	Raised	49	14.6%

OHA; Oral hypoglycemic agent; **CHF**: Chronic Heart Failure: **CLD**: Chronic Liver Disease: **CKD**: Chronic Kidney Disease

Factors associated with erectile dysfunction

In the bivariate analysis age 35–45 years and >45 years, the presence of depression, the level of social support, physical inactivity, the body mass index, the current use of substances, the types of DM, and the presence of comorbidity were factors significantly associated with ED.

After controlling for confounders, the prevalence of erectile dysfunction among patients with diabetes who were in the age group of 35–45 years and over 45 years old were 1.38 [APR=1.38; 95% CI: 1.03–1.84], and 1.58 times [APR=1.58; 95% CI: 1.17–2.13] higher than those

Table 4 Factors associated with Erectile Dysfunction among diabetic men at the public hospital of Harari region, Eastern Ethiopia ($n=244$): a modified Poisson model with robust variance estimate

Variables	Categories	Erectile Dysfunction		CPR (95%CI)	APR (95% CI)
		Yes	No		
Age (in years)	< 35	31(12.7)	34(13.9)	1	
	35– 45	46(18.9)	14(5.7)	**1.61(1.20–2.15) ****	**1.38(1.03–1.84) ****
	> 45	114(46.7)	5(2)	**2(1.55–2.59) ****	**1.58(1.17–2.13) ****
Social support	Strong	11(4.5)	19(7.7)	1	
	Medium	121(49.5)	32(13.1)	**2.16(1.34–3.48) ****	**1.79(1.16–2.78) ***
	Low	59(24.2)	2(0.82)	**2.64(1.64–4.24) ****	**1.701(1.09–2.65) ***
Physical Activity	HEPA	83(34)	38(15.6)	1	
	IPA	108(44.3)	15(6.1)	**1.28(1.12–1.47) ****	1.1(0.96 – 1.20)
DM Duration	< 5 years	55(22.5)	21(8.6)	1	
	5–9 years	61(25)	18(7.4)	1.06(0.89-1.28)	1.0(0.86-1.16)
	≥ 10 years	75(30.7)	14(5.7)	1.16(0.99-1.37)	1.1(0.97-1.27)
Body mass Index (kg/m^2)	Normal Weight	81(33.2)	32(13.1)	1	
	Underweight	41(16.8)	10(4.1)	1.12(0.94-1.34)	1.2(0.99-1.41)
	Overweight/Obese	69(28.3)	11(4.5)	**1.2(1.04–1.39) ***	1.1(0.94-1.18)
Glycemic Control	Controlled	152(62.3)	34(13.9)	1	
	Not Controlled	34(13.9)	15(0.1)	0.86(0.71-1.05)	1.1(0.94-1.25)
Depression	No	22(9)	26(10.6)	1	
	Yes	169(69.3)	27(11.1)	**1.9(1.38–2.57) ****	**1.41(1.06–1.86) ***
DM Types	Type I	36(14.8)	36(14.8)	1	
	Type II	155(63.5)	17(6.9)	1.8(1.42–2.28)	1.2(0.93-1.53)
Comorbidity	No	137(56.1)	47(19.3)	1	
	Yes	54(22.1)	6(2.5)	**1.2(1.07–1.36) ****	1.04(0.94-1.15)
Current khat chewers	No	66(27)	30(12.3)	1	
	Yes	125(51.2)	23(9.4)	**1.2(1.07–1.36) ****	**1.14(1.00-1.28) ***
Current cigarette smoker	No	137(56.1)	46(18.9)		
	Yes	54(22.1)	7(2.9)	1.23(1.05–1.42) **	0.96(0.86-1.07)
Current alcohol user	No	150(61.5)	47(19.3)	1	
	Yes	41(16.8)	6(2.5)	1.18(1.04–1.33) **	1.1(0.96-1.24)

APR: Adjusted Prevalence Ration,

CPR: Crude Prevalence Ration, *CI: Confidence Interval at 95%*

CPR, *CI*, *and P-Value were found from the bi-variables poisson regression analysis model with robust variance estimate. ** Statistically significant at p-value < 0.001*, ** statistically significant at p-value < 0.05.* ***BP;****Blood Pressure*: ***IPA***: *Inactive Physical Activity*: ***HEPA***: *Health Enhancing Physical Activity*

in the age group of younger than 35 years respectively. The prevalence of erectile dysfunction among patients with diabetes with low and medium social support levels was 1.70 [APR=1.70; 95% CI: 1.09–2.65] and 1.79 [APR=1.79; 95% CI: 1.16–2.78] times higher than those with a strong level of social support, respectively. The prevalence of erectile dysfunction was also 41% higher among patients with diabetes with depression than their counterparts [APR=1.41; 95% CI 1.06–1.86]. The prevalence of erectile dysfunction among patients with diabetes who are current khat chewers was 1.14 times [APR=1.14: 95% CI; 1.00-1.28] higher than their counterparts (Table 4).

Discussion

The study findings revealed that the prevalence of erectile dysfunction among patients with diabetes was 78.28% (95% CI: 73–83%). This implies that the problem is very high among patients with diabetes and is a public health problem. Furthermore, factors such as age 35–45 years and >45 years, presence of depression, level of social support, and current use of substances were factors significantly associated with ED.

