Sexual Function in Women with Insulin Dependent Diabetes Mellitus

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Abstract: The objective of this study was to analyse sexual function in women with insulin dependent diabetes mellitus (IDDM) compared to age-matched controls (C), and to correlate sexual ability to neurological symptoms and signs. Forty-two women, with a known diagnosis of IDDM for at least a year, and 42 age-matched controls without diabetes or any neurological disease were included in this quantitative, descriptive and retrospective study. The study also included qualitative aspects concerning sexuality. The basic method was a structured interview, includingusing open-ended questions that focused on medical, sexological and social case histories. The participants also underwent neurological examination with special attention to the sacral segments. At the time of the interview, 26% of the women with diabetes had an decreased sexual desire, 22% had decreased vaginal lubrication and 10% had decreased capacity to achieve orgasm. Several of the IDDM -women reported two or three sexual dysfunctions. Among the controls, the dysfunctions in question were limited to one participant each (2%). Taken together, the different sexual types of dysfunction were significantly more prevalent in the IDDM -group (40%) than in the C -group (7%) ($p<0.001$). The duration of disease was related to findings from neurological examinations concerning Achilles tendon reflexes, and perceived sensations of temperature and pain in the feet. Fourteen women with diabetes and four of the women in the control group did not have Achilles reflexes ($p<0.01$). The diabetic participants had significantly higher vibration perception thresholds in the hands and in the clitoris than the control group ($p<0.05$). Reduced foot perspiration ($p<0.01$), increased gustatory perspiration ($p<0.05$) and impaired subjective vulvar sensation ($p<0.05$) were reported more often by the women with diabetes than by the control group. Reports of reduced foot perspiration, increased gustatory perspiration, constipation and incontinence were correlated with sexual dysfunction. In general, it was concluded that sexual dysfunction was more common in the women with diabetes than in the controls. Different types of dysfunction were correlated with autonomic neurological symptoms. These data are similar to findings in men with IDDM. Scand J Sexol 1998;1;43-50

Key words: Diabetes mellitus, IDDM, women, sexual function, desire, lubrication, orgasm, perspiration, vibration perception thresholds.

Introduction

It is well known that diabetes mellitus can have a negative impact on sexual functioning. Most prevalent is erectile dysfunction in men, but retrograde ejaculation (Greene et al 1963, Ellenberg & Weber 1966, Lundberg & Brattberg 1992, Bemelmans et al 1994) and reduced sexual desire are also notable (Notarbartolo 1975, Jensen 1981). The factors most often found to be of importance in causing sexual dysfunction in men include neurogenic mechanisms (Notarbartolo 1975, Ellenberg 1971, Kolodny et al 1974, Jensen 1981, Lehman & Jacobs 1983) and psychological mechanisms (Jensen 1981, 1986). However, a number of other factors have also been demonstrated, such as vascular insufficiency, veno-occlusive disease, and endocrine changes (for review see

Ertekin 1998). Genital candida infections may also cause dyspareunia in both men and women.

According to previous studies, women with insulin dependent diabetes mellitus (IDDM) have relatively fewer sexual problems in comparison to men. Loss of sexual desire (Newman & Bertelsen 1986, Schreiner-Engel et al 1987, Campbell et al 1989), inadequate vaginal lubrication (Tyrer 1983), as well as orgasmic dysfunction (Kolodny 1971) have been reported. In certain cases, signs of neurodegeneration and vascular damage in the clitoris have been found in post-mortem tissue samples from diabetic women (Zrustová et al 1978).

The purpose of this investigation was to determine to what extent women with insulin dependent diabetes mellitus (IDDM) experienced changes in their sexual lives and whether these changes were related to signs of neuropathy or other diabetic complications, or to social or psychological factors. These last two factors will be discussed in another paper (Hulter et al, in preparation). An age-matched group of women without any diagnoses of diabetes or any neurological diseases were studied for comparative purposes.

Subjects and methods

SUBJECTS

Seventy-six women diagnosed with IDDM of a duration of at least one year (aged 25 - 50) and attending the Uppsala University Hospital Diabetic Centre were asked to participate in the study. Forty-two women (55.3%) agreed to participate and 34 women (44.7%) declined participation. The median age of these 42 women was 37.5 years (range 27 - 50).

