

# Sexual Dysfunction Among Men With Diabetes Mellitus Attending Chronic Out-patient Department at the Three Hospitals of Northwest Amhara Region, Ethiopia: Prevalence and Associated Factors

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## Research

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# Abstract

**Background:** Sexual dysfunction is the commonest reproductive health problem seen among men with diabetes which has different health and social consequences. Previous studies conducted in this area were concentrated to specific domain of sexual dysfunction and factors were not well addressed.

**Objective:** To determine the prevalence of sexual dysfunction and identify associated factors among men with diabetes at the three hospitals of Amhara region, Ethiopia.

**Methods:** Institutional-based cross-sectional study was conducted among 462 men diabetic patients attending at the three hospitals of northwest Amhara region. Systemic random sampling were used and interviewer administered change in sexual functioning questionnaire were collected from February 20, 2020- April 15, 2020. The collected data were entered to Epi-data and analyzed by SPSS. Binary logistic regression was employed and multi-variable logistic regressions model used to control confounders. Variables that had independent correlation with the outcome were identified (with  $p\text{-value} \leq 0.05$  and 95%CI) the direction and the strength of the association were measured by Adjusted Odds Ratio (AOR).

**Results:** The prevalence of sexual dysfunction found to be 69.5% (95%CI= (65.1-73.9)). The magnitude of sexual dysfunction has been disproportionately observed among old age individuals (AOR=8.7, 95%CI: (3.3-23.1)), longer duration of diagnosis with diabetes(AOR=10.8, 95%CI: (5.3-21.9)), poor metabolic control (AOR=3.57, 95%CI: (1.81-7.05)), existence of comorbidities (AOR=5.07, 95%CI: (2.16– 11.9)) and having diabetic related complications (AOR=3.01, 95%CI=1.31-6.92). Nevertheless, physically active (AOR=0.41, 95%CI: (0.12-0.7)) and couples satisfied with their relationship (AOR=0.15, 95%CI: (0.03-0.7)) were less likely to experience the problem.

**Conclusion:** Well over two-thirds of men with diabetes have experienced sexual dysfunction, implying a public health pressing concern. Older individuals, physical in activity, longer duration of diagnosis with diabetes, having diabetic complication, experiencing co-morbid illnesses, couples un satisfaction, and poor metabolic control increased risk of developing SD. Therefore, promoting physical exercise, preventing co-morbid illnesses, couples counseling to build good relationship are recommended for combating the problem.

## Plain English Summary

Sexual dysfunction is a significant disturbance in a people's ability to respond sexually or to experience sexual pleasure which is a common condition that occurs among patients with chronic disease. Sexual dysfunction in diabetic men can be related to different diabetic complications, psychological impact of the disease, hormonal disturbance, atrophy of smooth muscle bodies and, different comorbidities which can be related to the diabetes.

Participants were asked about their current sexual experience along with different factors that were believed to have an impact on sexual function of men. Of total of respondent 69.5% of them claimed to

have sexual dysfunction. Different modifiable (e.g. age, duration of diagnosis with diabetes etc.) and non-modifiable factors (e.g. metabolic control, relationship satisfaction etc.) were identified to have an influence on ongoing development of sexual dysfunction.

In conclusion sexual dysfunction was found to be a serious public health concern among diabetic men. The finding ultimately indicates different priority prevention areas that need to be considered so as to tackle the occurrence of sexual dysfunction.

## Background

Sexual dysfunction (SD) is a multi-factorial and heterogeneous group of disorders which may take different forms mainly characterized by clinically significant disturbances in a people's ability to respond sexually or to experience sexual pleasure (1–3). SD in men categorized based on sexual response cycle which includes hypoactive sexual desire, arousal disorder (erectile dysfunction(ED)), and orgasm disorder (premature, retrograde ejaculation and anorgasmia)(4, 5). Sexual problems in men tend to be more associated with physical health including chronic disease and aging (6–8).Chronic disease patients are more susceptible to develop SD that might related to the disease condition itself, drug side-effects, emotional sequel, or combination of those factors(8). The mechanism by which diabetes results in SD is diversified and multifaceted, including psychogenic, hemodynamic, neurogenic, hormonal, atrophy of smooth muscle within the corpus cavernous bodies and so forth factors (8–10).

