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The Prevalence of Erectile Dysfunction in Male Patients with Diabetes Mellitus (DM) in Rwanda: A Cross-Sectional Study

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ABSTRACT

BACKGROUND: Diabetic men may experience erectile dysfunction (ED). Although commonly acknowledged to be a significant burden on diabetic men worldwide, nothing is known about the prevalence of diabetic ED in Rwanda.
The aim of this study was to determine the prevalence of ED in diabetic men in Rwanda with the focus on one private clinic (Fraternity Clinic) and 3 different public hospitals; University Teaching Hospital of Kigali (CHUK), University Teaching Hospital of Butare (CHUB), and Masaka District Hospital (MDH).
METHODS: A cross-sectional study was conducted on 125 diabetic men attending different health facilities; KUTH, BUTH, MDH and Fraternity Clinic and meeting the inclusion criteria. Data were collected from November 2017 to January 2018. During this period, 125 diabetic men between 20 and 70 years old were screened for ED by using international index of erectile function (IIEF-15) standards. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20, and a Confidence Interval (CI) of 95% was used.
RESULTS: The median age of the study participants was 47.58 years (SD: 11.638). We found that 62.40% of patients had ED, in whom 21.60% had mild ED, 17.60% had mild to moderate ED, 15.20%had severe ED, 8%had moderate ED and 37.60% had no dysfunction.
CONCLUSION: The prevalence of ED in our study was found to increase with age. In our study, the determinants of ED were duration of diabetes mellitus, health insurance, site or health facility, level of education, and alcohol use.

Keywords (MeSH): Erectile Dysfunction, Diabetes Mellitus, Cross-Sectional Study, Impotence, Sexual Dysfunction

INTRODUCTION

DM is potentially identified as an important cause of disruption of normal sexual function in both men and women [1,2]. Erectile dysfunction is the inability to develop or maintain an erection of the penis during sexual activity [3], and it is the third most common complication of diabetes mellitus for men [1]. Poor glycemic control induces macrovascular changes, microvascular changes, neuropathy, and endothelial dysfunctions resulting in ED for diabetic men [4]. The prevalence of ED due to diabetes mellitus worldwide occurs at 30% to 90% for diabetic men and also affects teens [2,5].

ED prevalence due to DM has been reported as 52% in the USA, 34% in Australia, 26% in Japan, 19.2% in Germany, 63% in Egypt and 54% in Morocco [5-8s] and is significantly higher compared to those without diabetes mellitus [9]. Although ED is commonly acknowledged to be a common problem in diabetic men worldwide, nothing

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is known about the prevalence of diabetic ED for men in Rwanda.

There is no data to suggest that ED can be prevented by strict glycemic control [10], however patients with HbA1C above 7% have a seven times higher risk of ED compared to DM patients with good glycemic control [11]. Increased physical activity has been identified as protective against developing ED, but obesity is an independent predictor of ED [12,13] and obese men have a 1.5 to 3-fold increased risk of ED [14]. The previous studies reveal that physical activity in diabetic male patients will not only improve the quality of life but it may also help them to reduce morbidity, mortality and complications resulting from diabetes mellitus including ED [9].

Patients are often embarrassed whe talking about their sexual history to the medical officer. This cross-sectional study was conducted to assess the prevalence of ED by focusing on diabetic men in Rwanda. This study was the first in Rwanda, and it provides the preliminary data for future consideration for diabetic men in Rwanda.

METHODS

Data were collected over a period of 3 months; from November 2017 to January 2018 during which 125 patients meeting inclusion criteria (See Figure 1) were screened and included in the final analysis. The study was a multicenter, cross-sectional study conducted at the three public hospitals; University Teaching Hospital Kigali (CHUK), University Teaching Hospital of Butare (CHUB), and Masaka District Hospital (MDH) and one private clinic known as Fraternity Clinic. Male inpatients and outpatients between 20 and 70 years old, with a new or previous diagnosed type I or type II DM were only included in this study, and each of the patients voluntarily agreed to sign the consent form. All patients included in this study presented the most common clinical signs of DM such as high fasting blood sugar level, polyuria, unexplained weight loss, or polydipsia. Patients severely sick (in DKA: diabetic ketoacidosis, HHS: hyperosmolar hyperglycemia state or unstable) were not identified as patients to be considered in this study. For every day of consultation for non-communicable diseases, patients who agreed were seen in a private room and screened for inclusion and exclusion criteria and informed fully about the purpose of this study. We took note of demographic data (age, marital status, etc.), and social history (smoking, alcohol intake). Other information regarding medical and surgical history (hypertension and medications, heart disease and previous surgery especially pelvic surgery) were asked and documented.

