Sexual dysfunction among Jordanian men with diabetes

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ABSTRACT

Objective: To estimate the prevalence and severity of erectile dysfunction (ED) and its correlations among Jordanian men with diabetes.

Methods: We conducted this study at the National Center for Diabetes, Endocrinology and Genetics, Amman, Jordan, between January and August 2004. The study included 988 married diabetic men. Patients were interviewed by one of our medical staff based on a health care questionnaire and an Arabic translation of the 15-item International Index of Erectile Function. Scores of the questions in each of the 5 sexual function domains were summed up. Dysfunction was categorized as absent, mild, moderate or severe.

Results: The overall prevalence of ED was 62%; and we found that 30.3% had severe ED. The prevalence increased with age from 26.5% (13 out of 49) of patients <40 years of age to 91% (87 out of 96) in the age group ≥70 years. Severity of ED increased with age as well. Multivariate logistic regression analysis identified age, glycemic control, hypertension, coronary artery disease, retinopathy and neuropathy as independent risk factors of ED. Among patients with ED, 7% reported having treatment for ED.

Conclusion: Prevalence of ED among Jordanian diabetic patients is high. It increases with age and poor glycemic control. Other independent risk factors include: hypertension, coronary artery disease, retinopathy and neuropathy.

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Erectile dysfunction (ED) is a common problem. both in the developed world[1,2] and in developing countries.[3,4] It has been reported in its moderate to severe form by 3-64% of men in various age groups.[5,6] The prevalence of ED greatly increases with age.[2,4,6,7] A variety of chronic illnesses are associated with higher rates of ED including diabetes, cardiovascular disease and depression.[8] Diabetes appears to be a major determinant of ED.[9] Diabetic men are 3 times as likely to develop ED as non-diabetic men.[1] Increased duration of diabetes increases both the rate and severity of ED.[10] It can occur early in the course of the disease and it can occasionally be the presenting symptom.[11] Studies regarding the prevalence of ED in Arab countries are few.[12-14] The prevalence of diabetes mellitus (DM) in Jordan is rising, as it has been estimated that 13.4 % of the Jordanian population have diabetes.[15] Awareness towards ED has increased since the introduction of the Phosphodiesterase 5 inhibitors as a first line therapy for ED. The aim of this study is to find the prevalence of ED and its correlates among Jordanian men with diabetes.

Methods. This study was conducted at the National Center for Diabetes, Endocrinology and Genetics, Amman, Jordan between January and August 2004.

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The diabetes service in the center is one of the largest in the country. The duration of the study was planned to last for one year or once a 1000 patients had been studied whichever comes first. The study was approved by the Institution Ethics Committee. The subjects were invited to attend face to face interviews. The interviews, which were held in privacy, were started by explaining the study. Patients were assured that the collected information will remain confidential and will not be included in their hospital medical records. The option to participate or to refrain from participation was given to the patients. Married diabetic male patients were eligible for inclusion into the study. Divorced, widowed or seriously ill patients were excluded. The participation rate was 99%; 10 patients refused to participate. The structured interviews were based on a health questionnaire, and the International Index of Erectile Function (IIEF).[16] The questionnaire included questions regarding the type and duration of diabetes, the coexistence of other medical conditions, and the presence of complications of diabetes. Coexisting medical conditions and diabetic complications were verified by reviewing the medical records. Control of diabetes was determined by the mean glycosylated hemoglobin level (HbA_{1c}) of the last 4 consecutive visits, which spanned one year. Patients were categorized according to their mean HbA_{1c} to 4 groups: <7%, 7-7.9%, 8-8.9% and ≥9%. Medication for diabetes and other conditions were recorded, and any treatment for ED was noted. A detailed smoking history was taken, and patients were categorized as smokers, ex-smokers and non-smokers. Subjects were weighed barefooted in light clothing, using a Detetco® scale with an accuracy of ±100 g. Standing height was measured without shoes to the nearest cm using a stadiometer with the shoulders in a relaxed position and the arms hanging freely. Body mass index (BMI) was calculated by dividing the weight in kg by the squared height in meters. Patients were categorized as of normal weight (BMI <25), overweight (BMI = 25-29.9) or obese (BMI ≥30).[17] An Arabic translation of IIEF was used to assess the sexual function. The questionnaire consists of 15 questions grouped into 5 domains that assess erectile function (questions 1-5 and 15), intercourse satisfaction (questions 6-8), orgasmic function (questions 9 and 10), sexual desire (questions 11 and 12), and overall satisfaction (questions 13 and 14). The responses to questions 1-10 were rated on a 6 point scale (0-5) and the responses to the last 5 questions were rated on a 5 point scale (1-5).[16] Prior to the beginning of the study, the Arabic translation of IIEF was judged by 30 persons for clarity and conformity with the local culture; and stated to be appropriate. The score for each domain of the sexual function was calculated and used to classify the severity of dysfunction as severe, moderate, and mild or no dysfunction; a higher score indicates better function.[18,19]

