Prevalence and Predictors of Sexual Dysfunction in Patients With Type 1 Diabetes

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OBJECTIVE — This study aimed to *1*) measure the prevalence of sexual dysfunction in patients with diabetes; *2*) describe how descriptive variables, psychological variables, diabetic complications, and sexual dysfunction relate in patients with diabetes; and *3*) describe the predictors of sexual dysfunction in patients with diabetes.

RESEARCH DESIGN AND METHODS — A total of 240 adult type 1 diabetic patients visiting the outpatient diabetes clinic of a university hospital completed questionnaires evaluating psychological adjustment to diabetes and sexual functioning. Medical records were used to obtain HbA_{1c} values as well as information on microvascular diabetic complications.

RESULTS — Sexual dysfunction was reported by 27% of women and 22% of men. No differences were found between sexes in type of reported sexual dysfunction. In men, but not in women, sexual dysfunction was related to age, BMI, duration of diabetes, and diabetic complications. No correlation with HbA_{1c} was found in either sex. In women, but not in men, sexual dysfunction was related to depression and the quality of the partner relationship. Binary logistic regression demonstrated that, in men, the significant predictors of sexual dysfunction were higher age and presence of complications, whereas, in women, sexual dysfunction was related to depression.

CONCLUSIONS — Both women and men with diabetes are at increased risk for sexual dysfunction. This study suggests that in men with diabetes, sexual dysfunction is related to somatic and psychological factors, whereas in women with diabetes, psychological factors are more predominant.

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Diabetes is known to cause multiple medical (1), psychological (2), and sexual (3) dysfunctions. Impaired sexual function in men is a well-documented complication of diabetes. Several studies have shown that men with diabetes are at increased risk for erectile dysfunction, that it occurs at an earlier age (4–8), and that it is related to longer duration of diabetes, poor metabolic control, and the presence and number of diabetic complications (9).

Although women run the same risk to develop diabetic complications, the sexual problems of women with diabetes have received much less attention in research and clinical practice (10). Although it has often been suggested that diabetes has no influence on female sexual functioning, in a review, we formulated the hypothesis that women with diabetes (compared with men) are also at increased risk for sexual dysfunction (3,11). Moreover, in a recent controlled study, comparing women with diabetes and control subjects, we demonstrated that significantly more women with diabetes (27%) than control subjects (15%) reported sexual dysfunction and that a significant difference was found only for decreased lubrication (12). Furthermore, no association was found between sexual dysfunction and age, BMI, diabetes duration, diabetic complications, HbA_{1c}, medication use, or menopausal status (12).

The debate about the etiology of sexual dysfunction of patients with diabetes is, however, still ongoing. Because patients with diabetes are at risk for vascular and neurological complications and psychological problems, they are at risk for both organogenic and psychogenic sexual dysfunction (3). Therefore, attempts to clarify the etiology of sexual dysfunction have proposed neurological, vascular, endocrine, and psychological factors; medication use; or a combination of both (5–7). Up to now, it has been hypothesized that the etiology of sexual dysfunction in men with diabetes is linked with somatic factors and that, in women with diabetes, sexual dysfunction is linked with psychological factors (3). To our knowledge, there are no studies that have taken into account all relevant variables to clear up this suggested sex difference in the etiology of sexual dysfunction in diabetes.

This article presents the continuation of our first report on diabetes and female sexuality (12) and reports on the comparison of the same sample of type 1 diabetic women and men to *1*) study the prevalence of sexual dysfunction in men and women with diabetes; *2*) describe how descriptive variables, psychological variables, diabetic complications, and sexual dysfunction relate in women and men with diabetes; and *3*) describe the specific predictors of sexual dysfunction in women and men with diabetes.

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Abbreviations: ADS, Appraisal of Diabetes Scale; ATT19, Diabetes Integration Scale; BDI, Beck Depression Inventory; DAS, Dyadic Adjustment Scale; FET, Fisher's exact test; mwU, Mann-Whitney *U* test.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

RESEARCH DESIGN AND METHODS

Setting and sample

During a 2-year period, 240 consecutive patients with type 1 diabetes visiting the outpatient diabetes clinic of the University Hospitals of the Catholic University of Leuven were personally invited to participate. Patients were eligible for inclusion if they *1*) were ≥18 years of age, *2*) had had type 1 diabetes treated with an intensified insulin therapy, *3*) did not have other health problems except complications secondary to diabetes, and *4*) had had a stable heterosexual relationship for at least 1 year.