Five hundred women living in the same area as the patients were randomly selected from the Official Census Bureau. Women born in Sweden on the closest date to the woman with IDDM were invited to participate in the study. Information about the research was sent by mail and the women were asked to take part in the study. One hundred and twelve consecutively selected women were asked before 42 women (37.5%) could be matched to those with diabetes.

The study was approved by the Committee of Ethics at the Medical Faculty of the Uppsala University (176/93).

DESIGN

The subjects underwent a comprehensive interview in this retrospective, quantitative and descriptive study, including questions regarding qualitative aspects on sexuality and life satisfaction. The structured interview included open-ended questions and focused on the social, medical, and detailed sexological case histories. The focus was on sexual experiences throughout their lives, as well as a subjective evaluation of the last past month in relation to former experiences. The average length of the interview with the diabetic women was longer due to discussions on medical history. The interviews lasted 1.5 and 1.1 hours respectively (SD 0.72 and 0.41) ($p<0.01$). For further presentation of the interview technique, see Hulter & Lundberg (1994). The women underwent a neurological examination with special attention to the sacral segments. Measurements of vibration perception thresholds (VPT) were performed using a vibrameter (Somedic AB, Sweden). The VPT was the value first perceived by the subject when the stimulus was increased from zero. The test sites were the dorsal surface of both hands at the region of the second metacarpal bone, both feet at the region of the first metatarsal bone, labiae majora lateral of urethra, perineum and the glans clitoridis. The method, the apparatus and its principle action are described in studies by Fagius & Wahren (1981) and Halonen (1986). VPT registrations in the vulvar region of healthy women are reported by Helström & Lundberg (1992). All interviews and all examinations were conducted by the female investigator (BH).

STATISTICAL ANALYSIS

The results are expressed as median and range, or mean and standard deviation. For testing differences of proportions, two-tailed t-tests, ANOVAs with Fisher PLSD, chi-square tests with Yates correction and Mann-Whitney tests were conducted. Probabilities below 0.05 were regarded as statistically significant.

Results

There were no significant differences between the groups on demographic characteristics (Table 1) or early sexological case histories (Table 2).

Table 1.
Demographic data: 42 women with IDDM and 42 controls. No significant differences between the groups.

Age	IDDM	Controls
Median in years	37.5	38.5
Range	27-50	27-50
Marital status		
Married	19	29
Divorced	8	8
Widowed	1	0
Never married	14	5
Cohabitation	31	36
Non-cohabiting	11	6
Education		
Compulsory school	6	7
Upper secondary school	25	16
University	11	19
Occupation		
Working part or full time	30	36
Not working	12	6

Table 2.
Early sexological history of 42 women with IDDM and 42 controls. No significant differences between the groups.

Menarche	IDDM	Controls
Median age	13	13
Range	9-17	11-17
First masturbation		
Median age	13.5	13.5
Range	7-30	6-40
First sexual intercourse		
Median	16	16
Range	13-34	13-25
First orgasm		
Median	17	18
Range	8-29	4-36
Pregnancies		
Median	2	3
Range	0-6	0-6
Number of children		
Median	2	2
Range	1-4	1-4

CLINICAL CHARACTERISTICS OF PARTICIPANTS.

The age of the women ranged from 27 - 50 years (median 37.5 years). The age at onset of diabetes ranged from 4 - 41 years (median 16 years) and the duration from 3 - 38 years (median 20 years).

Thirty-six (86%) of the women with diabetes were treated with ≥4 doses of insulin per day and 6 women were on 3 doses per day. Nineteen diabetic women had diabetic retinopathy, 5 had cardiovascular symptoms, 5 had nephropathy, and 12 used medication for hypertension. Four diabetic and 11 controls used estrogen in contraceptive pills or for postmenopausal complaints. More diabetic women (60%) had experienced menstrual irregularities than had the controls (24%) ($p<0.001$). Five women with diabetes (mean age 35.6 years) and 7 controls were amenorrhoic. Of the controls, 3 were using contraceptives (e. g., hormonal IUD) which caused the amenorrhoea and one woman had had a hysterectomy. Of the remaining three, (mean age 48.7 years) two were taking hormonal replacement therapy.