There has been a global increase in male sexual disorders(6). Sexual problems was higher in east and southeast Asia than in other regions of the world in which 31% of men aged between 40 and 80 declared to have sexual dysfunction. In East Asia, around 29.1% and 27.1% percentage of victims claimed to have, early ejaculation and erectile difficulties respectively (6, 11, 12). Erectile dysfunction is estimated to affect 152 million in the world(13). The prevalence of erectile dysfunction in the general population of America is 52% where the problem ranges from 35–75% among men with diabetes and it occurs at an earlier age(14).In Africa 12 million men are estimated to be affected by ED; as some reports show that in Nigerian in particular, more than three out of every 10 men have reported ED or another sexual problems (2, 6, 15). The magnitude of SD among men with DM varies across settings which ranges from 51%-85.5% (10, 16–19). Magnitude of ED in Ethiopia ranges from 69.9–85.5% among diabetic men(20, 21).

SD is ascribed to various preventable and non-modifiable factors. Age is a commonest risk factor for increasing incidence of sexual dysfunction like ED(14). Where the age-adjusted risk of ED was doubled in diabetic men compared with those without diabetes(22). Likewise, comorbid illnesses for instance, hypertension increased the problem; an estimated 40–80% of diabetic patients with HTN have reported SD (23–25).People with microvascular and macrovascular diabetic complications have an increased risk of SD (10, 26)

Although SD is a frequently observed complication of diabetes, there has been little information so far about SD in many countries including Ethiopia. In addition, the previous studies carried out on specific

domain of SD, which is not comprehensive. This this study was, therefore, conducted to assess the prevalence of SD among diabetic men and identify factors that could have an impact on sexual function. By doing so, the findings will positively influence the local decision makers to mitigate the problem through working on the identified attributes. Furthermore, the study will contribute in expanding the individual's sphere of knowledge in the field and contributing factors among men diabetic patient.

## **Methods**

### **Study design and setting**

An institutional-based cross-sectional study was employed among men with DM attending to chronic outpatient department in the selected public hospitals of northwest Amhara region from February 20, 2019 to April 30, 2020. Participants were from Felege Hiwote comprehensive and specialized hospital (FHCSH), Debre Markos referral hospital and Debre Tabor general hospital. Chronic out-patient department is the one among other out-patient departments in each health institutions where diabetic patients account the largest proportion of chronic out-patient visit.

### **Study population**

Men patients who have diabetics and came to chronic OPD for monthly follow-up during the data collection period in the selected hospital were invited to participate. Screening was done to identify and recruit study participants who already have started sex. Victims who were disoriented, unable to communicate and those who were currently sexually inactive due to different reasons (separated from partner and men who were catheterized) were excluded.

### **Study variables, data collection procedures and tools**

Sexual dysfunction was the dependent variable and the independent variables were Socio-demographic factors (age, marital status, education etc.), medical conditions (comorbid conditions and illness related factor), structural factors (benign prostatic hyperplasia, iatrogenic pelvic injuries, pelvic radiation), behavioral and lifestyle factors (alcohol, smoking, body mass index, physical activity) and psychosocial factor (quality of relationship and stressful life event).

### **Sexual dysfunction**

explained by total scores below the cutoff points (47) from 70 for all 14 items of change in the sexual functioning questioner (CSFQ) (27).

### **Sexual dissatisfaction**

Scoring less than 5 from CSFQ-14(27).

### **Sexual desire disorder**

Scoring less than 20 from the sum of CSFQ-14- (items 2 through 6)(27).

### **Arousal/excitement dysfunction**

explained by scoring and less than 14 from the sum of CSFQ-14- (items 7 through 9)(27).

### **Anorgasmia**

explained by scoring less than 14 from the sum of CSFQ-14- (items 11 through 13)(27).

### **Sexual pain disorder**

it is explained by scoring less than 5 from the CSFQ - 14- (item teen)(27).

### **Quality of relationship**

explained by score of above 20 from the summation of relationship assessment scale called the more satisfied with his/her relationship(28).

### **Stressful life event**

is explained by experiencing at least one of the listed ten items from daily stressful event measurement scale (DSEMS) in the past 6 month.

### **Comorbid illness**

is defined as presence of additional chronic illness among patient with DM; which includes previously confirmed hypertension, cardiac disease, dyslipidemia, psychosis, renal disease, HIV, cancer, asthma, multiple sclerosis and other.