Data were analyzed using the software package SPSS for windows version 10 (SPSS Inc., Chicago, IL, USA). The χ^2 test was used to evaluate the association of the prevalence and the severity of ED in relation to different risk factors. The odds ratio for individual factors was obtained as a measure of the association with ED. Significant factors were then subjected to a multivariate logistic regression analysis to assess the independent effect of each factor after controlling for potential confounders. P value of <0.05 was considered statistically significant.

Results. There were 988 patients responded to the IIEF questionnaire. The mean age of the participants was 57 years (range 25-89 years). Forty-four patients reported using sildenafil or a vacuum device when attempting intercourse. The severity of ED and sexual dysfunction in other domains in the remaining 944 patients not receiving any treatment for ED is shown in **Table 1.** The overall prevalence of ED was 62%. Forty-nine percent of those with ED were found to have severe degree, 12% had moderate degree while 32% had mild ED. Only 7% of them were receiving treatment for ED. The scores of various domains of sexual activity were highly correlated. The highest correlation was between erectile function and intercourse satisfaction [r=0.91 (p<0.001)]. The least correlation was between sexual desire and orgasmic function [r=0.26 (p<0.001)].

The prevalence and severity of ED increased with age. **Table 2** shows the prevalence and severity of ED according to age, duration of diabetes and glycemic control. It shows that 43.8% of patients with duration of diabetes of <5 years had ED, whereas 79% of patients with duration of >10 years had ED (p<0.001). The prevalence and severity of ED increased with poor glycemic control (**Table 2**).

Table 3 shows the association between ED and risk factors when examined one factor at a time. In addition to age, duration of diabetes and glycemic control, a significant association was observed between ED and coronary artery disease (CAD), hypertension, dyslipidemia, retinopathy and peripheral neuropathy. No association was found between ED and BMI or current smoking; however, a higher proportion of the ex-smokers had ED when compared with the nonsmokers. The simultaneous effect of the risk factors that showed significant association with ED was examined.

Table 4 shows the odds ratio for the factors that remained significant using multivariate logistic regression analysis. The duration of DM and

Table 1 - Severity and prevalence of dysfunction in various domains of sexual activity in diabetics as assessed by International Index of Erectile Function (n=988 patients).

Dysfunction	Sexual dysfunction category*			
	No dysfunction Score (%)	Mild Score (%)	Moderate Score (%)	Severe Score (%)
Erectile function	26-30 (38)	17-25 (19.7)	11-16 (7.6)	1-10 (30.3)
Intercourse satisfaction	11-15 (29.4)	8-10 (26.8)	4-7 (14.3)	0-3 (25.1)
Orgasmic function	9-10 (59.5)	7-8 (8.9)	5-6 (6.3)	0-2 (20.8)
Sexual desire	9-10 (12.2)	7-8 (34.2)	5-6 (32.8)	2-4 (16.3)
Overall satisfaction	9-10 (33.3)	7-8 (24.6)	5-6 (17.8)	2-4 (19.8)

*44 patients (4.5%) treated

Table 2 - Prevalence and severity of erectile dysfunction (ED) according to age, duration of diabetes and glycemic control.

