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Sexual Function in Women with Type 1 Diabetes Matched with a Control Group: Depressive and Psychosocial Aspects

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ABSTRACT

Introduction. Sexual dysfunction in women with diabetes, despite its important consequences to their quality of life, has been investigated only recently with conflicting results about its prevalence and association with complications and psychological factors.

Aims. To assess the prevalence of the alteration of sexual function and the influence of metabolic control and psychological factors on female sexuality.

Methods. Seventy-seven adult Italian women with type 1 diabetes, matched with a control group (n = 77), completed questionnaires evaluating sexual function (Female Sexual Function Index, FSFI), depressive symptoms (Self-Rating Depression Scale, SRDS), social and family support (Multidimensional Scale of Perceived Social Support), and diabetes-related quality of life (Diabetes Quality of Life). Clinical and metabolic data were collected.

Main Outcome Measures. Prevalence and magnitude of sexual dysfunction in terms of alteration of sexual functioning as measured by the FSFI scores.

Results. The prevalence of sexual dysfunction was similar in diabetes and control groups (33.8% vs. 39.0%, not significant), except for higher SRDS scores in the diabetes group (47.39 ± 11.96 vs. 43.82 ± 10.66; P = 0.047). Diabetic patients with an alteration of sexual function showed a significantly higher SRDS score (53.58 ± 14.11 vs. 44.24± 9.38, P = 0.004). Depression symptoms and good glycemic control (A1C < 7.0%) were predictors of alteration of sexual function only in diabetic patients (odds ratio [OR] = 1.082; 95% confidence interval [CI]: 1.028–1.140; OR = 5.085; 95% CI: 1.087–23.789), since we have not found any significant predictor of sexual dysfunction in the control group.

Conclusions. The prevalence of sexual dysfunction in our type 1 diabetes patients' sample is similar to those reported in other studies. Diabetic patients are similar to healthy people except for higher depression scores. Further studies are necessary to understand whether the correlation between an alteration of sexual function and good glycemic control may be related to the role of control as a mental attitude. Tagliabue M, Gottero C, Zuffranieri M, Negro M, Carletto S, Picci RL, Tomelini M, Bertaina S, Pucci E, Trento M, and Ostacoli L. Sexual function in women with type 1 diabetes matched with a control group: Depressive and psychosocial aspects. J Sex Med 2011;8:1694–1700.

Introduction

In 1974, the World Health Organization [1] recognized that human sexuality is an important element of an individual's health. In recent years, many studies have been conducted about prevalence of sexual dysfunction and comorbid mental disorders in patients with diabetes.

Researches have initially focused on sexual dysfunction secondary to diabetes in male patients. Several studies have indeed shown that men with diabetes are subjected to a higher risk of developing erectile dysfunction, especially when other complications of diabetes are present [2].

Only recently, the sexual function of women with diabetes has been investigated, with results more conflicting than for men.

The prevalence of female sexual dysfunction (FSD) in the general population is estimated at between 25% and 63% [3]. In the diabetic population, the prevalence varies widely between different studies: Nowosielski [4] reports a range between 14% and 85%, in particular in type 1 diabetes, which varies between 17% and 71%. The prevalence data reported here, as well as those resulting from this work, relate more to a change in sexual functioning rather than to a diagnosis of FSD. The latter, as evidenced by Giraldi and colleagues [5], would require the assessment of distress.

In the same review [5], type 2 diabetes mellitus is demonstrated to have a greater impact on women's sexuality than type 1. This, probably, is due to social and psychological factors, problems related to age, menopausal status, and comorbidities.

It is unclear whether FSD is correlated to diabetic complications. Enzlin and coworkers wrote that women with diabetic complications did not report more sexual dysfunction than did women without complications [6]. In subsequent research on both men and women, they found an association between the number of complications and the occurrence of sexual dysfunction [7].

Several studies [4,8] found no association between metabolic control and sexual dysfunction in women with diabetes, unlike that reported for men. It appears that the etiology of sexual dysfunction in women is mainly related to psychological factors [7–9]. Influences on female sexuality are multifactorial and are attributable to biological, psychosocial, and context-related factors [10]. Nowosielski [4], in particular, has highlighted the importance of partner-related factors. In keeping with this, some researches have noted that sexual dysfunction is linked to having a poor relationship with the partner [11], to the duration of the relationship [12], to marital status [13], and to the quality of marital relations [6].