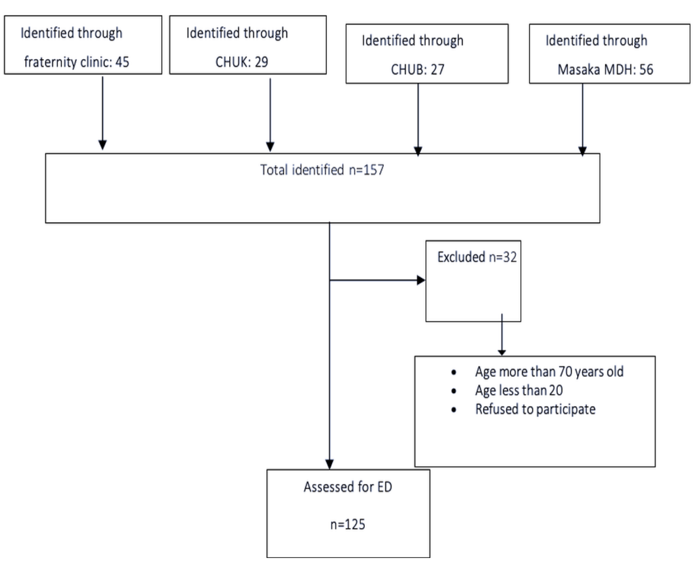

Figure 1: Diagram showing the participants selection criteria

A pretested questionnaire was used to obtain information and data were stored in a secure cupboard. Patient data were collected using detailed medical, sexual history, self-reported glycosylated hemoglobin. Medical officers were trained as research assistants before the commencement of the study. The questionnaires were pretested for the suitability of questions and necessary adjustments made. Questionnaires were checked every day for completeness by the principle investigator. The participants' sexual history was assessed using the international index of erectile function (IIEF-15) questionnaire. The IIEF-15 was translated into Kinyarwanda by a professional translator. The questionnaire was administered by the principal investigator with the help of the research assistant (nurses in change of NCD: non-communicable diseases). Data as were analyzed by using the Statistical Package for Social Sciences (SPSS) version 20. In calculation of the sample size, we used a small percentage of patients with ED and we increased the P value for reducing the cost and P value < 0.07 was considered a significant risk factor and confidence Interval (CI) of 95% was used.

RESULTS

In this study, 125 patients meeting the inclusion criteria were screened and included in the final analysis. The median age was 47.58 years with a relatively normal distribution between 20 to 70 years and a slight skew towards older age (Figure 2).

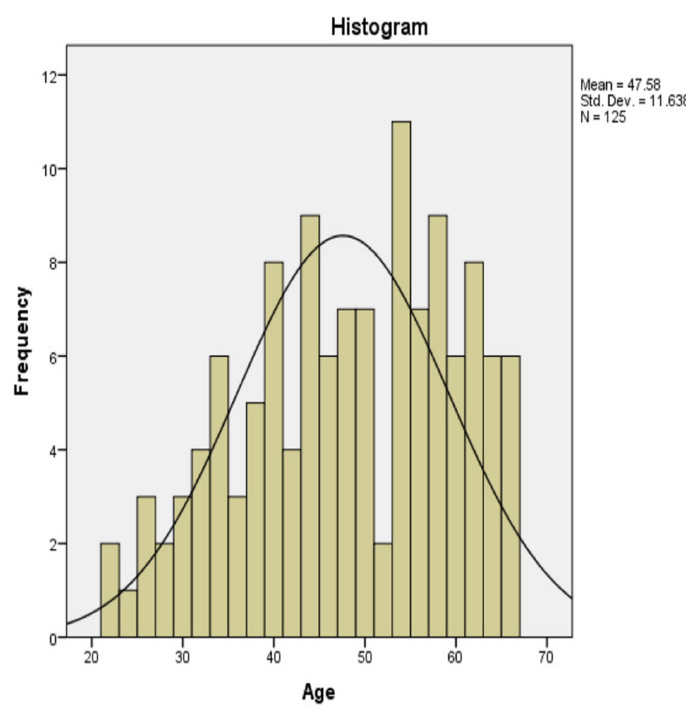

Figure 2: Distribution of age of studied sample

In Fraternity clinic, 45 patients were identified and 1 patient was older than 70 years old and another one was less than 20 years old while 8 patients refused to participate, and 10 patients from Fraternity clinic were consequently excluded in this study. In CHUK, 29 patients were identified in which, 5 patients were older than 70 years old and 5 patients refused to participate, and consequently 10 patients from CHUK were excluded in this study. In CHUB 27 patients were identified and 8 of them were excluded (refuse to participate). In Masaka DH 56 were identified 1 patient refused to participate while another one was older than 70 years old and 2 patients from Masaka DH were consequently excluded in this study. Another concern we considered only male patient, and this can explain the small number of participants.