The Mean Body Mass Index were similar in the two groups, 23.2, SD 3.3 (IDDM) and 23.8, SD 3.7 (C). Eleven women (26%) in each group were smokers.

NEUROLOGICAL EXAMINATION

Fourteen women with diabetes and 4 controls had no Achilles reflexes, 5 and 1 respectively had no patellar reflexes and 5 women with diabetes no brachioradial reflexes. Lack of Achilles reflexes is an early sign of diabetic polyneuropathy, which affects the long neurons in the leg first. Loss of Achilles tendon jerks in the controls was due to other types of peripheral nerve disorders. As expected, the duration of disease had an impact on Achilles reflexes, and perceived sensations of temperature and pain in the feet.

The diabetic patients had higher mean vibration perception thresholds than the controls at all measured points. There were significant differences on the VPTs for the hands and at the clitoris (Table 3). Impairment of vibration sense may be one of the first signs of peripheral neuropathy in diabetes.

Table 3.
Mean vibration perception thresholds in 42 women with IDDM and 42 controls.

I DDM		Controls		
Hands		*Hands*		
right	left	right	left	
0.43	0.50	0.34	0.39	p<0.05
Feet		*Feet*		
right	left	right	left	
1.99	2.06	0.9	1.09	n.s.
Labiae majora		*Labiae majora*		
right	left	right	left	
1.5	1.54	1.33	1.41	n.s.
Clitoris		*Clitoris*		
0.83		0.5		p<0.05
Perineum		*Perineum*		
3.54		2.44		n.s.

REPORTED CLINICAL SYMPTOMS

A number of symptoms were stated more often by the diabetic women than the controls (Table 4). Seven women reported reduced foot perspiration (p<0.01), 13 increased gustatory perspiration (p<0.05) and 5 reported impaired vulvar sensibility (p<0.05). Changes in perspiration are symptoms of autonomic nervous dysfunction, very often seen in diabetes mellitus.

Table 4.
Some neurological symptoms and signs in 42 women with IDDM and 42 controls.

	IDDM	Control	
Reduced feet perspiration	7	0	p< 0.01
Increased gustatory perspiration	13	5	p< 0.05
Decreased vulvar sensitivity	5	0	p< 0.05
Decreased feet sensitivity	12	5	n.s.
Absent Achilles reflex	14	4	p< 0.01
Absent brachio-radial reflex	5	0	p< 0.01
Absent patellar reflex	5	1	n. s.

SEXUAL FUNCTIONING AT TIME OF INTERVIEW

Twenty-six percent of women with diabetes had reduced sexual desire, 22% decreased lubrication and 10 % had a decreased ability to reach orgasm (Table 5). Only one of the controls had a reduction of each of these sexual functions. Taken together, the different types of sexual dysfunction were significantly more prevalent in the IDDM group (40%) than in the C group (7%) (p<0.001). Moreover, none of the controls had more than one type of dysfunction, but several of the IDDM women reported two or three different types of dysfunction. Treatment with 4 doses of insulin per day was predominant in this group and no correlations were found between this regimen of treatment and sexual function.

Table 5.
Reports of reduced sexual functions in 42 women with IDDM and 42 controls at time of interview.

	IDDM	Controls	
Reports of:			
reduced desire			
yes	11	1	
no	31	41	p< 0.002
reduced lubrication	*		
yes	9	1	
no	32	41	p< 0.01
reduced orgasm	**		
yes	4	1	
no	36	41	p< 0.05

* One virgin.

**Two patients without orgasmic experience ever.

CORRELATIONS BETWEEN SEXUAL DYSFUNCTION AND SOME CLINICAL SYMPTOMS

Reduced foot perspiration and increased gustatory perspiration correlated with sexual dysfunction. Decreased lubrication was correlated with constipation (p<0.05) and decreased orgasmic capacity with difficulty in controlling urine (p<0.05).

