

# Sexual dysfunction and sexual health concerns in women with diabetes

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## Abstract

This article aims to investigate the prevalence of female sexual dysfunction and sexual health problems in women with diabetes. We explore the causes, natural history and available treatments.

We have examined evidence from clinical and non-clinical studies for sexual dysfunction in women with diabetes and report this information alongside our own large, self-reported study of sexual health problems.

Sexual dysfunction is more prevalent in diabetic women compared to controls. Problems identified include reduced vaginal lubrication, inability to achieve orgasm, dyspareunia and reduction in libido. Other sexual health concerns include genito-urinary infection, problems of self-image, depression and mood-related issues, plus a range of reproductive and contraceptive worries.

In conclusion, sexual health problems are common in women with diabetes. Women should be encouraged to talk about sexual health issues, and specialist advice and therapies should be made available to those who need it. Psychological factors have a more profound effect on sexual functioning in women with diabetes compared to men where physical sexual dysfunction (erectile dysfunction) is the dominant problem. Copyright © 2013 John Wiley & Sons.

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## Key words

female sexual dysfunction; reproduction; lubrication; orgasm; contraception; depression

## Background

Sexual health remains a much neglected area of study in clinical medicine but it is important for psychological and social well-being as well as reproductive function. Given the multi-system nature of diabetes and its complications and the complex physical and psychological issues involved, it is not surprising that sexual health is markedly affected by this condition.

Male sexual problems have been shown to be common in diabetes and treatment of erectile dysfunction in men with diabetes has received considerable attention.<sup>1</sup> This has led to greater awareness of the problem and improvements in management.

Female sexual health issues in diabetes<sup>2,3</sup> have received little attention, yet sexual health problems in this group may be more common than previously recognised.

There are four phases to the sexual response cycle. These are desire, arousal, orgasm and resolution.<sup>4</sup>

The desire phase is often referred to as libido. Several studies have shown a significantly decreased level of sexual desire in women with diabetes, varying from 20–78%, and

this problem appears to be more common in type 2 diabetes.<sup>5–12</sup>

The arousal phase is responsible for the erection in men and lubrication in women. Reductions in arousal of 14–76% have been reported in women with diabetes,<sup>1,8,10,13</sup> although others report little effect.<sup>14,15</sup>

Animal studies have shown that type 1 diabetes impairs the contractile and relaxant capacity of vaginal musculature, reduces clitoral and vaginal blood flow and causes fibrosis of the clitoris and vaginal tissue with reduced muscular layer and epithelial thickness in the vagina.<sup>16–18</sup> Clinical studies in women with type 1 diabetes have demonstrated a significantly impaired arousal response, as measured by vaginal blood flow,<sup>19</sup> when exposed to erotic stimuli. It seems likely that structural changes in female genital tissue, plus impairment of nerve and blood supply, might impact on the arousal and orgasmic sexual response. However, although physical arousal in men (the erection) correlates highly with subjective arousal, measured physical arousal in women correlates less with subjective sexual arousal.<sup>20,21</sup>

Most studies have reported an increase in general orgasmic problems in women with diabetes, ranging from 10–84%,<sup>10,22</sup> but several studies have failed to show any effect of diabetes.<sup>6,14,23,24</sup> Variations may be attributable to differences in populations studied and the self-reporting of outcomes. In addition, the ability to achieve orgasm is affected by all stages of sexual functioning.

Several studies have shown an increased risk of dyspareunia (painful intercourse) from diabetes ranging from 3–43%, and this can affect all stages of the sexual cycle. Erol *et al.*<sup>25</sup> have also shown that women with diabetes have reduced vibration sense in their genitalia but this does not correlate with sexual dysfunction.

There are other sexual health concerns which may specifically or more frequently arise in the female population with diabetes. These include medical issues related to pregnancy, contraception and genito-urinary infection, as well as psychological issues: mood, anxiety and self-image. There is a lack of up-to-date research identifying the prevalence and impact of these predominantly female issues.