### **Diabetic complication**

is defined as the existence of one or more diabetic related complication other than sexual dysfunction such as retinopathy, neuropathy, nephropathy and diabetic foot ulcer.

### **Poor glycemic control**

current fasting blood glucose level greater than 130 mg/dl or most recent HgA1c > 9.0% reflecting poor glycemic control(29).

### **Alcoholic**

The daily alcohol amount of respondent were calculated by taking the average alcohol percent(%/ml) of each drink multiplied by the volume(ml) of the drink and volumetric mass density(which is 0.8 g/ml). Participants were explained to be Alcoholic if they drink alcohol more than 12 g ethanol per day for the past six months (30).

## **Nutritional status**

is defined as underweight if BMI < 18.5 kg/m<sup>2</sup>, normal 18.5–24.9 kg/m<sup>2</sup>, over weight 25-29.9 kg/m<sup>2</sup> and obese if BMI > 30 kg/m<sup>2</sup>.

## **Smoker**

a respondent was explained as smoker if he smokes  $\geq$  12 cigarettes per day for the past six month (1).

The data were collected through face-to-face interviewer administered questionnaires. Changes in Sexual Functioning Questionnaire (CSFQ-14) adopted from reliability and construct validity of the changes in sexual functioning questionnaire short-form (CSFQ-14) were used to measure sexual response of respondents. CSFQ has 14 items that used to assess the existence of SD in the study participant. Each item have five point (Likert scale) measurement where eleven of the items ranges from “Never” to “Every day” and the rest three items were reverse scored “No” to “Great”. The tool which was used to assess SD in this study (CSFQ) was chosen because: its comparative nature eases to appreciate change in sexual function, its standard nature that aims drug and illness related sexual problems and the tool is valid and (reliable (with Cronbach’s  $\alpha$  of 0.91)).

## **Relationship satisfaction**

Relationship satisfaction index (CSI) was applied to assess participant’s satisfaction in their relationship. The tool has six items each item have five point (Likert scale) measurements where the items ranges from “Low satisfaction” to “High satisfaction”.

## **Stress**

Daily stressful event measurement scale (DSEMS) was used to asses any stressful life conditions for the past six months. This measurement scale contains ten (10) stressful life events that the participant might encounter in the past six month.

Moreover, medical history (type of diabetes, metabolic (glycemic) control, existence of diabetic complication, medication regimen, etc.) and comorbid illness related data were taken from the patient record.

The questionnaire was taken from previous studies in which the English version instrument was translated to Amharic language and retranslate to English to see the consistency. Training and brief orientation was delivered for the data collectors and supervisors prior to the data collection. Six male BSc nurse data collectors and three supervisors were assigned to collect the data. Amharic version of structured questionnaire was used. The data were collected in separated room to keep privacy of study participant.

## **Sample size and sampling procedure**

The required sample size was calculated by taking an assumption prevalence of SD among men with diabetes mellitus as 65% (19), margin of error (d) 4.5%, a standard Z score of 1.96 corresponding to 95% confidence interval and adding 10% non-response rate. The final sample size was computed as:

$$n = \frac{Z_{\alpha}^2 \times p(1-p)}{d^2}; n = \frac{(1.96)^2 \times 0.65(1-0.65)}{(0.0451)^2} = 420$$

After adding 10% none response rate the sample size was 462.

Systemic random sampling technique was used to approach the study participants. Sample size was proportionally allocated to each hospital considering the monthly patient flow. Oral informed consent was taken and the confidentiality and privacy of the patients were ensured by avoiding names.

### **Data quality assurance, data processing, and analysis**

The collected data were checked for inconsistencies, coding error, completeness, accuracy, clarity and missing values and then entered into Epi-data version 4.6 which were further exported to SPSS version 21 for recoding, cleaning, and analyses. All continuous independent variables were categorized.

The wealth status of the participants was analyzed through principal component analysis (PCA). All categorical and continuous variables were categorized to be between '0' and '1'. All statistical assumptions of factor analysis were checked. In addition, communality value and Eigenvalues of 0.5 and greater and 1 respectively were included in factor analysis and the analysis was done repeatedly until all variables were meeting the inclusion criteria for factor analysis. Next, all eligible factor scores were computed using the regression-based method to generate one variable, wealth status.