With regard to comorbidity of mental disorders in women with diabetes, several studies [4,6–8,14] highlight the correlation between sexual dysfunction and the presence of depressive symptoms [5]. Depression is more prevalent in diabetics in comparison with the normal population [15] and particularly in women with diabetes compared to men with diabetes [16].

Finally, there are conflicting results about the prevalence of sexual dysfunction. Some studies show a higher prevalence in women with type 1 diabetes as compared to healthy women [6,17], while other studies do not show this difference [18,19]. Salonia and colleagues [20] find a difference in the prevalence of sexual dysfunction between women with type 1 diabetes and the control group only in the luteal phase of the menstrual cycle, whereas in the follicular phase, the prevalence is similar.

This work has sought to contribute knowledge on the subject by attempting to neutralize the effect of some factors on the presence of sexual dysfunction, on whose role there seems to be moderate agreement. Specifically, with regard to the influence of depression, we have chosen not to include in the study those subjects diagnosed with depressive disorder. We did this in order to assess the actual presence of greater symptomatology in the group of diabetic patients and to understand

whether the role of these symptoms in female sexual function differs from a healthy population. In order to reduce a source of heterogeneity, we have chosen to include only women involved in a stable couple relationship for at least 1 year. To take into account certain indicators related to the intimate relationship, but not necessarily similar in couples united by stable relations, we also investigated perceived social support so that we could evaluate the effective comparability of the two samples.

Aims

The aims of this study are to assess (i) the prevalence of sexual dysfunction in terms of alteration of sexual functioning in a sample of Italian type 1 diabetic women in comparison with a matched control group, the members of both groups being in a stable couple relationship continuing for at least 1 year; and (ii) the role of depression symptoms, Diabetic Quality of Life and Multidimensional Perceived Social Support on sexual function in the patients' group compared with a matched control group.

Were supposed to find no significant difference in the prevalence of sexual dysfunction between the type 1 diabetes and the control group in a sample with a stable intimate relationship.

We also hypothesized a significant role of depressive traits relating to sexual dysfunction in diabetic patients even in the absence of a depressive disorder.

Methods

We conducted a case-control study with a total of 91 consecutive women with type 1 diabetes mellitus who attended seven diabetic centers in Piedmont (Italy) during a 2-month period. The study was approved by a local branch of the Italian Diabetes Society (S.I.D.). Eighty-three patients were eligible in terms of the following criteria: (i) 18–65 years of age; (ii) a stable couple relationship continuing for at least 1 year; and (iii) type 1 diabetes mellitus. We excluded patients with major health problems other than complications of diabetes, such as neoplasm, major depression or other psychiatric disorders, severe neurological diseases, and drug or alcohol abuse. Subsequently, an age- and education-matched group of healthy control women without diabetes (n = 77), recruited from women attending the general outpatient departments of the seven centers in Piedmont for routine screening reasons and from patients' relatives, was also invited to participate in the study.

We distributed the questionnaires to women of childbearing age during the early follicular phase, in order to neutralize the influence of hormonal changes on emotional state, as did other authors [21].

Written informed consent was obtained from all participants prior to administering the questionnaires. In order to maintain privacy, a modified version of a self-generating code was used [22].

Instruments

Patients and control participants were asked to complete four validated multiple-choice questionnaires at home and return them within 4 weeks. Established self-report questionnaires were used to assess depression, perceived social support, and relevant aspects of sexual function and diabetes-related quality of life. The last aspect was inquired only for the diabetic patients. All of the questionnaires used were validated for the Italian language. The scores for each instrument were calculated by the recommended scoring system. Each questionnaire was explained to the participants to ensure that they understood the questions.