In contrast to findings in men with diabetes, most studies in women show no correlation between sexual dysfunction and duration of diabetes, glucose control, complications or medication.<sup>6–9,11–15,24,26</sup> A few studies have suggested a correlation between female sexual dysfunction (FSD) and neuropathy and with FSD and duration of diabetes.<sup>10,22,26–28</sup>

The most well-established risk factor for FSD in women with diabetes is depression.<sup>6,7,11–13,28,29</sup> Women with diabetes are at increased risk of developing depression<sup>30</sup> which can impact on all stages of sexual functioning.<sup>31</sup>

Several studies have shown that other psychological issues in diabetes may negatively impact on sexual function; these include problems of self-image, tiredness and dependency on others.<sup>14,15</sup>

Type 2 diabetes has negative psychological effects on sexual function,<sup>15</sup> women viewing themselves as less attractive and less happy, reporting less satisfaction with their sexual partner, sex life in general,

Variable	Diabetic patients	Controls
No. (% reply rate)	161/270 (60%)	72/104 (69%)
Age: years*	46 (35–53)	44 (34–51)
Diabetes type	55% type 1, 45% type 2**	–
Duration of diabetes: years*	10 (5–20)	–
*Data are median (interquartile range). **43% of type 2 patients were receiving insulin therapy		

**Table 1.** Subject characteristics in the self-reporting study of female sexual dysfunction

lubrication and orgasm. Diabetes and increased age are associated with both reduced desire<sup>32</sup> and decreased arousal in women.<sup>33</sup> However, few studies of women with diabetes report the treatment status of women experiencing postmenopausal symptoms. This is important because oestrogen therapy is associated with improved postmenopausal vaginal lubrication and potentially less FSD in the arousal stage.

These findings are explored in our own self-reporting study (below) where we have determined whether sexual dysfunction in women with diabetes is more common in a typical clinic population, and examined the effect of physical and psychological influences on sexual functioning.

### Prevalence of female sexual dysfunction: self-reporting study

#### Study methods

We randomly distributed an anonymised investigative questionnaire to 270 women with diabetes who were aged 21–65 years. Information was obtained from three separate diabetes centres over a three-month period and an abbreviated form of the questionnaire, which omitted diabetes-specific questions, to 104 age-matched non-diabetic healthy control subjects recruited from hospital staff. Ethical approval was obtained from the local research ethics committee and verbal consent was obtained. Subject headings were derived from Koch's Sexual Concerns Inventory,<sup>34</sup> and questions were designed to address a range of female sexual health issues.

• **The sexual act.** Women with diabetes and controls were asked specifically about several aspects of sexual functioning – libido, vaginal

lubrication, pleasure obtained from sex, genital sensation, orgasmic ability and dyspareunia. The severity of problems were recorded using a Likert scaling system, with graded responses ranging from 'severe' to 'not at all'.

• **Physical health.** Women with diabetes were also asked about a number of general health issues. These included questions about the effects of any co-existing medication on sexual health and the presence and impact of genito-urinary infection or inflammation.

• **Family planning.** Women with diabetes were asked about any concerns regarding pregnancy and contraception and for any advice and information they had received.

• **Psychological well-being.** Women with diabetes were also asked about general psychological issues and their relationship to diabetes. These included worries about body image, communication with others and a range of psychological symptoms.

The characteristics of subjects are shown in Table 1.

### Study results

Sexual problems were more common in women with diabetes compared to controls (Table 2). Women with diabetes were more likely to report a lack of lubrication/moistness in the vaginal area, and to report painful sex, difficulty achieving orgasm, lack of interest in sex and loss of genital sensation compared to controls. None of the sexual problems recorded were influenced by duration of diabetes (Chi-squared = 1.8–3.2, df=2, p>0.2 for all problems), patient age (Chi-squared = 1.9–3.0, df=2, p>0.2 for all) or diabetes centre attended (Chi-squared

Sexual function	Diabetic patients	Controls	Significance
Lack of interest in sex (libido)	66/103 (64%)	33/70 (47%)	$\chi^2=4.5$ , $df=1$ , $p<0.05$
Reduction in pleasure obtained from sex	49/103 (47%)	27/70 (39%)	$\chi^2=1.4$ , $df=1$ , $p>0.2$
Difficulty achieving orgasm	52/103 (50%)	29/70 (41%)	$\chi^2=9.4$ , $df=1$ , $p<0.01$
Loss of lubrication/moistness	72/103 (70%)	28/70 (40%)	$\chi^2=15.3$ , $df=1$ , $p<0.001$
Loss of genital sensation	37/103 (36%)	14/70 (20%)	$\chi^2=5.1$ , $df=1$ , $p<0.05$
Dyspareunia	44/103 (43%)	16/70 (23%)	$\chi^2=7.3$ , $df=1$ , $p<0.01$

**Table 2.** Prevalence of self-reported functional sexual problems in diabetic patients compared to non-diabetic controls

=1.7–2.6,  $df=2$ ,  $p>0.2$  for all). Only 17% of those respondents reporting difficulties with sexual function had sought medical advice, and only 20% were aware that treatment might be available.