FLUCTUATIONS OF SEXUAL ABILITY

Both groups reported temporary changes in their sexual ability. They interpreted increased and decreased desire somewhat differently. Twenty-three women

(54.8%) in the diabetic group and 16 (38%) of the controls related it to the quality of the sexual relationship. Eight women (19%) in the diabetic group and 18 (42.8%) of the controls associated perceived changes to childbearing circumstances (e.g., pregnancy, delivery, nursing). Thus, 14 women with diabetes (33%) claimed that reduced desire was related to the disease.

Eight diabetic women connected casually impaired lubrication to transient hyperglycaemia. Nine controls associated reduced lubrication to lack of desire and seven to being on the pill. Only one woman with diabetes used these explanations for the phenomenon.

Eight women with diabetes (19%) had experienced an increased orgasmic response at certain occasions and this was reported by 18 of the controls (43%). Thus, the orgasms came more easily, were felt more intensely and lasted longer. The patients' own explanations for improved orgasmic response were quality of the sexual relationship, practice and greater knowledge.

More women in the diabetic group (11 women, 26%) had experienced negative changes in their orgasms than had the controls (7 women, 17%). They had either lost the capacity or needed more time to achieve an orgasm or the orgasms had become less enjoyable. Two women with diabetes had never experienced an orgasm. One woman with herpes genitalis reported that she became extra sensitive at activation of infection and could have 5 orgasms instead of one under the same circumstances.

Altogether, ten diabetic women did not experience any orgasms during the prior year compared to two among the controls. Four of these diabetic women were amenorrhoic. The six who were menstruating had a mean of 39 days between the menses in comparison to 30 days in the group of women with diabetes who had experienced orgasm during the last year.

Discussion

Recruiting women for research on sexual experiences is a delicate matter. Although women were approached tactfully, many would not agree to take part either in an interview or in a physical examination with an explicit sexological focus, because sexual experiences are looked upon as very private. Still, it was a sincere intention in this study to recruit a randomly selected sample. However, many women, both diabetics (44.7%) and controls (62.5%), declined participation. Similar studies by the author on women with hypothalamo-pituitary disorders (Hulter & Lundberg 1994) and multiple sclerosis (Hulter & Lundberg 1995) had lower rates of refusal to participate, 9.4 and 17.5% respectively. One explanation could be that the women with IDDM were not hospitalised, and they were mostly functioning well at home. They had to keep up, not only with the needs of their families and vocational demands, but with time and energy consuming medical diagnostics and treatment of their diabetes. Research in the field of diabetes is extensive, and the patients already have the psychological benefit of knowing that their disorder has been focused on scientifically. Patients with less studied diseases might be more motivated by this aspect. The women with IDDM expressed that they didn't want to pay an extra visit to the hospital just to take part in research. It is not possible to judge whether the dropouts had more or less sexual problems than those who took part in the study. The fact that the women with IDDM did indeed have less sexual complaints than women with multiple sclerosis and hypothalamo-pituitary disorders might have been a good reason for them not to take part in the study.

More of the diabetic women had never been married than the controls. They also had less on-going steady sexual relationships. Some women with IDDM questioned if they really should take part in the study since they were not in a steady sexual relationship. In former studies of women with diabetes (Kolodny 1971, Tyrer 1982, Schreiner-Engel 1987, Campbell 1989), non-cohabiting or non-coitally active women were not included. However in our study, the women with diabetes were informed that such a relationship was not a criterion of inclusion in the study. The same explanation was not given to the female controls and it might have prevented women with no ongoing sexual relationship from taking part in the study. The resemblance in demographic and sexological history data between women with IDDM and controls provides support that the controls were suitable for comparison of the sexual function with the women with IDDM. Although women with IDDM are not supposed to smoke for health reasons, they smoked in exactly the same percentage as the controls and as the female population in general, of women planning to become pregnant in Sweden (Holm & Otterblad Olausson 1996).

Both groups reported variations in sexual function through the years. The women's interpretations of the connections to concurrent life events differed between the groups. The women with IDDM associated their sexual abilities more to their relationships and to the disease. The controls connected their fluctuations to changes in desire, childbearing and the use of hormonal contraceptives (the pill). The controls had experienced more improvements by practice and less deterioration in orgasmic capacity than had the women with diabetes.