The Female Sexual Function Index (FSFI) [23,24] is a multidimensional self-reporting instrument for assessing the key dimensions of sexual function in women. It includes 19 items subdivided into six domains (frequency and degree of sexual desire, subjective arousal, lubrication, orgasm, satisfaction, and pain) referring to sexual activity in the last 4 weeks. Responses were graded on a scale of 1 (almost never or never) to 5 (almost always or always), where a score of 0 indicated no sexual activity. An alteration of sexual function was evidenced by a score 26.55 or less [25].

The Zung Self-Rating Depression Scale (SRDS) [26,27] is a 20-item self-reporting questionnaire that is widely used as a screening tool covering affective, psychological, and somatic symptoms associated with depression. It has been effectively used in a variety of settings that include primary care, psychiatric treatment, drug trials, and various research situations. For each item, the patient specifies the frequency with which the symptom is experienced on a Likert scale ranging from 1 (rarely) to 4 (most of the time). A total score, ranging from 25 to 100, is derived by adding up the score of the individual items and then normalizing them, as suggested by the author. Most people with depression score between 62 and 74, while a score of 87 or above indicates severe depression. The scores provide indicative ranges of depression severity that can be useful for clinical and research purposes.

The Multidimensional Scale of Perceived Social Support (MSPSS) [28,29], evaluates the perception of social support, particularly of family, friends, and other significant people. It has 12 items, which are divided into three subscales: family, friends, and significant other support. Responses are graded on a scale of 0 (completely false) to 5 (completely true). Total scores range from 0 to 84, with higher scores indicating a more positive social support.

The Diabetes Quality of Life (DQOL) [30,31] is used to assess a patient's personal experience of the impact of diabetes care and treatment on major life domains. The scale consists of 46 items that address four major dimensions (satisfaction with treatment, impact of treatment, worries about long-term complications, and worries about social issues). Each item is rated on a five-point Likert scale ranging from 1 (very satisfied) to 5 (very dissatisfied). Higher scores indicate a higher burden of diabetes treatment on the patient's quality of life.

A venous blood sample to determine hemoglobin A1c (HbA1C) had been collected from all diabetic patients within the last 3 months prior to the day they were invited to participate in this study. HbA1C was determined using high-performance liquid chromatography the normal range of which is 4.5–6.2 mg/dL. The patients' medical records were used to obtain data on age, education, duration of marriage or relationship, previous or current pregnancies or menopausal state, smoking habit, years of diabetes, type of insulin and other medications used, presence of complications (neuropathy and/or nephropathy and/or retinopathy), and body mass index (BMI).

Power Calculation

For assessing the power of the test we used G*Power 3 software [32]. To have 90% power to detect an effect size of 0.40 in the global FSFI score comparing the women with diabetes with a matched healthy control group with two-sided significance level alpha of 0.05, we required 68 participants per each paired group. Taking into account the inclusion and exclusion criteria and a possible refusal rate, we decided to evaluate approximately 90 patients.

Statistical Analysis

Analyses were performed using the Statistical Package for Social Sciences (SPSS version 14.0; Chicago, IL, USA). Student's t-test and $\chi 2$ test were used to calculate differences between case and control groups and between patients without sexual dysfunction (FSFI > 26.55) and patients with an

alteration of sexual function (FSFI ≤ 26.55). To study the predictors of sexual functioning in both groups, two binary logistic regressions were employed, taking the presence of sexual dysfunction as a dependent variable, and taking as independent variables are age, depression, the menopausal condition, and for the diabetic group only, complications and good glycemic control (A1C < 7.0%).

Results

Of 83 type 1 diabetes patients, 77 (response rate: 93%) agreed to participate and took the questionnaires home. Six refused to participate. All the 77 healthy control women without diabetes agreed to participate in the study.

The patients' baseline characteristics and the differences between the two groups are depicted in Table 1.

The patients' baseline characteristics and the differences between the two groups are depicted in Table 1.

	Case group	**Control group**	***t*-test/χ^2 *P***
	n = 77	**n = 77**	

- [†]Data are means ± SD or n (%).
- [‡]Possible scores range from 19 to 95, with higher scores indicating better sexual function.
- [§]Considered as FSFI score ≤ 26.55.
- [¶]Possible scores range from 25 to 100, with higher scores indicating more severe symptoms.
- [††]Possible scores range from 1 to 28, with higher scores indicating higher perceived social support.
- FSFI = Female Sexual Function Index; SDRS = Self-Rating Depression Scale; MSPSS = Multidimensional Scale of Perceived

Social Support; HbA1C = hemoglobin A1c; n.s = not significant.