One-third of women (33%) replied that diabetes had affected their choice of contraception; 31% of women had worried that their fertility would be affected by diabetes; 43% worried about becoming pregnant (concerns included the need for tight antenatal glycaemic control, the risk of complications to mother and baby and the perceived likelihood of hospital admissions). In 12%, concern about pregnancy had led to sexual or relationship difficulties. Sixty percent of women of child-bearing age had not discussed the topic of pregnancy with a health care professional; 75% expressed concern that their diabetes might be passed on to a child or future child and, in 66%, this worry had never been discussed.

Problems of self-image attributed to diabetes were common. Thirty-six percent felt that their diabetes had led to a loss of self-esteem. Feelings of loneliness or isolation, attributed to diabetes, were common (40% in type 1 vs 21% in type 2 [Chi-squared =7.3,  $df=1$ ,  $p<0.05$ ]). Sufferers felt that friends, family or partner did not understand the effects that insulin administration had on lifestyle. Loss of attractiveness attributed to diabetes was also reported more commonly in type 1 compared to type 2 patients (34% vs 19%; Chi-squared =4.1,  $df=1$ ,  $p<0.01$ ). This was due predominantly to either injection site disfigurement or insulin

mediated weight gain. Patients reported other diabetes-attributed factors affecting sexual health including tiredness (70%), anxiety/worry (53%), anger/irritability (61%), depression (50%) or lack of time/inconvenience (37%). Post-menopausal women were more likely to suffer anxiety/worry and depression which aggravated sexual problems (40% vs 14% [pre-menopause] and 25% [peri-menopause]: Chi-squared =8.6,  $p<0.02$  and Chi-squared =6.0,  $p<0.05$ , respectively).

Twenty-three percent of women with diabetes suffered from genitourinary infections, cystitis or 'thrush', inhibiting sexual relationships. Medication was implicated in 8%, primarily attributed to antibiotic therapy leading to thrush or changes in oral contraceptive regimen. Only 14% reported chronic complications as negatively affecting sexual relationships.

### Study discussion

Many aspects of sexual functioning appear to be impacted by diabetes. The arousal phase of sexual function resulting in lack of lubrication appears to be most significantly affected and is accompanied by a reduction in libido and in ability to achieve orgasm, and pain on intercourse. A more detailed analysis of these findings and those of related studies, together with study limitations, are discussed more fully in this article's conclusions.

Psychological issues are common in women with diabetes and they appear to be impacting on sexual functioning. Family planning worries

and the impact of medication and ill health also appear to have a negative effect on sexual function.

### Treatment of female sexual dysfunction

The treatment of sexual dysfunction in women with diabetes is less clear-cut than in men. There are no specific guidelines available and effective therapy may involve psychological and/or pharmacological treatment.

Sexual dysfunction in women with diabetes is complex and may require complex solutions. Psychological treatment needs to take into account the wide-ranging elements of dysfunction including depression and anxiety within the context of relationship difficulties. Treatment should be offered by diabetes psychotherapists, such as cognitive analytic therapists and sex psychotherapists skilled in the interconnection of these difficulties.

Long-standing and desire phase (libido) dysfunction is more resistant to treatment. Psychological issues, such as previous sexual education and experiences, relationship issues, anxiety and depression, and the mechanisms the woman has developed to cope with diabetes and life, may need to be addressed. Couple therapy has been proven to result in greater partner intimacy.

Treatment of depression is crucial for women with sexual dysfunction, while appropriate and specific antidepressive medications are beneficial.

Adequate glycaemic control is in lessening depressive illness and reducing the risk of complications.

Oestrogen replacement therapy in postmenopausal women may improve sexual function by proliferating vaginal mucosa, improving vaginal pH and elasticity, and increasing vaginal blood flow to enhance lubrication.