Kolodny (1971) reported 35.2% absence of orgasmic response (6% in controls). Only 4 of the 44 anorgasmic women were primary anorgasmic. The rest had gradually become non-orgasmic over a period of 6 months to 1 year. Jensen (1981) found sexual dysfunction in 27.5% of 80 insulin-treated women, most often reported as reduced sexual desire, in comparison to 25% in controls. Peripheral neuropathy correlated with sexual dysfunction in diabetic men as well as women. Newman and Bertelson (1986) reported the highest rate of sexual dysfunction (47%) in insulin treated diabetic women (Type 1 and 2). They found no association between neuropathy and sexual problems.

Schreiner-Engel et al (1987) studied sexual functioning in women with different types of diabetes and in healthy controls. They found that Type 1 diabetes (IDDM) had little or no effect on the women, while Type 2 (most often NIDDM) had a pervasively negative impact on sexual desire, orgasmic capacity, lubrication, sexual satisfaction, sexual activity, and on relationships with sexual partners. The difference in mean age between the groups was 10 years and the age span was 50 - 60 years, which might have influenced sexual functions. However, Schreiner-Engel et al reported that 11% of women with Type 1 diabetes seldom or never were interested in sexual activity. In 10%, lubrication was seldom or never sufficient for intercourse, and 15% had not had orgasms recently. There were only small differences between that Type 1 group in comparison to the IDDM-group in this study: The duration of disease was the same, 20 years, but signs of diabetic complications were higher in the present group of women. Frequency of miscarriages and abortions were 5% less in the present group, 29% and 21% respectively. The 5 postmenopausal women in this study all had Type 1 diabetes. One discriminating factor might be that all subjects in the study by Schreiner-Engel et al had been living with their sexual partner for at least the preceding year. These authors also suggest that their subjects might have been a selected group of diabetics. Establishing steady sexual relationships might be difficult for Type 1 diabetic women with multiple complications of the disease. In the present study, 26 % were not cohabiting. Of these, 36% had reduced desire, 11% decreased lubrication and 50% reported reduced orgasmic response.

Sexual dysfunction was common in our group of diabetic women. Nephropathy as well as autonomic neurological symptoms correlated with the sexual impairments. Anorgasmia correlated with amenorrhoea and with prolonged menstrual cycles. This may be related to the impact of oestrogen. The group mean of VPT was higher in the diabetics than in the controls in feet and significantly higher in hands and clitoris. Vibration perception in the feet seems to be influenced by decreased temperature (Fagius & Wahren 1981). They showed pronounced intraindividual variation for all thresholds in a methodological study using VPT-measurement on normal subjects and patients with polyneuropathy. This variability limits the usefulness of the method for longitudinal studies of single patients. The authors state that the method is useful for comparing groups of subjects in clinical and epidemiological investigations, but the variability may prevent detection of existing differences between groups.

In one study, Slob et al (1990) measured both labial temperature changes and subjective responses to erotic visual stimulation in women with IDDM and controls. No significant differences were found. When Wincze et al (1993) measured vaginal pulse amplitudes (VPA) by photo-plethysmography, they found that 6 of 7 women with IDDM had less physiological arousal to erotic stimuli than controls, whereas their subjective responses were comparable. None of the women had severe diabetic complications and the one diabetic woman who responded similarly to the controls on VPA had the shortest history of diabetes and reported no complications. It was suggested that diabetic women are as capable as non-diabetic women of experiencing sexual arousal when viewing erotic stimuli in spite of their lower VPA responsivity. Unlike men, where decreased genital vasocongestion may result in "sexual failure", women may be less likely to perceive failure or to develop negative self evaluations associated with less genital congestion.

In a qualitative study, LeMone (1996) described the physical effects of diabetes on sexuality by interviewing 20 women with IDDM and NIDDM. Problems reported by subjects affecting sexuality were fatigue, changes in perimenstrual blood glucose control, vaginitis, decreased sexual desire, decreased vaginal lubrication, and an increased time to reach orgasm. Vaginal infections were not identified as a significant problem in the present study.

The sexual difficulties shown in this study are not surprisingly high in comparison to findings in men with IDDM. These women had not asked for sexual counselling, but were not functioning as well as their age-matched controls. The sexual abilities in connection to life-satisfaction and coping will be discussed in a forthcoming paper.

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