Overall, 62.4% of patients reported some degree of erectile dysfunction, with 15.2% reporting severe dysfunction, 8% moderate dysfunction, 17.60% mild to moderate, 21.60% mild dysfunction and 37.60% had no dysfunction (Table 1). Despite nearly 2/3 of patients reporting erectile dysfunction, only 10% reported decreased satisfaction with overall sexual activity and, specifically, 33% reported orgasmic dysfunction (See Tables 1-2).

Table 1: Prevalence of erectile dysfunction

Prevalence of ED	N	%
Any	78	62.4
Severe	19	15.2
Moderate	10	8
Mild to moderate	22	17.6
Mild	27	21.6
No dysfunction	47	37.6

Severe, moderate definitions were based on the international index of erectile function

Table 2: Others domains of IIEF (International index of erectile function)

Characteristic	N	%
Orgasmic function		
Less	42	34
Normal	83	66
Intercourse satisfaction		
Moderate Impairment	30	24
Mild Impairment	55	44
Normal	40	32
Sexual desire		
Less	54	43
Normal	71	57
Overall satisfaction		
Less	13	10.4
Normal	112	89.6

Patients were mainly urban dwellers (80% vs 20%) and nearly 90% were married. 48.8% of patients had a primary school level of education and 68.8% had community-based health insurance (See Table 3). Only 28.8% were diagnosed with DM more than 10 years ago and 3.2% were smokers, 1.6% were heavy alcohol users, 40.8% were hypertensive, 3 .2% had history of a stroke, 24% had peripheral neuropathy, 57.6% had self-reported HbA1C, 36.8% were taking hypertensive drug and 7.2% had history of pelvic surgery (See Table 4).

There was no association with self-reported glycosylated hemoglobin with smoking, hypertension medication, pelvic surgery and arterial hypertension or age. There was less ED in patients using premium health insurance, patients from fraternity clinic (private) and patients with post-secondary school as level of education (Appendix 2). There was less ED in patients diagnosed with diabetes mellitus 10 years ago.

No correlation is found between ED and antihypertensive medication in our study and most of patients with ED were not on any

Table 3: Demographics data

Variables	N	%
Residency		
Countryside	25	20
Urban	100	80
Health facilities		
Fraternity clinic	35	28
CHUK	19	15.2
CHUB	19	15.2
Masaka district hospital	52	41.6
Marital status		
Married	111	88.8
Single	8	6.4
Divorced	1	0.8
Cohabiting	4	3.2
Widowed	1	0.8
Level of education		
Informal	8	6.4
Primary	61	48.8
Secondary	36	28.8
Post-secondary	20	16
Employment		
Peasant	18	14.4
Government	5	4
Private sector	31	24.8
Self-employee	53	42.4
Others	18	14.4
Health insurance		
Community based insurance	86	68.8
Premium	16	12.8
None	23	18.4

Table 4: Clinical data

Variables	N	%
Duration of diabetes		
<10years	89	71.2
>10years	36	28.8
Tobacco use: Yes	4	3.2
Alcohol use		
Never	55	44
Monthly or less	16	12.8
2 to 4times a month	40	32
2 to 3times a week	12	9.6
4 or more times a week	2	1.6
History of artery hypertension: Yes	51	40.8
History of stroke: Yes	4	3.2
Peripheral neuropathy: Yes	30	24
Glycosylated hemoglobin level		
<7%	32	25.6
>7%	72	57.6
Unknown	21	16.8
Medication of hypertension: Yes	46	36.8
History of pelvic surgery: Yes	9	7.2

hypertensive medications, and we found that severe ED was common in patients with self-reported HbA1C of more than 7% (Appendix 1).