Parameters	N	Severe (%)	Moderate (%)	Mild (%)	Treated (%)	No. ED (%)	*p value
Age							0.00
<40	49	(8.2)	(10.2)	(6.1)	(2)	(73.5)	
40 - 49	183	(12.6)	(6)	(15.8)	(1.6)	(63.9)	
50 - 59	310	(21.9)	(8.4)	(24.5)	(6.8)	(38.4)	
60 - 69	350	(39.1)	(7.4)	(21.1)	(5.4)	(26.9)	
70	96	(69.8)	(7.3)	(13.5)	(0.0)	(9.4)	
***Duration** of diabetes*							0.00
<5	301	(17.9)	(5)	(16.6)	(4.3)	(56.2)	
5 - 10	283	(25.1)	(8.1)	(20.8)	(3.2)	(42.8)	
>10	404	(43.1)	(9.2)	(21.3)	(5.4)	(21)	
Glycemic control (HbA_{1c})							0.00
<7%	247	(20.6)	(6.1)	(20.6)	(2)	(50.6)	
7 - 7.9%	289	(29.8)	(7.6)	(16.3)	(5.2)	(41.2)	
8 - 8.9%	206	(34)	(6.8)	(24.8)	(5.8)	(28.6)	
>9%	246	(37.4)	(9.8)	(18.7)	(4.9)	(29.3)	
All patients	988	(30.3)	(7.6)	(19.7)	(4.5)	(38)	

*p value is statistically significant when <0.05

dyslipidemia lost their significance after controlling for age.

Discussion. A wide range of prevalence rates of ED among diabetic men has been reported in various studies. The prevalence rate of 62% found in this study is consistent with the reported prevalence rates of 61-67% in some of the studies conducted in Western[6,10,20,21] and Arab countries.[13] However, it is higher than the rate reported by previous studies.[22-24] The differences in the prevalence rates can be explained by differences in the populations studied, the methods used and the research instruments. Additionally, the introduction of effective oral treatment has increased the awareness toward ED, which might explain the higher rates reported in the recent studies as compared with other studies.[7] Collecting data by self-administered questionnaires or interviews can lead to different results.[8] Underreporting and a lower response rate are expected if a self-administered questionnaire is used, especially when dealing with a sensitive issue such as ED. Furthermore, in the Arabic culture, erection is associated with the concept of manhood, therefore, some patients with ED denied the disease. The prevalence and severity of ED increase significantly and progressively with age, as reflected by the higher prevalence of overall ED and severe ED as age advances. This association between age and ED confirms what has been shown in other studies.[6] However, ED should not be considered as an inevitable outcome of older age. Among our patients, 48% in the age groups 60-69 years, and 22.9% in the

Table 3 - Results of univariate analysis of factors associated with erectile dysfunction (ED).

Factors	With ED (%)	Odds ratio	*p value
Age			
<40	(26.5)	1	
40 - 49	(36.1)	1.6	0.213
50 - 59	(61.6)	4.5	0.001
60 - 69	(73.1)	7.5	0.001
>70	(90.6)	26.8	0.001
HbA_{1C}			
<7%	(49.2)	1	
7 - 7.9%	(58.7)	1.5	0.028
8 - 8.9%	(71.4)	2.6	0.00
>9%	(70.7)	2.5	0.00
Hypertension	(70.2)	2.4	0.00
Retinopathy	(84.4)	4.9	0.00
Neuropathy	(83.7)	4.9	0.00
Coronary artery disease	(80.2)	3.3	0.00
Dyslipidemia	(65.2)	1.4	0.00
Smoking			
Non-smokers	(59.9)	1	
Current	(56.3)	0.9	0.35
Ex-smokers	(69)	1.5	0.02
Body mass index			
<25	(59.8)	1	
25 - 30	(61.7)	1.1	0.64
>30	(63.4)	0.9	0.65
Duration of diabetes			
<5	(43.9)	1	
5 - 10	(57.4)	1.8	0.001
>10	(79)	4.8	0.00

*p value is statistically significant when <0.05

Table 4 - Results of multivariate analysis of factors associated with erectile dysfunction.