Methods

The methodology used in this study has been previously described (12). Patients were asked to complete at home a battery of self-report questionnaires to assess psychological adjustment to diabetes, diabetes-related quality of life, marital satisfaction, depression, and relevant aspects of sexual function.

HbA_{1c} values were determined using the Cobas Integra assay (Roche, Basel, Switzerland) with a normal range of 4.0–6.0%. The medical records were used to obtain data on medication use, BMI, and early-onset microvascular complications (neuropathy, nephropathy, and retinopathy).

Instruments

The Appraisal of Diabetes Scale (ADS) was used to assess patients' cognitive appraisal of diabetes, i.e., their thoughts about having diabetes (13). The ADS consists of seven items, for example, "How effective are you in coping with your diabetes?" and "To what degree does your diabetes get in the way of your developing life goals?" Scores can range from 8 to 31, and higher scores mean a more positive appraisal of diabetes. Acceptable 1-week test-retest reliability ($r = 0.85$), internal consistency (Cronbach's $\alpha = 0.73$), and convergent validity are reported (13).

The Diabetes Integration Scale (ATT19) was used to assess patients' emotional adjustment to diabetes (14). This scale consists of 19 items, such as, "I dislike to be referred to as 'a diabetic'" and "I try not to let people know about my diabetes." Scores can range from 19 to 95, and higher scores indicate that patients are accepting of their diabetes, are comfortable with public awareness of their diabetes, have a sense of self-control, and feel well adjusted to their diabetes (14). Internal reliability for this 19-item scale ranged from 0.82 to 0.84 (14).

The Udvalg for Kliniske Undersoegelser is a well-validated questionnaire to assess side effects of psychotropic drugs in clinical studies and clinical practice (15). This questionnaire consists of 48 items; we used only three items that covered sexual functioning (decreased libido, erectile dysfunction/dry vagina, and ejaculatory dysfunction/orgasmic dysfunction). To come closer to the *Diagnostic and Statistical Manual of Mental Disorders* (4th edition) (DSM-IV) definition of a sexual dysfunction, we added to these items a formulation that enabled us to take into account the severity and to some extent the problematic status of a dysfunction in the scoring of sexual dysfunction. The Udvalg for Kliniske Undersoegelser is a checklist of specific symptoms scored on a 4-point scale, with scores ranging from 0 to 3. Higher scores indicate more severity of the reported problems. A "sexual dysfunction" was indicated if a score of 2 or 3 was mentioned, a score that also reflected marked distress. Good content and concurrent validity was reported for the whole questionnaire (15,16). The validity of the used subscale was based on its face validity assessed by an andrologist, a sexologist, and psychiatrists experienced in working with patients with sexual problems. Reliability analysis of the used subscale revealed a Cronbach's α of 0.71, reflecting acceptable reliability.

The Beck Depression Inventory (BDI) was used to assess current self-reported symptoms of depression (17). Each item measures the presence and severity of a symptom of depression, and by adding the item scores, a total score is determined. A score of 16 on the BDI was used as a cutoff to indicate "clinical depression" (18). Higher scores indicate a higher number of depressive symptoms. Reliability analysis has shown a Cronbach's α ranging from 0.92 to 0.93 and a good 1-week test-retest reliability of 0.93, and good content and construct validity were reported (17).

The Dyadic Adjustment Scale (DAS) was used to assess the quality of the marital relationship (19). The DAS consists of 32 items. Scores can range from 0 to 151, and the mean score in the general population is 100. Higher scores indicate better marital quality. The DAS has shown good reliability (Cronbach's $\alpha = 0.94$) and construct validity, as shown in high correlations with the Locke-Wallace Marital Adjustment Test (19,20).

Glycemic control

HbA_{1c} was determined on a venous blood sample taken the day patients agreed to participate in this study.

Data analysis

Analyses were performed using the Statistical Package for Social Sciences (SPSS version 10.0; Chicago). Student's *t* test, χ^2 test, Fisher's exact test (FET), and the Mann-Whitney *U* test (mwU) were used to calculate differences between groups. Binary logistic regressions were used to study the predictors of sexual functioning for each sex separately, whereas the independent factors were first dichotomized (mid-split procedure) before being entered (forward conditional) in the regression. Where appropriate scores are presented as means ± SD. The level of significance used was $P < 0.05$.