DISCUSSION

The median age of all participants is 47.58 years and it is in accordance with that found in other similar studies [8,9,15,16-18]. The ED correlated with increasing age with 74.2% of ED are between 51 and 60 years old (Table 5), which is consistent with other similar studies [8, 19,20]. The prevalence of ED in our study (62.4%) (Table 1) was lower than that found in Saudi Arabia (84%) but notably higher than that reported in Nigeria (42%) [16,21]. First, the median age of participants in Saudi Arabia was 80 versus our population where patients were, on average, much younger and patients older than 70 years were excluded. The difference of prevalence can also be explained by difference in population characteristics and sample size. A study done in Tanzania [15] found the same association of ED with increasing age. This can be related to testosterone deficiency, atherosclerosis, psychogenic problem, decline in several organ functions or medication that induced ED [15,19].

We found that severe ED was common in patients with self-reported HbA1C more than 7% (Table 6) as shown in other studies [20,21] but the association was not significant for ED and self-reported HbA1C. Longstanding DM di was associated with ED as mentioned in several studies [15,19-21]. With HbA1C more than 7% and longer duration of diabetes mellitus, patients tend to have more microvascular, macrovascular, and neurologic complication of DM which contribute to ED pathophysiology. Most of the patients with ED were married and it was found that there was no significant association between marital status and ED (Table 5) as found in similar previous studies [8,16,22].

In contrast to another study [6,] we found that ED is common amongst urban patients (Table 5) and it is evident that the ED can be underdiagnosed in rural areas (Table 5). This study found that 44% of patients had mild intercourse satisfaction which is similar to other findings [6]. However, the study reports that 57% (Table 2) of patients had normal sexual desire which is different from Braun and co-workers' study where sexual desire was more affected by ED [6]. It seems that other components of IIEF-15 were not affected by DM. This can be related to embarrassment of the patients when talking about sexual history.

The level of education was statistically associated with ED (Table 5). We found less ED in patients with a post-secondary primary school level of education as previously reported in the literature [8]. It is possible that patients with post-secondary level of education tend consult earlier, understand more the complications of DM and are more compliant on treatment. The prevalence of ED is higher among patients with lower income level. This finding is similar to that reported by Abdullah [20]. Without money, it is difficult to have a regular follow up and to pay medications and a glucometer. No correlation is found between ED and antihypertensive medication in our study and most of patients with ED were not on any hypertensive medications (See Table 6). This is consistent with the findings of Berrada and co-workers [8]. We found less ED in patients with premium as health insurance, and from Fraternity clinic (private clinic) (Tables 5). The difference was statistically significant for ED and health insurance, site or hospital. The reason is that most of the patients are financially stable and had high levels of education.

This study found that more patients with ED had no history of smoking (Table 6), which is different from findings of Kovac and co-workers [23]. It showed a high risk of ED in smokers and ex-smokers and this difference is due to the characteristics of the population under this study. The ED in a smoking patient is thought to be related to acceleration of atherosclerosis [23-25]. The difference is statistically significant between ED and alcohol consumption (patient taking beer 2-4 times per month) and stroke. This corresponds with the findings reported in literature for similar study [15].

CONCLUSION

This study was limited by Rwandans cultural barriers. The cultural barrier was due to reluctance of patients to talk about their sexual history. The prevalence of ED in our study is very high. ED is found to increase with age. In our study, the determinants of ED were duration of DM, health insurance, site or health facility, level of education, and alcohol use. The Rwanda Ministry of Health is recommended to do more education regarding DM and its related complications including ED. More effort needs to be put into screening and treatment as part of follow-up for diabetic patients, using the first 5 questions of international index of erectile function-5 (IIEF-5) and management of ED as well as diagnosing DM among all patients with ED are highly recommended.

Up to now, there is no standard treatment of ED in Rwanda except the treatment of the cause and risk factors. it is possible that ED in old people becomes irreversible case but young people can be recovered depending on the cause but no data that are available. ED can be stabilized using adjuvant treatment based on age, marital status and individual social life. Some drugs are available but no local study to assess the benefit. The local collaboration between the physician, urologists and gynecologists for future study is recommended for solving ED problem.

Data Availability

The demographic, clinical and statistical data used to support the findings of this study are included within the article.

Conflicts of interest:

The authors have no conflict of interest to declare.