Factors	Odds ratio	*p value
Age		
<40	1	
40 - 49	1.7	0.231
50 - 59	3.6	0.003
60 - 69	6.1	0.00
>70	25.3	0.00
HbA_{1C}		
<7%	1	
7 - 7.9%	1.2	0.458
8 - 8.9%	2.5	0.00
>9%	2.1	0.002
Hypertension	1.6	0.011
Retinopathy	2.8	0.00
Neuropathy	2.9	0.00
Coronary artery disease	1.7	0.015

*p value is statistically significant when <0.05

≥70 years had only mild or no ED. The score of ED domain was ≤10 in 30% of our patients; however, the low score is not always indicative of severe ED. It may result from the lack of interest in sex or having no opportunity for sexual activity rather than ED per se.[25] In our study, we only included men who were living with their spouses, yet 6%, mostly from the older age groups, responded to question 12 as having no or very low sexual desire.This study clearly shows the association between glycemic control, and the prevalence and severity of ED, which has been shown in other studies,[23,24,26] but was not evident in other studies.[10,20-22] One reason behind this apparent discrepancy is probably the use of different cutoff values of HbA_{1c}. In one study, the cutoff point was 6.5%,[26] whereas it was 10% in other study.[21] Using HbA_{1c} values from different laboratories could result in a different reflection of the actual level of diabetes control. In this study, we computed the average of 4 consecutive HbA_{1c} measurements, determined by the same laboratory, which reflects the control of diabetes over one year period. Patients were grouped into 4 groups and it was observed that the prevalence and severity steadily increase with poorer control, reaching a plateau at 8% HbA_{1c} level. This highlights the importance of having a well controlled DM for the prevention of ED. Compared with other studies,[10,20,21] the duration of DM was not an independent risk factor in this study. This might reflect a strong association between duration and other independent risk factors of ED, particularly age, which resulted in excluding it from the multivariate logistic model. The effect of duration of DM on ED was not evident in another study either.[22] The association between smoking and ED is another controversial issue. Whereas many epidemiological and experimental studies have shown a significant association,[7] this was not evident in other studies.[2,27] In diabetic patients, similar discrepancies regarding the association between smoking and ED exist in the literature, a number of studies did not confirm this association.[20,26,28] In this study, current smoking was not associated with a higher prevalence of ED. However, ex-smokers were observed to have a significantly higher prevalence of ED compared with nonsmokers in the univariate analysis, but the difference disappeared after controlling for age or CAD in the logistic regression analysis. Apparently, many ex-smokers quit smoking after they had suffered from its morbid sequel. Only 7% of our patients with ED reported using oral therapy or mechanical devices for ED.The percentage of patients seeking or receiving treatment is generally lower.[4,5,7,8] This could reflect reluctance on the part of the patient or failure of the doctor to raise the issue. Many patients believe

ED would not be recognized as a medical problem.[29] In addition, the relatively high cost of therapy and the fear from possible side effects appear to be the reasons in some of our patients.