RESULTS

Descriptive variables

Of 240 subjects, 222 patients (response rate 92.5%) agreed to participate and took the questionnaires home (50% women; 10 men and 8 women refused). Of those, 97 women (response rate 87.4%; 10 did not send back, 4 sent back a blank questionnaire) and 95 men (response rate 85.6%; 13 did not send back, 3 sent back a blank questionnaire) filled out the questionnaires properly and sent them back. Patients' characteristics are shown in Table 1.

Prevalence of sexual dysfunction

A total of 27% of women and 22% of men with type 1 diabetes reported sexual dysfunction [χ^2 (1) = 0.61, $P = 0.49$]. No significant differences were found in the distribution of the kind of sexual dysfunction between sexes. However, when taking into account the presence of complications, more women without complications reported sexual dysfunction [χ^2 (1) = 4.9, $P = 0.037$], and especially decreased sexual desire [χ^2 (1) = 4.3, $P = 0.048$], than men without complications (Table 2).

Table 1—*Descriptive characteristics and score on psychological questionnaires completed by men and women with type 1 diabetes*

	Men	Women	*P*
n	95	97	—
Age (years)	37.5 ± 10.6	36.9 ± 10.3	0.69
BMI (kg/m^2)	24.3 ± 2.8	24.9 ± 3.9	0.19
Duration of diabetes (years)	13.1 ± 8.9	14.3 ± 10.1	0.36
HbA_{1c} (%)	7.8 ± 1.3	8.0 ± 1.4	0.27
Depression (BDI)	6.0 ± 5.3	10.0 ± 7.4	0.000
Marital satisfaction (DAS)	110.7 ± 17.8	108.1 ± 17.7	0.32
Emotional adjustment (ATT19)	62.8 ± 12.0	62.1 ± 12.9	0.68
Cognitive adjustment (ADS)	16.7 ± 4.4	17.5 ± 4.6	0.19
Number of complications (%)			
0	54	52	NS
1	22	28	
2	14	14	
3	7	5	
4	3	1	

Data are means ± SD unless otherwise indicated.

Sexual dysfunction and descriptive variables

Women who reported sexual dysfunction were not significantly different for age, BMI, duration of diabetes, or HbA_{1c} compared with those not reporting sexual dysfunction. In men, no significant difference for HbA_{1c} was found between individuals with and without sexual dysfunction. Men with sexual dysfunction, however, were significantly older (46.9 vs. 34.5 years of age), had a higher BMI (25.6 vs. 23.9 kg/m^2), and had a longer diabetes duration (17.5 vs. 11.7 years) (Table 3).

Sexual dysfunction and psychological variables

Women with and without sexual dysfunction reported more depressive symptoms than men with and men without sexual dysfunction, respectively (Table 3). Both women and men with sexual dysfunction reported more depressive symptoms than their respective counterparts without sexual dysfunction (Table 3). Based on a cutoff score of 16 on the BDI, four times more women with sexual dysfunction (37.7%) had scores suggestive of clinical depression (BDI score ≥16) than women without sexual dysfunction (8.3%) [FET: χ^2 (1) = 25.3, $P < 0.001$]. When using this cutoff (BDI score ≥16) in men, no significant difference for clinical depression was found between men with (15.0%) and without sexual dysfunction (4.2%) [FET: χ^2 (1) = 2.9, P = 0.12].

In women, an association was found between depression and sexual dysfunction. This association was found for sexual dysfunction in general [FET: χ^2 (1) = 11.7; P = 0.002], for libido decrease [FET: χ^2 = 14.9, df = 1, P = 0.001], and for arousal [FET: χ^2 (1) = 11.3, P = 0.003], but not for orgasm [FET: χ^2 (1) = 1.2, P = 0.28]. In men, however, no such association was found for the presence of sexual dysfunction in general [FET: χ^2 (1) = 2.9, P = 0.12], for libido decrease [FET: χ^2 (1) = 3.3, P = 0.13], for arousal [FET: χ^2 (1) = 4.7, P = 0.07], or for orgasm [FET: χ^2 (1) = 0.2, P = 0.51].