Then after, the loading factors were sorted in their ascending order and they were corrected to be between four and negative four. Following this, the final scores were ranked to five quantiles as first, second, third, fourth, and fifth. Finally, ranks were coded as richest, rich, middle, poorer and poorest, respectively.

The outcome variable was dichotomized and coded as '0' and '1', representing those who have not developed and developed SD, respectively. Further, for continuous variables age for instance, the Shapiro-Wilk, statistic and Kolmogorov-Smirnov was used to determine which measure of central tendency is appropriate to use. Descriptive statistics like frequency, percentage, and measures of central tendency with their corresponding measure of dispersion were used for the presentation of demographic and other variables. Tables, graph and texts were used to present the findings.

Furthermore, the binary logistic regression analysis was applied to identify factors associated with SD. Those variables with p-value  $\leq 0.2$  from bivariable analysis were entered to the multivariable model to control the possible effects of confounder/s, and to identify the significant variables. According to the Hosmer and Lemeshow test, model was found to be adequate. Prior to identifying the significant factors, the presence of multicollinearity were examined using the Variance Inflation Factor (VIF) and no variable were found to have multicollinearity. Finally, the variables which had independent correlations with SD

were identified on the basis of Adjusted Odds Ratio (AOR) and p-value with its corresponding 95%CI. Variables having p-value less than 0.05 were claimed as statistically significant and the direction as well as strength of the association was interpreted using the AOR.

## Results

### Socio-demographic characteristics of respondent

A total of 416 participants were enrolled in this study making a response rate of 90.04%. The mean (SD) age of respondent was 47.8( $\pm$  15.16) years. The majority of the respondents were orthodox Christian followers 372(89.4%) where about two thirds of respondent lived in urban (64.7%). The married respondents accounted the largest proportion of the participants 355(85.3%). Moreover, slightly more than a quarter 110 (26.4%) and a third (35.8%) of participants have attained secondary education and had a private work respectively (Table 1).



Table 1  
 Socio-demographic characteristics of men with diabetes  
 at three hospitals found in Northwest Amhara region,  
 Ethiopia from February 20- April 30 2020(n = 416)

<b>Variable</b>	<b>Frequency (n)</b>	<b>Percent (%)</b>
Age		
< 40	141	33.8
40–50	88	21.2
> 50	187	45
Religion		
Orthodox	372	89.4
Muslim	38	9.1
Protestant	5	1.2
Catholic	1	0.2
Relationship status		
Single	40	9.6
Married	355	85.3
Divorced	9	2.2
Widowed	12	2.9
Educational status		
Can't read and write	83	20
Grade 1–8	93	22.4
Grade 8–12	110	26.4
Diploma	23	5.5
Degree & above	107	25.7
Occupation		
Government employee	99	23.8
Private work	149	35.8
Farmer	106	25.5
Student	17	4.1
Job seeker	7	1.7

Variable	Frequency (n)	Percent (%)
Retired	38	9.1
Wealth quantile		
Poorest	86	20.8
Poor	109	26.2
Middle	107	25.7
Rich	68	16.2
Richest	46	11.1

### Medical and comorbidity characteristics

The mean duration of diagnosis with diabetes among participant was 8.22 ( $\pm$  5.65) years ranged from (1–30 years). A bit more than half, 203 (51.2%) of the participants were patients with type II diabetes and 133(32%) had at least one diabetic related complication. Moreover, 50.2% of participants had at least one comorbid illness where hypertension was most frequent 150 (36.6%) comorbid illness followed by hyperlipidemia 64(15.6%). About 39 (9.4%) of them have benign prostatic hyperplasia and 26(6.1%) of them had undergone pelvic surgery (Table 2).

Table 2  
 Medical conditions and other comorbidities among men diabetic patients at the three hospitals found in Northwest Amhara region, Ethiopia February 20- April 30, 2020(n = 416)

Variable	Frequency (n)	Percent (%)
Duration of DM		
<5 years	169	40.6
≥5 years	247	59.4
FBS (metabolic control)		
<130	96	23.1
≥130	320	76.9
Diabetic complication		
Yes	133	32
No	283	68
Hypertension		
Yes	150	36.1
No	264	63.5
Hyperlipidemia		
Yes	64	15.4
No	351	84.4
BPH		
Yes	39	9.4
No	377	90.6
Pelvic surgery		
Yes	26	6.1
No	398	93.9
FBS@ fasting blood sugar, BPH@ Benign prostatic hyperplasia		

About 247(59.7%) of men were found to be alcoholic. Pertaining to the nutritional status, the majority of them 378(90.9%) had BMI that falls in the normal range. More than 248(59.6%) of the respondents had experienced at least one stressful life event in the past 6 months of the survey. Regarding relationship satisfaction, 382(91.8%) of the participant gets satisfied with their relationship.