Nicolosi et al[4] studied treatment-seeking behavior of patients with ED in 4 countries. Overall, only 5% of the patients with ED had been previously treated. A great variability among the patients of the 4 countries was noted (0% in Japan compared with 19% in Brazil). The effect of local culture on treatment seeking behavior has been suggested.[4] A recent large national survey in Australia reported the presence of this gap between the prevalence of ED, and the proportion of men who had actively sought treatment. It showed that the willingness to ask for treatment was significantly related to the ethnic origin.[30] Barriers to discussing sexual dysfunction exist among different cultures though to a variable extent.[4,31] Generally, patients would welcome discussing the problem, but they prefer that their doctors initiate the discussion.[21] However, the proportion of doctors who ask their diabetic patients regarding their sexual problems is low; the vast majority never or occasionally do so.[5] In our culture, discussing sexual problems may be viewed as an embarrassing discussion for the doctor or his patient but, not by the majority when carried out properly. It is the responsibility of the doctor, as a health care provider, to ensure that his diabetic patient has the chance to address this problem and receive treatment for it, if needed.

In conclusion, the prevalence of ED among Jordanian diabetic men is high. It increases with age and poor glycemic control. Other independent risk factors include: hypertension, CAD, retinopathy and neuropathy. Only a small percentage of patients receive treatment for their ED.

References

1. Feldman HA, Goldstein I, Hatzichristou DG, Krane RJ, McKinlay JB. Impotence and it's medical and psychosocial correlates: results of the Massachusetts Male Aging Study. ***J Urol*** 1994; 151: 54-61.
2. Braun M, Wassmer G, Klotz T, Reifenrath B, Mathers M, Engelmann U. Epidemiology of erectile dysfunction; results of the 'Cologne Male Survey'. ***Int J Impot Res*** 2000; 12: 305-311.
3. Morillo LE, Diaz J, Estevez E, Costa A, Mendez H, Davila H, et al. Prevalence of erectile dysfunction in Colombia, Ecuador, and Venezuela: a population-based study (DENSA). ***Int J Impot Res*** 2002; 14 Suppl 2: S10-18.
4. Nicolosi A, Moreira ED Jr, Shirai M, Bin Mohd Tambi MI, Glasser DB. Epidemiology of erectile dysfunction in 4 countries: cross-national study of the prevalence and correlates of erectile dysfunction. ***Urology*** 2003; 61: 201-206.
5. Kloner RA. Assessment of cardiovascular risk in patients with erectile dysfunction: focus on the diabetic patient. ***Endocrine*** 2004; 23: 125-129.
6. Marumo K, Nakashima J, Murai M. Age-related prevalence of erectile dysfunction in Japan: assessment by the International Index of Erectile Function. ***Int J Urol*** 2001; 8: 53-59.
7. Meuleman EJ. Prevalence of erectile dysfunction: need for treatment? ***Int J Impot Res*** 2002; 14 Suppl 1: S22-28.
8. Kubin M, Wagner G, Fugl-Meyer AR. Epidemiology of erectile dysfunction. ***Int J Impot Res*** 2003; 15: 63-71.
9. Shiri R, Koskimaki J, Hakama M, Hakkinen J, Tammela TL, Huhtala H, et al. Effect of chronic diseases on incidence of erectile dysfunction. ***Urology*** 2003; 62: 1097-1102.
10. Siu SC, Lo SK, Wong KW, Ip KM, Wong YS. Prevalence of and risk factors for erectile dysfunction in Hong Kong diabetic patients. ***Diabet Med*** 2001; 18: 732-738.
11. Deutsch S, Sherman L. Previously unrecognized diabetes mellitus in sexually impotent men. ***JAMA*** 1980; 244: 2430-2432.
12. Seyam RM, Albakry A, Ghobish A, Arif H, Dandash K, Rashwan H. Prevalence of erectile dysfunction and its correlates in Egypt: a community-based study. ***Int J Impot Res*** 2003; 15: 237-245.
13. El-Sakka AI, Tayeb KA. Erectile dysfunction risk factors in noninsulin dependent diabetic Saudi patients. ***J Urol*** 2003; 169: 1043-1047.
14. Berrada S, Kadri N, Mechakra-Tahiri S, Nejjari C. Prevalence of erectile dysfunction and its correlates: a population-based study in Morocco. ***Int J Impot Res*** 2003; 15 Suppl 1:S3-7.
15. Ajlouni K, Jaddou H, Batieha A. Diabetes and impaired glucose tolerance in Jordan: prevalence and associated risk factors. ***J Intern Med*** 1998; 244: 317-323.
16. Rosen RC, Riley A, Wagner G, Osterloh IH, Kirkpatrick J, Mishra A. The international index of erectile function (IIEF): a multidimensional scale for assessment of erectile dysfunction. ***Urology*** 1997; 49: 822-830.
17. Cummings S, Parham ES, Strain GW. American Dietetic Association Position of the American Dietetic Association: weight management. ***J Am Diet Assoc*** 2002; 102 : 1145-1155.
18. Cappelleri JC, Rosen RC, Smith MD, Mishra A, Osterloh IH. Diagnostic evaluation of the erectile function domain of the International Index of Erectile Function. ***Urology*** 1999; 54: 346-351.
19. Podnar S, Oblak C, Vodusek DB. Sexual function in men with cauda equina lesions: a clinical and electromyographic study. ***J Neurol Neurosurg Psychiatry*** 2002; 73 : 715-720.
20. Yamasaki H, Ogawa K, Sasaki H, Nakao T, Wakasaki H, Matsumoto E, et al. Prevalence and risk factors of erectile dysfunction in Japanese men with type 2 diabetes. ***Diabetes Res Clin Pract*** 2004; 66 Suppl 1: S173-177.
21. Giuliano FA, Leriche A, Jaudinot EO, de Gendre AS. Prevalence of erectile dysfunction among 7689 patients with diabetes or hypertension, or both. ***Urology*** 2004; 64: 1196-1201.
22. Moulik PK, Hardy KJ. Hypertension, anti-hypertensive drug therapy and erectile dysfunction in diabetes. ***Diabet Med*** 2003; 20: 290-293.