Women with sexual dysfunction reported a significantly lower overall quality of marital relationship than women without sexual dysfunction (mwU: $z = -4.6$, $P < 0.001$), a difference not found in men (mwU: $z = -1.3$, P = 0.19).

Sexual dysfunction and complications

Women with diabetic complications did not report more sexual dysfunction (33%) than women without complications (22%) [FET: χ^2 (1) = 1.3, P = 0.34]. Men with diabetic complications were more likely to report sexual dysfunction (40.5%) than men without complications (6.1%) [FET: χ^2 (1) = 15.6, $P <$ 0.001]. There was, however, for both men and women an association between the number of complications and the occurrence of sexual dysfunction: subjects with more complications were more likely to report more sexual dysfunction [χ^2 (12) = 30.9, P = 0.002; χ^2 (12) = 40.1, $P < 0.001$]. A comparison of men with and without complications revealed a significant association between complications and decreased desire [FET: χ^2 (1) = 5.2, P = 0.04], arousal dysfunction [FET: χ^2 (1) = 9.6, P = 0.002], and orgasmic dysfunction [FET: χ^2 (1) = 8.7, P = 0.005]. In women, however, no such association was found between complications and decreased desire [FET: χ^2 (1) = 0.01, P = 1.0], arousal dysfunction [FET: χ^2 (1) = 1.9, P = 0.22], or orgasmic dysfunction [FET: χ^2 (1) = 1.9, P = 0.22].

Table 2—*Comparison of type of sexual dysfunction in women and men with diabetes by presence of complications*

	Women with diabetes without complications	Men with diabetes without complications	*P**	Women with diabetes with complications	Men with diabetes with complications	*P**
Any sexual dysfunction	21.7	6.1	0.04	32.6	40.5	0.51
Decrease in desire	17.0	4.1	0.05	16.3	19.0	0.78
Arousal (erection/vaginal lubrication)	8.7	6.1	0.71	18.6	31.0	0.22
Orgasm	8.7	2.0	0.20	18.6	21.4	0.79
Dyspareunia	10.0	—	—	13.0	—	—

Data are %. *Determined by the FET.

Table 3—*Descriptive characteristics of men and women with and without sexual dysfunction*

	Women		Men		Comparison of			
	Without sexual dysfunction	With sexual dysfunction	Without sexual dysfunction	With sexual dysfunction	Women with and without sexual dysfunction	Men with and without sexual dysfunction	Men and women without sexual dysfunction	Men and women with sexual dysfunction
Age	35.6 ± 9.7	38.3 ± 10.0	34.6 ± 9.0	46.9 ± 9.0	0.13	0.000	0.68	0.002
BMI	24.6 ± 3.9	26.1 ± 3.8	23.9 ± 2.8	25.5 ± 2.6	0.08	0.023	0.43	0.84
Duration	13.5 ± 9.2	15.5 ± 9.9	11.7 ± 8.2	17.5 ± 9.4	0.36	0.015	0.28	0.40
HbA_{1c}	8.0 ± 1.3	8.1 ± 1.3	7.6 ± 1.3	8.3 ± 1.4	0.47	0.055	0.17	0.74
BDI	7.7 ± 6.4	14.6 ± 7.6	4.9 ± 4.6	9.2 ± 5.9	0.000	0.001	0.008	0.013
DAS	112.0 ± 16.4	98.4 ± 19.6	111.7 ± 18.4	108.7 ± 14.4	0.004	0.19	0.96	0.09
ATT19	64.5 ± 12.3	56.8 ± 12.2	64.9 ± 12.2	57.7 ± 9.0	0.013	0.005	0.94	0.65
ADS	16.7 ± 4.5	19.5 ± 1.3	15.9 ± 4.1	18.8 ± 4.5	0.012	0.009	0.17	0.56

Data are means ± SD or *P*. *P* values are for within- and between-sex comparisons by presence of sexual dysfunction (Mann-Whitney *U* test) for age, BMI, duration, glycemic control, depressive symptomatology (BDI), quality of partner relationship (DAS), and emotional (ATT19) and cognitive (ADS) adjustment to diabetes.

Predictors of sexual dysfunction in women and men

To find out which factors predict the presence of sexual dysfunction, several binary logistic regressions were performed for each sex. The independent factors that were taken into account after dichotomization comprised longer duration of diabetes, presence of complications, poor emotional and cognitive adjustment to diabetes, low-quality partner relationships, high age, poor glycemic control, and depression.