### **Prevalence of sexual dysfunction**

The prevalence of SD was found to be 69.5% (95% CI = 65.1%-73.3%). The prevalence in Felege Hiwote referral hospital, Debre Markos referral hospital and Debre Tabor general hospital were 68.1%, 65.8% and 73.9% respectively. About 53.3% and 86.2% of type I and type II diabetes victims respectively had experienced SD.

### **Prevalence of SD in each domain of SD**

Almost all (99.5%) participants found to have orgasmic disorder (ejaculatory problem). Participants that have arousal problem (erectile dysfunction) were 99.3%. On the other hand sexual pain disorder (painful orgasm and ejaculatory pain) was the SD domain that show the lowest prevalence 42% (95%CI: 39%-45%).Further, close to half, 204(49%) of participants claimed to have on more domain of SD (Fig. 1).

### **Factors associated with SD**

Variables found with a p-value < 0.2 in the bi-variable analysis were older age, rural residence, type of DM, physical inactivity, long duration with DM, existence of diabetic complication, having comorbid illness, poor metabolic control, having daily stressful event and being un satisfied with.

In multivariable analysis older age, long duration of diagnosed with DM, physical activity, poor metabolic control, existence of other diabetic complication, having comorbid illness and relationship satisfaction have shown an independent association with SD. The odds of SD is increased by 9.6 (AOR = 9.6, 95%CI, 3.6-25.46), and 8.7(AOR = 8.7, 95%CI = 3.3–23.1) times, among participants with aged between 40 and 50 and > 50 than participants younger than 40 years respectively. In addition the likelihood of developing SD among physically active participants were reduced by 59% than who were physically inactive (AOR = 0.41, 95% CI = 0.12–0.79).

Participants who have been diagnosed with diabetes for more than 5 years were 10.8 times higher chance of SD than participants who have been diagnosed with diabetes for less than five year (AOR = 10.8 95% CI = 5.33–21.88). The likelihood of developing SD among diabetic individuals with poor metabolic control rises by more than triple than that of diabetic but with good metabolic control (AOR = 3.57, 95%CI = 1.81–7.05).

Having at least one diabetic complication increased SD by three-folds (AOR = 3.01, 95%CI = 1.31–6.92). Participants who have at least one comorbid illness were 5.07 times higher to develop SD over participants who were free of comorbid illnesses (AOR = 5.07, 95%CI = 2.16–11.9).

Moreover, participants satisfied with their relationship were 85% less likely to have sexual dysfunction than respondent who are unsatisfied participants (AOR = 0.15, 95%CI (0.03–0.704) (Table 3).

Table 3

Factors associated with SD among men patients with diabetes at the three hospitals found in Northwest Amhara region, Ethiopia from February 20- April 30, 2020(n = 416)

Variable	Sexual dysfunction		Odds ratio (95% CI)	
	Yes	No	Crude(COR)	Adjusted(AOR)
Age				
< 40	60	81	1	1
40–50	50	38	1.8(1.03–3.63)	<b>9.6(3.6–25.50)**</b>
> 50	179	8	30.2(13.0-46.6)	<b>8.7(3.3–23.10)**</b>
Resident				
Rural	93	54	1	1
Urban	196	73	1.9(1.01–5.40)	1.7(0.71–4.15)
Type of DM				
Type I	114	99	1	1
Type II	175	28	5.43(3.35–8.78)	0.63(0.27–1.45)
Physical activity				
No	100	5	1	1
Yes	189	122	0.77(0.03–0.2)	<b>0.41(0.12–0.7)*</b>
Comorbid illnesses				
No	93	114	1	1
Yes	196	13	18.48(9.9–34.5)	<b>5.07(2.16–11.9)**</b>
Duration of the illness				
< 5 years	65	104	1	1
≥ 5 years	224	23	15.58(9.18–62.76)	<b>10.8(5.33–21.88)***</b>
Metabolic control				
< 130 mg/dl	39	57	1	1
≥ 130 mg/dl	250	70	5.22(3.21–8.49)	<b>3.07(1.62–5.53)**</b>
Daily stressful event				
No	100	67	1	1
Yes	188	60	2.1(1.37–3.21)	1.17(0.62–2.21)