Testosterone replacement can improve FSD secondary to androgen deficiency in women<sup>35</sup> and the Intrinsa patch is licensed for topical use. Testosterone can have beneficial effects on desire, arousal, and orgasm. Long-term side effects have not yet been fully evaluated, with hepatic dysfunction, cardiovascular disease and malignancy being potential risks.

Women with arousal or orgasm disorders can benefit from generic vibrating tools or localised aids such as the Eros clitoral therapy, a device which creates a gentle vacuum that increases genital blood flow and sensitivity.

Phosphodiesterase type 5 (PDE-5) inhibitors act on nitric oxide-mediated smooth muscle relaxation to increase vasodilatation, so might theoretically improve vaginal lubrication and vulvar engorgement. Studies with PDE-5 inhibitors have been small and not ideally designed to focus on lubrication potential. Sildenafil is not licensed for use in women with FSD but it has some benefits in the arousal phase of sexual dysfunction results.<sup>36</sup>

### Conclusions

It is clear that women with diabetes are at higher risk of FSD with effects on desire, arousal, orgasm, sensation and dyspareunia; however, it is not known whether these effects are primary or secondary. For example, primary arousal problems can impact on all the other stages of the sexual cycle.

Genital changes may not, however, be the critical factor in determining FSD, given the complex interaction of physical and psychological factors.<sup>37</sup>

Psychological factors in sexual response seem to be more important in women than in men.<sup>15,38,39</sup> In addition, men's physiological sexual response can be measured by their erection which directly affects subjective arousal. It is difficult to measure genital arousal (congestion and lubrication) in women and the relationship between physiological and psychological states of sexual response is lower in women.<sup>20,21,40,41</sup> Small alterations in erection make intercourse difficult in men and this reduces subjective arousal. In contrast, women can engage in sexual activity when lubrication is decreased, so a higher degree of physical dysfunction may be required before it becomes obvious. This difference may provide one explanation as to why diabetic complications seem to have less impact on sexual function in women than in men.

Men primarily complain of erectile dysfunction, whereas women most

Sexual problem	Available treatments
<b>Reduced vaginal lubrication</b>	<ul style="list-style-type: none"> <li>• Application of water-based vaginal lubricants</li> <li>• Local or systemic hormone replacement therapy (HRT)</li> <li>• Education regarding the need for adequate stimulation prior to intercourse</li> <li>• Arousal enhancement strategies, e.g. increased/prolonged stimulation, fantasy, erotic focus, anxiety reduction</li> <li>• PDE-5 inhibitors may be effective</li> </ul>
<b>Loss of genital sensation</b>	<ul style="list-style-type: none"> <li>• Penetrative vibrating sex aids</li> <li>• Arousal enhancement strategies</li> <li>• Exploration of other erogenous zones, e.g. breasts, lips, neck, thighs, buttocks, perineal and anal areas</li> </ul>
<b>Dyspareunia</b>	<ul style="list-style-type: none"> <li>• Treatment of underlying genito-urinary disease</li> <li>• Vaginal lubricants</li> <li>• Arousal enhancement</li> <li>• Decreased focus on penetrative sex</li> </ul>
<b>Inability to orgasm</b>	<ul style="list-style-type: none"> <li>• Psychosexual techniques, including arousal enhancement</li> <li>• Vibrating sex aids. Clitoral therapy devices</li> </ul>
<b>Reduced libido</b>	<ul style="list-style-type: none"> <li>• Treatment of concurrent depressive illness</li> <li>• Addressing intrapersonal, interpersonal and self-image issues</li> <li>• Correction of concurrent sexual problems</li> <li>• Use of oestrogen replacement therapy in post-menopausal women</li> <li>• Consider adding testosterone replacement</li> </ul>

**Table 3.** Sexual dysfunction in women with diabetes: available treatments

commonly complain of decreased desire.<sup>42</sup> Therefore, the major sexual problem in men is more vulnerable to vascular and neurovascular changes caused by diabetes, but these have less influence on FSD. Women are also more vulnerable to psychosocial factors.<sup>43</sup> Depression and individual coping are strong predictors of sexual dysfunction in women with diabetes,<sup>6,13,29</sup> and the quality of a marriage has been shown to be the best predictor of sexual dysfunction in women.<sup>44</sup>