In men, the significant predictors for sexual dysfunction were presence of complications [95% CI for Exp(B) = 2.0–31.8] and high age [95% CI for Exp(B) = 2.0–48.8] (Table 4). In women, the significant predictor for sexual dysfunction was depression [95% CI for Exp(B) = 2.0–18.0] (Table 4). The results of the logistic regressions performed per sexual dysfunction for women and men separately are shown in Table 4.

CONCLUSIONS — In the present study, prevalence of sexual dysfunction in type 1 diabetic women (27%) and men (22%) was high (taking into account the young age of this sample) but comparable to previously reported data. In a smaller study, Jensen (21) found that 27.5% of women and 44% of men reported sexual dysfunction. The doubling of men reporting sexual dysfunction in Jensen's study cannot be explained by a difference in mean age between his sample (35.8 years) and our sample (37.5 years). A possible explanation might be that Jensen did not take into account the severity and/or problematic status of sexual dysfunction. The prevalence of sexual dysfunction in patients with diabetes is higher than in the general population. Recently, Diemont et al. (22) reported a prevalence of sexual dysfunction of 14.9% in women and 8.7% in men in a community-based sample in the Netherlands. The findings of the present study thus confirmed our hypothesis that sexual functioning is affected not only in men with type 1 diabetes, but also in women with type 1 diabetes (11,12).

The comparison of the type of sexual dysfunction by presence of complications revealed that significantly more women without complications reported sexual dysfunction than men without complications, which was due to a higher number of women reporting decreased desire. This observation, however, parallels the sex difference in desire disorders found in community and clinical samples (23). A comparison of the type of sexual dysfunction in patients with complications revealed no significant differences between sexes, which suggests that the sexual response cycle of women and men with diabetes can equally be affected, as shown previously (3,11,24–26). Within-sex comparisons of patients with and without complications revealed a statistically significant association between complications and sexual dysfunction in men but not in women. This was remarkable because of the doubling of the percentage of women with desire or orgasm problems when comparing those with and those without complications.

Interesting sex differences were found concerning the predictors of sexual dysfunction in type 1 diabetic women and men. First, differences were found in the relation between sexual dysfunction and descriptive variables. In men, but not in women, evidence was found that higher age, higher BMI, poor glycemic control, longer duration of diabetes, and the presence of complications were associated with sexual dysfunction. These results confirm what is already known about men with diabetes, and they moreover suggest that in women, as opposed to men, sexual dysfunction is not related to diabetic complications.

Second, using binary logistic regressions, sex differences were found in the relation between sexual dysfunction and somatic and psychological variables. In men, the predictors of different sexual dysfunctions were higher age, worse glycemic control, complications, low-quality partner relationships, and poor emotional and cognitive adjustment to diabetes. This finding reveals that, in men, sexual dysfunction is related to both somatic and psychological variables. In women, however, the predictors of different sexual dysfunctions were all psychological variables (depression and poor cognitive adjustment to diabetes). This study is the first to confirm that, in men with diabetes, sexual dysfunction is linked to both somatic and psychological factors and that, in women with diabetes, sexual dysfunction is predominantly linked to psychological factors. The fact that in women no relation was found among diabetes-related factors, however, could be because we just relied on self-reported data. Schreiner-Engel (24) suggested that even if a complication such as peripheral neuropathy interferes with genital vasocongestion, a woman would probably not be

Table 4—*Statistics for the variables in several binary logistic regression equations with different dependent variables and longer duration, presence of complications, poorer emotional and cognitive adjustment to diabetes, low-quality partner relationships, high age, poor glycemic control, and depression as (dichotomized) independent variables*

	Significance (*P*)	Exp(B)*	95% CI for Exp(B)	Nagelkerke R^2 (%)
Predictors of sexual dysfunction†				
Women				17
Depression	0.001	6.0	2.0–18.0	
Men				41
High age	0.005	10.0	2.0–48.8	
Complications	0.003	8.0	2.0–31.8	
Predictors of decreased desire				
Women				22
Depression	0.000	8.7	2.6–29.4	
Men				41
High HbA_{1c} values	0.020	0.14	0.03–0.73	
Predictors of arousal dysfunction				
Women				18
Depression	0.002	7.6	2.1–27.9	
Men				45
High age	0.005	22.9	2.6–203.6	
Low-quality partner relationships	0.014	5.7	1.4–22.7	
Complications	0.024	5.7	1.3–25.9	
Predictors of orgasmic dysfunction				
Women				14
Poor cognitive adjustment	0.019	0.15	0.03–0.73	
Men				29
Poor emotional adjustment	0.07	7.3	0.85–62.8	
Complications	0.032	10.4	1.2–88.2	