Variable	Sexual dysfunction		Odds ratio (95% CI)	
	Yes	No	Crude(COR)	Adjusted(AOR)
Couple satisfaction index				
Satisfied	257	125	1	1
Unsatisfied	32	2	0.13(0.3–0.55)	<b>0.15(0.03–0.704)**</b>
Existence of complications				
No	166	117	1	1
Yes	123	10	8.7(4.36–17.22)	<b>3.01(1.31–6.98)**</b>

\*indicate significant at p-value < 0.05 and \*\* (< 0.01), and \*\*\* (< 0.001), COR = crude odds ratio and AOR = adjusted odds ratio

Hosmer and Lemshow goodness of fit (p-value = 0.42), Multicollinearity test (VIF) = 1.28

## Discussions

SD is the commonest reproductive health problem observed among people who are aged and people living with chronic non-communicable diseases such as DM. The problem would end up with relationship instability, mental health disorder, and poor reproduction unless detected and managed early and appropriately. However, in Ethiopia, paternal reproductive health is the most disregarded and unrecognized issue both in research and interventions. Therefore, estimating the magnitude and identifying the contributing factors as well as recognizing the most liable individuals for SD may have a paramount contribution in mitigating the problem. Accordingly, this study was designed to determine the magnitude of SD and identify factors among men attending chronic out-patients departments of the three hospitals of northwest Amhara region.

About 69.5% (95% CI = 65.1%-73.3%) of diabetic individuals claimed to experience SD, in line with a study conducted in Nairobi (65.1%)(19). Where erectile dysfunction were a domain of SD that shows high prevalence in this study as well as study conducted in Nairobi(19)The prevalence of sexual dysfunction was higher among type two diabetes patients (86.2%) than type one diabetic patients (53.3%). This could be due to sexual dysfunction and type two diabetes shares similar risk factor like ageing, obesity and high blood pressure (29). For instance reports showed that 87.5% of adults with type II diabetes are overweight/obese at the same time obesity is associated with reduced level of testosterone production (31).

This study shows significantly higher prevalence of erectile dysfunction 99.3% than studies based in Israel (37%) and Nigeria (67%) (24, 32). This is possibly because of the tools that used across studies were distinct; the former studies conducted in Israel use International Index of Erectile Function (IIEF) unlike the current study employed change in sexual functioning questionnaire adopted form reliability

and construct validity of change in sexual function which was purposely developed to assess illness or medication related SD (24, 32).

Likewise, arousal disorder (erectile dysfunction) was a problem observed in this study in which 99.3% of participants have shown. The finding is higher than a study done elsewhere in Ethiopia (69.9%-85.5%) (20, 21). The tool used by those studies was (IIEF) which is different and less sensitive than the one employed by this study(20, 21).

Similar to a previous study in Nairobi, the current study witnessed that participants older than 50 years were 8.7 times higher to develop SD than participants aged below 40 (19). As a matter of fact, the level of testosterone in men declines with age at a rate of 1–2% per year starting from age 40(14). Indeed, as age increases, individuals become more exposed to develop peripheral neuropathy, hypertension and impotence in diabetic patients(26).

Regular physical activity reduced SD and the current study evidenced the same, performing regular exercise cuts the likelihood of developing SD by 59%, which is in agreement with the previous study 59% (10). It is utterly known that physical activity enhances blood flow to the genitalia, and promotes sexual desire. Similarly, it has a favorable effect on production testosterone, a hormone that increases sexual desire and behavior (31). Thus, promoting physical activity would strengthen sexual performance of individuals apart from preventing other chronic illnesses that has an adverse impact on sexual desire.