23. McCulloch DK, Campbell IW, Wu FC, Prescott RJ, Clarke BF. The prevalence of diabetic impotence. ***Diabetologia*** 1980; 18: 279-283.
24. Fedele D, Bortolotti A, Coscelli C, Santeusanio F, Chatenoud L, Colli E, et al. Erectile dysfunction in type 1 and type 2 diabetics in Italy. ***Int J Epidemiol*** 2000; 29: 524-531.
25. Cappelleri JC, Rosen RC. The Sexual Health Inventory for Men (SHIM): a 5-year review of research and clinical experience. ***Int J Impot Res*** 2005; 17: 307-319.
26. Miyata Y, Shindo K, Matsuya F, Noguchi M, Nishikido M, Koga S, et al. Erectile dysfunction in hemodialysis patients with diabetes mellitus: association with age and hemoglobin A1c levels. ***Int J Urol*** 2004; 11: 530-534.
27. Ponholzer A, Temml C, Mock K, Marszalek M, Obermayr R, Madersbacher S. Prevalence and risk factors for erectile dysfunction in 2869 men using a validated questionnaire. ***Eur Urol*** 2005; 47: 80-86.
28. Kalter-Leibovici O, Wainstein J, Ziv A, Harman-Bohem I, Murad H, Raz I. Clinical, socioeconomic, and lifestyle parameters associated with erectile dysfunction among diabetic men. ***Diabetes Care*** 2005; 28: 1739-1744.
29. Jackson G. Sexual dysfunction and diabetes. ***Int J Clin Pract*** 2004; 58: 358-362.
30. Holden CA, McLachlan RI, Pitts M, Cumming R, Wittert G, Agius PA, et al. Men in Australia Telephone Survey (MATeS): a national survey of the reproductive health and concerns of middle-aged and older Australian men. ***Lancet*** 2005; 366: 218-224.
31. Shabsigh R, Perelman MA, Laumann EO, Lockhart DC. Drivers and barriers to seeking treatment for erectile dysfunction: a comparison of six countries. ***BJU Int*** 2004; 94: 1055-1065.