*Exp(B), estimated odds ratio in binary logistic regression models. †Independent variables: longer duration, presence of complications, poor emotional and cognitive adjustment to diabetes, low-quality partner relationships, high age, poor glycemic control, and depression.

aware of a decrease in lubrication and thus not report it. Therefore, it is important to use both subjective and objective methodology in future research in this field (11). Only two objective studies have been performed in this field and yielded contradictory results (27,28).

Furthermore, this study showed that more women than men with diabetes reported depressive symptomatology and that more women reached a BDI score suggestive of clinical depression (BDI score ≥16). These results, however, reflect the female-to-male ratio of depression in the general population (28,29) and confirm the results of a meta-analysis on comorbidity of depression in diabetes (30). The present study also revealed that patients with sexual dysfunction reported twice as much depressive symptomatology as patients without sexual dysfunction. The mean score of women with sexual dysfunction was almost as high as the cutoff score for clinical depression. This study further questions the relation between sexual dysfunction and depressive symptoms because, in women, depression was related not only to a decreased desire, but also to arousal dysfunction. Moreover, in men, no relation was found between depression and any sexual dysfunction. To unravel the relation between these interrelated factors in both sexes, future prospective research should focus on the longitudinal interaction between sexual dysfunction and depression in patients with diabetes.

Finally, this study has several limitations. First, because of the cross-sectional design, the temporality of the relation between the different studied variables and sexual dysfunction could not be evaluated. Therefore, future studies should use a longitudinal design to clear up sex differences in the temporal evolution of sexual dysfunction in diabetes. Second, caution should be exercised in interpreting these results because some of the analyses were based on small groups. Although our study is the largest ever done in the field of sexual function in diabetes, large numbers could not always be included in every analysis. Third, no control groups were included because the focus was on the comparison of the etiological factors related to sexual dysfunction in diabetes. Therefore, we just relied on general population data to interpret the frequencies of sexual dysfunction.

In conclusion, this study confirms that women with diabetes are at as much of an increased risk for sexual dysfunction as men with diabetes and that the predictors of sexual dysfunction are different for each sex. Therefore, sexual problems of women with diabetes should gain more attention in both clinical practice and research. Such increased attention could confirm the hypothesis that, in men, sexual dysfunction is related to somatic and psychological factors, whereas, in women, sexual dysfunction is predominantly related to psychological variables.