Consistent with a literature conducted before, this study indicates that nutritional status don't show any association with SD (33). A longer duration of diagnose with diabetes were also a significant factor for SD in which patients who have been diagnosed with diabetes for greater than five years were 10.5 times more at risk of developing SD than having shorter diagnosis time. This finding is analogous with another studies conducted before (25, 34). Microvascular and macrovascular diabetic complications become higher while the duration of living with the illness increases (25). Although the drugs used for management of diabetes don't have a direct relationship with SD taking those drugs for longer period would increase the chance of heart failure and weight gain that have a deleterious impact on sexual function (18).

Individuals with diabetic complications like retinopathy, nephropathy and, neuropathy are three times to develop SD this is supported by a former study (25). Individuals with neuropathy obviously poor penile innervation and interferes the normal dilation of penile blood vessels that deters to relaxation of penile muscles for erection and experiencing sexual pleasure(25, 26).

Having other comorbid illnesses like HTN, cardiovascular disease, hyperlipidemia and others rise the likelihood of SD by 5.07 times. This finding was supported by another study that shows having another concomitant medical condition increase the risk of developing SD (24, 35, 36). This is because (i) different comorbid illnesses solely could alter the sexual function of individuals, for instance renal disease results in significant endocrine disturbances including hypogonadism due to reduced renal clearance, (ii) the drugs used to manage those comorbid illnesses have a proven side effect on sexual



function for instance antihypertensive drugs reduce blood flow to men reproductive organ that will reduce ability of penile erection and (iii) the psychological impact of having chronic illness would reduce the sexual desire(8, 35, 37) This finding suggested that comorbidity interferes the reproductive health of individuals on the top of challenging them to stabilize their blood glucose level and putting them at higher risk of death. Therefore, it should be noted that preventing extra illnesses and managing it at the earlier stage would help maintain the reproductive health.

Similarly patients with poor metabolic control are at a greater risk of developing SD than those with good metabolic control. Another study also witness the association in that the odds of developing each domain of sexual dysfunction was higher among respondent with fair and poor metabolic control than those with good metabolic control (25, 29). Poor metabolic control is associated with increased risk of long-term macro and micro-vascular complications that might have greater impact for the occurrence of SD (1, 29).

Furthermore, this study revealed that participants who were satisfied with once relationship were 85% less likely to develop SD than those who are with unsatisfied relationship, which is similar with a previous finding (38). Since sexual function is cumulative effect of vascular, neurologic, hormonal and psychologic systems and marital un satisfaction have an impact on psychological well-being of an individual which might reduce sexual desire(38). The linkage of SD and relationship satisfaction is interplayed. To put simply, SD weakens the bond between couples as a result of poor sexual satisfaction and unhealthy relationship result in poos sexual desire. It would be possible to inferred that having good relationship is crucial not only to maintain the mental, emotional and physical health dimensions, but also vital to improve the reproductive health of individuals. Thus, individuals, in particular diabetic people are advised to establish a healthy relationship. Healthcare professionals shall to promote strategies to maintain healthy relationships to their clients. Furthermore, given the devastating reproductive, mental, psychological, and emotional health impact of SD(39, 40), the Amhara regional health office and the federal government should work jointly on tackling the contributing factors.

The study was conducted in health institutions which help to acquire reliable clinical data. Although all possible strategies have been applied to reduce bias (like recruiting male interviewee and underway the interview in the most private room), the study might still have introduced social desirability bias because of the nature of the study and data collection technique (face-to-face interviewer administered questionnaire).

## Conclusions

This study remarks that more than two-thirds of diabetic patients have experienced SD; orgasmic dysfunction and arousal disorder together accounted for the substantial problem observed in the study participants. Older age, long duration of the illness, poor metabolic control, physical inactivity, having other diabetic complications, contracting comorbid illness and being unsatisfied with once relationship are factors which raise the chance of experiencing SD. Special emphasis should be given for older

patients and those who have been diagnosed with diabetes for longer time. Moreover, participants should be promoted to engage in regular physical activity and other healthy practice to maintain good glycemic control so as to prevent different diabetic complications. Marriage counseling is another strategy to mitigate SD. The magnitude of the finding is an alarming issue, demands strengthening of the chronic care through promoting personal and behavioral change communications.