The finding of this study is consistent with studies done in Sri Lanka 79.2% [9], Turkish 75.2% [13], and Ethiopia 83.6% [23]. However, the finding is higher than studies in Northern Sri Lanka 68% [41], Tanzania 55.1% [14], Ghana 67.9% [19], Nigeria 48.4% [18], Ethiopia, Amhara region 59.7% [28], Oromia region 60.4% [22], and Tigray region 69.9% [21]. Furthermore, this finding is lower than the study in Saudi Arabia 89% [11] and Amhara region 85.5% [24]. This discrepancy could be attributed to differences in sociocultural context, methodological variations, and timing of the studies. This finding implied that many people with diabetes mellitus are suffering from erectile

dysfunction, which requires early diagnosis and treatment of DM to address its negative health consequences.

The findings of the current study found a significant association between age and erectile dysfunction (ED) among patients with diabetes. The study showed that ED was 38% more prevalent in patients with DM of the 35-45-year age group than those in < 35 years of age. Similarly, patients with DM aged 45 years and older were 58% more prevalent than those in the younger age group (< 35 years). This result is comparable to studies conducted in Eastern Sudan [15] Egypt [16], and Nigeria [17]. The higher prevalence reported may be attributed to aging, which significantly impacts male sexual health. Testosterone levels naturally decline by 1–2% per year in men starting at age 40, accompanied by age-related physiological changes and an increased risk of developing conditions such as peripheral neuropathy, hypertension, and impotence. These factors collectively contribute to the elevated incidence of erectile dysfunction (ED) among older individuals [42, 43]. Furthermore, this is because erection involves blood vessels and diabetes facilitates blockage of blood flow to the penis, which results in ED.

In this study, depression was identified as a significant factor associated with erectile dysfunction (ED) among patients with diabetes. The prevalence of ED among patients with DM having depression was found to be 41% higher than in patients with DM without depression. These findings are consistent with a previous similar study conducted at Mizan-Tepi University Teaching and Tepi General, which reported that depressed patients with diabetes were four times more likely to develop sexual dysfunction compared to their counterparts [44]. Similarly, a study conducted in Japan that focused on depressive symptoms and the prevalence of erectile dysfunction in patients with type 2 diabetes mellitus found that 86% of people with depression experienced ED [8]. This association could be due to increased cortisol levels, decreased nitric oxide production that disrupts blood flow to the pelvic area, leading to difficulties in achieving and maintaining an erection in patients with diabetes having depression, physiological and psychological effects of depression on erectile function, apathy in regular and pleasant activities, lack of energy and motivation that often accompany depression can also contribute to difficulties in sexual performance and satisfaction [45].

In this study, the use of khat was identified as a significant factor associated with erectile dysfunction (ED) among patients with diabetes. The prevalence of ED among current khat chewers with diabetic mellitus was found to be 14% higher than among those who did not chew khat. A similar study in Yemen found 81% of ED among khat chewers [46]. The act of chewing khat itself has been found to have negative effects on sexual performance and satisfaction that can lead to couples' dissatisfaction [47].

Furthermore, the level of social support was also identified as a significant factor associated with erectile dysfunction. The prevalence of erectile dysfunction among diabetics with low and medium levels of social support was found to be 70% and 79%, respectively, higher than those with strong levels of social support. While there may not be previous studies specifically supporting this finding, it is plausible that people with erectile dysfunction may subjectively experience feelings of loneliness, and this association could be attributed to these psychosocial factors.

One of the primary limitations of our study is the reliance on self-reported data, which can introduce biases such as recall bias and social desirability bias. Additionally, we acknowledge that our cross-sectional design limits our ability to establish causal relationships between the examined variables. We recommend future research employing longitudinal studies, which could track changes over time and assess causality more effectively. While our study provides valuable insights into the prevalence and associated factors of erectile dysfunction among patients with diabetes, recognizing the limitations inherent in our methodology allows for a more nuanced discussion and encourages further research to build on our findings.

Conclusion

In this study, more than three-quarters of patients with diabetes mellitus were found to have erectile dysfunction. Factors such as age 35 years and older, depression, current khat use, and low and medium social support level were factors significantly associated with ED. As a result, the assessment and management of erectile dysfunction in the diabetic clinic should be part of routine medical care during follow-up visits in the diabetic clinic. Healthcare providers should emphasize those over 35 years of age, have depression, currently use khat, and have medium- and low-level social support. Furthermore, we recommend longitudinal studies to establish causality or intervention-based research to mitigate identified risk factors.

Acronyms and abbreviations

BMI	Body mass index
DM	Diabetes Mellitus
ETB	Ethiopian Birr
ED	Erectile Dysfunction
HEPA	Health Enhancing Physical Activity
IPAQ-7	International Physical Activity Questionnaire-7
IIEF-5	International Index of Erectile Function-5
MET	Metabolic Equivalent
PHQ-9	Patient Health Questioner-9
SD	Standard deviation
T2DM	Type 2 diabetes mellitus
OSS-3	Oslo Social Support – 3

USA United States of America
WHO World Health Organization

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12902-024-01815-x.

Supplementary Material 1

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Author contributions
AS, AM and BH are involved in the conception, design of the study, execution, data acquisition, analysis, and interpretation. AD, TG, and AE participated in the writing, review, or critical review of the article. All authors reviewed the final manuscript and gave their final approval of the version to be published; agreed on the journal to which the article was submitted; and agreed to be responsible for all aspects of the work.

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Data availability
All required data are included in the manuscript.

Declarations

Ethical approval
The Institutional Ethical Review Board Committee of Haramaya University's College of Health and Medical Sciences granted ethical approval. The approval number was Ref. IHRERC / 010/2023. Consent was obtained from each study participant before the start of the study. The research was conducted according to the Declaration of Helsinki.

Consent for publication
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Competing interests
The authors declare no competing interests.

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