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Appendix 1: Univariate analysis between clinical data and ED

Characteristics	Erectile dysfunction 78(62.4)	No Erectile dys-function 47 (37.6)	OR (95% CI)	P-value
HbA1C level				
<7%	18(56.2)	14(43.7)	Ref	
>7%	46(63.8)	26(36.1)	1.38(0.54-3.50)	0.46
Unknown	14(66.6)	7(33.3)	1.56(0.43-5.73)	0.45
Duration of DM				
<=10years	50(56.1)	39(43.8)	Ref	
>10years	28(77.7)	8(22.2)	2.73(1.04-7.35)	0.03
Tobacco use				
Yes	3(75)	1(25)	1.84(0.16-47.34)	
No	75(61.9)	46(38)	Ref	
Alcohol use				
Never	42(76.3)	13(23.6)	Ref	
Monthly or less	9(56.2)	7(43.7)	0.40(0.11-1.48)	0.12
2 to 4 times a month	18(45)	22(55)	0.25(0.009-067)	0.002
2 to 3 times a week	7(58.3)	5(41.6)	0.43(0.10-1.92)	0.21
4 or more times a week	2(100)	0(0.00)	1.59 (indefinite)	0.43
History of HTN				
No	43(58.1)	31(41.8)	Ref	
Yes	35(68.6)	16(31.3)	1.58(0.70-3.58)	0.23
History of stroke				
No	76(62.8)	45(37.1)	Ref	
Yes	2(50)	2(50)	0.59(0.06-6.14)	0.61
Peripheral neuropathy				
No	58(61)	37(38.9)	Ref	
Yes	20(66.6)	10(33.3)	1.28(0.50-3.31)	0.58
Medication of hypertension				
No	47(59.4)	32(40.5)	Ref	
Yes	31(67.3)	15(32.6)	1.41(0.61-3.24)	0.38
History of pelvic surgery				
No	73(62.9)	43(37)	Ref	
Yes	5(55.5)	4(44.4)	0.74(0.16-3.49)	0.66

Appendix 2: Univariate analysis between demgraphic data and ED

Characteristics	Erectile Dysfunction	No Erectile dysfunction	OR (95% CI)	P-value
	78(62.4)	47 (37.6)		
Age [years]				
20-30	5 (45.4)	6 (54.5)	Ref	
31-40	14 (53.8)	12 (46.1)	1.40 (0.28-7.24)	0.64
41-50	19 (57.5)	14 (42.4)	1.62 (0.34-7.94)	0.49
51-60	26 (74.2)	9 (25.7)	3.47 (0.70-17.97)	0.08
61-70	14 (70)	6 (30)	2.80 (0.48-17.26)	0.19
Residency				
Countryside	15 (60)	10 (40)	Ref	
Urban	63 (63)	37 (37)	1.14 (0.42-3.03)	0.78
Site				
Fraternity clinic	11 (31.4)	24 (68.5)	Ref	
CHUK	15 (78.9)	4 (21)	8.18 (1.90-38.31)	0.001
CHUB	10 (52.6)	9 (47.3)	2.42 (0.67-9.01)	0.13
Masaka DH	42 (80.7)	10 (19.2)	9.16 (3.07-28.31)	0.001
Marital status				
Married	68 (61.2)	43 (38.7)	0.95 (0.17-4.89)	0.96
Single	5 (62.5)	3 (37.5)	Ref	
Divorced	1 (100)	0 (0.00)	1.91 (indefinite)	0.45
Cohabiting	3 (75)	1 (25)	1.80 (0.07-71.23)	0.67
Widowed	1 (100)	0 (0.00)	1.91 (indefinite)	0.45
Level of education				
Informal 6(75)		2 (25)	1.26 (0.20-10.1)	0.79
Primary	43(70.4)	18 (29.5)	Ref	
Secondary	22(61.1)	14 (38.8)	0.66 (0.25-1.71)	0.34
Postsecondary	7(35)	13 (65)	0.23 (0.07-0.74)	0.006
Employment				
Farmer	13(72.2)	5(27.7)	Ref	
Government	3(60)	2(40)	0.58(0.05-7.03)	0.6
Private sector	14(45.1)	17(54.8)	0.32(0.07-1.29)	0.07
Self-employee	34(64.1)	19(35.8)	0.69(0.18-2.53)	0.53
Others	14(77.7	4(22.2)	1.35(0.24-7.88)	0.7
Health insurance				
Community based insurance	63(73.2)	23(26.7)	Ref	
Premium	5(31.2)	11(68.7)	0.17(0.004-0.59	0.002
None	10(43.4)	13(56.5)	0.28(0.10-0.8)	0.009