## Abbreviations

<b>AOR</b>	<b>Adjusted Odd Ratio</b>
BMI	Body Mass Index
BPH	Benign Prostatic Hyperplasia
COR	Crude Odd Ratio
CSFQ	Change in Sexual Function Questionnaire
CSI	Couple Satisfaction Index
DM	Diabetes Mellitus
DSEMS	Daily Stressful Event Measurement Scale
ED	Erectile Dysfunction
FBS	Fasting Blood Sugar
HTN	Hypertension
IIEF	International Index of Erectile Function
OPD	Outpatient Department
PE	Premature Ejaculation
RE	Retrograde Ejaculation
SD	Sexual Dysfunction
WHO	World Health Organization

## Declarations

Ethics approval and consent to participate: Ethical clearance was obtained from the ethical review board of University of Gondar, College of Medicine and Health Sciences, and each respective hospital was approached with support letter. Oral informed consent was taken from all study participants and they were informed that participation was on voluntary bases and have full right to withdraw at time of need during the interview process. Moreover, all information taken from them kept confidential and the entire data collected was used for the purpose of the current study only. Consent for publication: Not applicable.

Availability of data and materials: All data generated during this study are included in this manuscript. The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. Competing interest: We declare we have no any competing interests. Funding organization: The authors have declared they received fund from the University of Gondar. However, the organization has no role data collection, analyses, and other work of the study. Authors' contributions: EGM: Principal investigator corresponding author: conceived and designed the study, prepare the proposal, supervise the field work, analyzed and interpreted the data, prepared the draft manuscript and approved the final manuscript for publication. HYY: Design the study, wrote the proposal, analyzed and interpreted data, modified and approved the final manuscript. ABG: Design the study, wrote the proposal, analyzed and interpreted data, modified and approved the final manuscript. All authors read and approved the final manuscript. Acknowledgements: We would be really delighted to express our appreciation for the participants that have devoted their time to provide us basic information for our research. Lastly, we would like to extend our special gratitude for University of Gondar College of Medicine and Health Sciences, for funding the study. Author information: Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

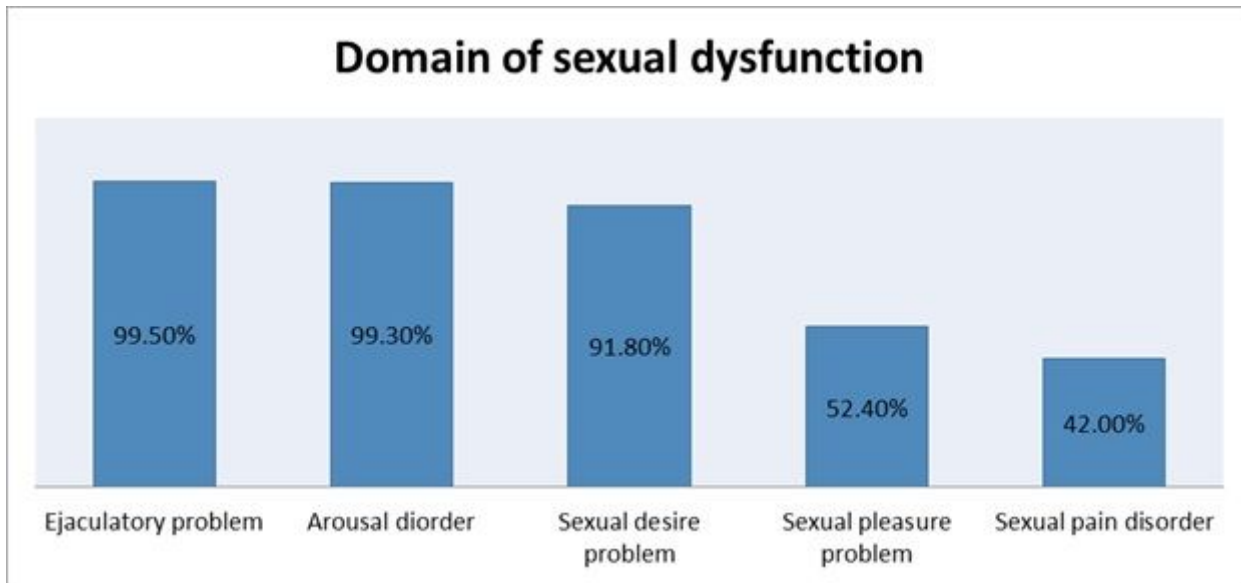
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## Figures



**Figure 1**

Domains of sexual dysfunction among men with diabetes at hospitals in Northwest Amhara region, Ethiopia from February 20- April 30 2020