Age in years	39.35 ± 9.77	40.22 ± 9.54	n.s.
Education			n.s
Primary school	1 (1.3)	1 (1.3)	
Secondary school	17 (22.1)	17 (22.1)	
High school	43 (55.8)	43 (55.8)	
University degree	16 (20.8)	16 (20.8)	
Duration of sexual relationship	12.06 ± 9.04	15.56 ± 9.90	0.029
At least one pregnancy	34 (44.2)	47 (61.0)	0.004
Number of pregnancies	1.21 ± 1.20	2.06 ± 1.21	0.012
Women in menopausal state	9 (11.7)	10 (13.0)	n.s.
Actual smokers	23 (29.9)	21 (27.3)	n.s.
FSFI score[‡]	25.99 ± 7.76	26.58 ± 8.97	n.s.

Sexual dysfunction prevalence[§]	26 (33.8)	30 (39.0)	n.s.
SDRS[¶]	47.39 ± 11.96	43.82 ± 10.66	0.047
MSPSS total score[††]	16.16 ± 4.35	15.80 ± 4.53	n.s.
Duration of disease in years	17.61 ± 10.11	—	—
HbA1C (%)	8.23 ± 1.10	—	—
HbA1C (%) < 7	11 (14.3)	—	—
Diabetes complications	32 (41.6)	—	—

Table 1. Characteristics of the study groups[†]

There was no significant difference in the prevalence of sexual dysfunction, in terms of the reporting of more symptoms of FSD. In the diabetes group, we found 26 patients (33.8%) with a FSFI score ≤ 26.55 and 51 patients (66.2%) with a higher FSFI score. In the control group, there were 30 women (39.0%) with a FSFI score ≤ 26.55 and 47 women (61.0%) with a higher score. In addition, the mean FSFI score is similar in the two groups (25.99 ± 7.76 vs. 26.58 ± 8.97). Diabetic women reported more depressive symptoms (SRDS score: 47.39 ± 11.96 vs. 43.82 ± 10.66; P = 0.047), while the scores of perceived social support (MSPSS score: 16.16 ± 4.35 vs. 15.80 ± 4.53) were similar in the two groups.

We divided diabetic women into two subgroups based on the presence of FSD (FSFI score ≤ 26.55). Both subgroups were similar in respect to the main characteristics: age, BMI, number of women in menopausal state, duration of disease, A1C, complications, previous pregnancies, MSPSS total score, and DQOL score (Table 2). In particular, we found that five (9.8%) diabetic patients without sexual dysfunction, and six (23.1%) diabetic patients with sexual dysfunction had presented good glycemic control (A1C < 7.0%).

	Diabetic patients without sexual dysfunction[‡] (n = 51)	**Diabetic patients with sexual dysfunction[§] (n = 26)**	***P***

- [†]Data are means ± SD or n (%).
- [‡]FSFI score > 26.55.
- [§]FSFI score ≤ 26.55.
- [¶]HbA1C < 7.0%.
- BMI = body mass index; HbA1C = hemoglobin A1c; MSPSS = Multidimensional Scale of Perceived Social Support; DQOL = Diabetes Quality of Life; n.s. = not significant.

Age (years)	37.90 ± 8.63	42.19 ± 11.33	n.s.
BMI (kg/m^2)	23.94 ± 3.31	23.68 ± 2.89	n.s.