References

1. DCCT Research Group: The effect of intensive treatment of diabetes on the devel-

opment and progression of long-term complications. *N Engl J Med* 329:977–986, 1993
2. Ryan CM: Psychological factors and diabetes mellitus. In *Textbook of Diabetes.* 2nd ed. Pickup J, Williams G, Eds. Oxford, U.K., Blackwell Science, 1997, p. 1–17
3. Thomas A, LoPiccolo J: Sexual functioning in persons with diabetes: issues in research, treatment and education. *Clin Psychol Rev* 14:1–86, 1994
4. McCulloch DK, Campbell IW, Wu FC, Prescott RJ, Clarke BF: The prevalence of diabetic impotence. *Diabetologia* 18:279–283, 1980
5. Veves A, Webster L, Chen T, Payne S, Boulton A: Aetiopathogenesis and management of impotence in diabetes males: four years experience from a combined clinic. *Diabet Med* 12:77–82, 1995
6. Close C, Ryder R: Impotence in diabetes mellitus. *Diabetes Metab Rev* 11:279–285, 1995
7. Webster L: Management of sexual problems in diabetic patients. *Br J Hosp Med* 51:465–468, 1994
8. Feldman HA, Goldstein I, Hatzichristou DG, Krane RJ, McKinlay JB: Impotence and its medical and psychosocial correlates: results of the Massachusetts Male Aging study. *J Urol* 151:54–61, 1994
9. Fedele D, Bortolotti A, Coscelli C, Santeusanio F, Chatenoud L, Colli E, Lavezzari M, Landoni M, Parazzini F: Erectile dysfunction in type 1 and type 2 diabetics in Italy. *Int J Epidemiol* 29:524–531, 2000
10. Koch P, Young E: Diabetes and female sexuality: a review of the literature. *Health Care Women Int* 9:251–262, 1988
11. Enzlin P, Mathieu C, Vanderschueren D, Demyttenaere K: Diabetes mellitus and female sexuality: a review of 25 years' research. *Diabet Med* 15:809–815, 1998
12. Enzlin P, Mathieu C, Van den Bruel A, Bosteels J, Vanderschueren D, Demyttenaere K: Sexual dysfunctions in women with type 1 diabetes mellitus: a controlled study. *Diabetes Care* 25:672–677, 2002
13. Carey MP, Jorgensen RS, Weinstock RS, Sprafkin RP, Lantinga LJ, Carnrike CL Jr, Baker MT, Meisler AW: Reliability and validity of the appraisal of diabetes scale. *J Behav Med* 14:43–51, 1991
14. Welch G, Beeney LJ, Dunn S: The development of the diabetes integration scale: a psychometric study of the ATT39. *Multivar Exp Clin Res* 11:75–88, 1996
15. Lingjaerde O, Ahlfors UG, Bech P, Dencker SJ, Elgen K: The UKU side effect rating scale: a new comprehensive rating scale for psychotropic drugs and a cross-sectional study of side effects in neuroleptic-treated patients. *Acta Psychiatr Scand Suppl* 34:1–100, 1987
16. Day JC, Wood G, Dewey M, Bentall RP: A self-rating scale for the measuring of neuroleptic side-effects: validation in a group of schizophrenic patients. *Br J Psychiatry* 166:650–653, 1995
17. Beck AT, Steer RA, Brown GK: *The BDI-II Manual.* Harcourt Brace, London, 1994
18. Lustman P, Clouse R, Griffith L, Carney R, Freedland K: Screening for depression in diabetes using the Beck Depression Inventory. *Psychosom Med* 59:24–31, 1997
19. Spanier G: Measuring dyadic adjustment: new scales for assessing the quality of marriage and similar dyads. *J Marriage Family* 38:15–28, 1976
20. Locke HJ, Wallace KM: Short marital adjustment prediction tests: their reliability and validity. *Marriage Family Living* 21: 251–255, 1957
21. Jensen S: Diabetic sexual dysfunction: a comparative study of 160 insulin treated diabetic men and women and an age-matched control group. *Arch Sex Behav* 10:493–504, 1981
22. Diemont WL, Vruggink PA, Meuleman EJH, Doesburg WH, Lemmens WAJG, Berden JHM: Sexual dysfunction after renal replacement therapy. *Am J Kidney Dis* 35:845–851, 2000
23. Spector IP, Carey MP: Incidence and prevalence of the sexual dysfunctions: a critical review of the empirical literature. *Arch Sex Behav* 19:389–408, 1990
24. Schreiner-Engel P: Diabetes mellitus and female sexuality. *Sexual Disabil* 6:83–92, 1983
25. Tyrer G, Steel J, Ewing D, Bancroft J, Warner P, Clarke B: Sexual responsiveness in diabetic women. *Diabetologia* 24: 166–171, 1983
26. Newman AS, Bertelson AD: Sexual dysfunction in diabetic women. *J Behav Med* 9:261–270, 1986
27. Wincze JP, Albert A, Bansal S: Sexual arousal in diabetic females: physiological and self-report measures. *Arch Sex Behav* 22:587–601, 1993
28. Slob AK, Koster J, Radder JK, van der Werff ten Bosch JJ: Sexuality and psychophysiological functioning in women with diabetes mellitus. *J Sex Marital Ther* 16: 59–69, 1990
29. Weissman MM, Leaf PJ, Tischler GL, Blazer DG, Karno M, Bruce ML, Florio LP: Affective disorders in five United States communities. *Psychol Med* 18:141–154, 1988
30. Andersson RJ, Freeland KE, Clouse RE, Lustman PJ: The prevalence of comorbid depression in adults with diabetes: a meta-analysis. *Diabetes Care* 24:1069–1078, 2001