	Diabetic patients without sexual dysfunction[‡] (n = 51)	Diabetic patients with sexual dysfunction[§] (n = 26)	*P*
Women in menopausal state (%)	4 (7.8)	5 (19)	n.s.
Duration of disease (years)	17.06 ± 9.63	18.78 ± 11.18	n.s.
HbA1C (%)	8.12 ± 1.09	7.94 ± 1.24	n.s.
Good control (%)[¶]	5 (9.8)	6 (23.1)	n.s.
Complications (%)	20 (39.2)	13 (50)	n.s.
Previous pregnancy	0.88 ± 0.91	1.17 ± 1.46	n.s.
MSPSS (total score)	16.81 ± 4.19	14.71 ± 4.41	n.s.
DQOL (total score)	89.86 ± 20.97	95.00 ± 30.48	n.s.
Self-Rating Depression Scale score	44.24 ± 9.38	53.58 ± 14.11	0.004

Table 2. Diabetic women and sexual dysfunction assessed by FSFI[‡]

To determine which factors predict the presence of sexual dysfunction in the diabetes group, binary logistic regressions were used. Depressive symptoms (odds ratio [OR] = 1.082; 95% confidence interval [CI]: 1.028–1.140) and good glycemic compensation (A1C < 7.0%; OR = 5.085; 95% CI: 1.087–23.789) were associated with a higher likelihood of having sexual dysfunction. Age, number of complications, and menopausal state did not reach statistical significance. Neither depressive symptoms (OR = 1.033; 95% CI: 0.982–1.088) nor other variables were significant predictors of sexual dysfunction in the control group.

Discussion

The prevalence of sexual dysfunction in terms of alteration of sexual functioning in our sample of women with type 1 diabetes was similar to those reported by other studies [8,20]. As others have reported [18,19,33], we found no significant differences in prevalence between the diabetic and control groups.

Few large-scale studies have examined the prevalence of FSD in apparently healthy women in Europe [34], in Italy [35] specifically, or in the United States [13]. Apart from age, other factors were generally not closely correlated to the presence of FSD, although life changes and distressing disorders play an important role. As other reports have indicated [7,36], we found that depression was higher in diabetic women than in the control group and affected their sexuality [37]. The Zung Self-Rating Depression Scale scores for both control and diabetes groups were not diagnostic of major depression (maximum score: 76), which was consistent with the inclusion criteria. As

Wallner and colleagues [14] have found, women with type 1 diabetes are similar to women in the control group except for higher depression scores. In addition, we found that depression is effective as a predictor of FSD in the diabetic patients group but not in the control group.

The negative correlation between good glycemic control and sexual dysfunction has no equivalent in other studies, which report either no correlation [8] or a close positive correlation [38] between sexual dysfunction and poor glycemic control. As we found a trivial lower limit and a very large upper limit of the confidence interval, it is difficult to determine the exact size of the differences in the two conditions. It is also for this reason that these results may need further specific investigation in order to assess whether a firm sense of control efficient for containing HbAlC levels within the optimal range can become too generalized—as an attitude—and affect the possibility to experience sexual pleasure.

Following Franciosi and colleagues [39], we evaluated the number of complications as determinants of the quality of life. Like other studies [6], we found that complications had no influence on sexual function, thereby supporting the hypothesis that women's sexual function is predominantly linked to sexual context and psychological factors rather than to biological factors [7].

Conclusion

According to previous studies, the prevalence of sexual dysfunction in terms of alteration of sexual functioning was similar in both type 1 diabetes and control groups. However, while it is known that depressive aspects play an important role in the sexual lives of people, in our study, depressive symptoms are associated with FSD only in the diabetes group.

It is interesting to note the role that the diabetologist is called upon to play in an area that is not yet free of taboos, i.e., women's sexuality. This situation is more difficult than the equivalent one in male diabetic patients, who report an objective, organic disorder that can be dealt with medically. In women, the psychological and depressive component is a better predictor of dysfunction. Therefore, a complex evaluation must be made, for which our experience may not have prepared us and in which a multidisciplinary approach is surely useful. Thus, the problem of sexuality in the diabetic woman runs the risk of being limited to reproductive aspects, in terms of pregnancy as an organic event that can be tackled medically.

Finally, there are some limitations to our study. We investigated the distribution of the alteration of sexual functioning rather than the prevalence of FSD defined according to diagnostic criteria, since to do so would require the assessment of distress. The subjective concerns of diabetic patients were investigated as secondary outcomes through the assessment of quality of life.

Furthermore, no account was taken of the time sequence of the onset of sexual dysfunction with regard to other variables studied, because it is not possible in a case-controlled study.

Conflict of Interest: None.

Statement of Authorship

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