The mechanisms by which diabetes adversely affects physical sexual dysfunction in women remain unclear, but the importance of diabetes-related risk factors is less than in men. Although psychosocial factors are more important than organic factors in the pathogenesis of FSD, physical effects may still be important. Hyperglycaemia reduces the hydration of mucous membranes in the vagina, leading to decreased lubrication and dyspareunia. The increased prevalence of vaginal infections increases the risk of vaginal discomfort and dyspareunia. Vascular damage and neuropathy

may result in decreased genital blood flow, leading to impaired genital arousal response.

The most commonly reported sexual problem in our population was lack of vaginal lubrication. This is consistent with under-reported findings from previous studies.<sup>1,15,23,24,38</sup> The inability to lubricate may partly explain the increased frequency of dyspareunia, inability to achieve orgasm and reduced libido observed in our patient group. However, conversely, reduced libido can contribute to the lack of lubrication. The inter-relationships between these physical sexual problems are likely to be complex and, rather than being specific to diabetes, may be related to the presence of a chronic disease state, self-esteem issues and/or depressive illness.

Health care professionals should be aware of the high prevalence of self-image problems present in younger women with diabetes, particularly the problems of weight gain and injection site disfigurement. Among older women, depression and anxiety are commonly attributed to diabetes and, by addressing

these psychological difficulties, it may be possible to reduce subsequent sexual morbidity. Pragmatic issues such as lack of time or inconvenience caused by diabetes and interpersonal problems such as support from and communication with partners are important areas of concern for women with diabetes. These are issues which are not currently addressed as part of routine diabetes care.

One limitation of our study is that we cannot give comparative control data for depressive symptoms although our control population did not have chronic illness. The non-response rates were significant (31–40%) and we do not know the degree to which non-responders may have affected outcome. However, since anonymity was guaranteed, we anticipated that the responses would be representative of the populations studied and, in addition, response rates were similar in both diabetic and control groups. The generic impact of chronic illness cannot, however, be precisely determined.

In recent years there has been a paucity of research into the sexual function of women with diabetes. The limited number of studies which have been performed have primarily focused upon the achievement of orgasm as their primary consideration.<sup>23,38</sup> It would be wrong, however, to assume that orgasm is the gold standard of sexual responsiveness,

### Key points

- Sexual dysfunction is more common in women with diabetes. Problems include orgasmic difficulties, reduced libido, lack of vaginal lubrication and dyspareunia
- Women with diabetes should be encouraged to talk about sexual health problems, and specialist help and advice should be made available to them
- Reproductive and contraceptive worries plus mood-related and self-image issues can have a profound effect on female sexual health. Greater efforts should be made to effectively educate women with diabetes and to address psychological concerns

and research focusing on this phase of sexual response may have underestimated the effects of diabetes on sexual function.

Further studies are required to investigate the complex aetiology of sexual dysfunction in female patients. There are effective treatments available for many of the sexual problems highlighted in our patient group (Table 3), yet few of our patients were aware that any treatment was available or had sought any assistance.

We have identified a number of sexual health concerns in diabetic women which, if identified, are treatable and may improve quality of life and glycaemic control. Women

should be encouraged to speak freely about functional sexual problems, and specialist advice should be made available for those who require help. Treatment of sexual dysfunction in women with diabetes includes lifestyle change, optimal diabetic control, psychotherapy, and appropriately-selected medical therapy. Further research is necessary to investigate the effects of the different types of diabetes on female sexuality.

The reproductive issues highlighted in this study emphasise the need for improved pre-pregnancy and genetic counselling. Worries about fertility, contraception and the risks of pregnancy can lead to significant anxiety and sexual morbidity and, in many cases, may be prevented by appropriate education.

Finally, the incidence of sexual dysfunction in women with diabetes appears strongly linked to psychological factors, particularly depression; this is an area that needs further study. We hope that this review stimulates future research and reminds health care professionals of the importance of sexual health concerns in women with diabetes.

### Declaration of interests

There are no conflicts of interest declared.

### References

References are available at [www.practicaldiabetes.com](http://www.practicaldiabetes.com).

## News

### Continuous monitors may miss hypoglycaemia

Continuous blood glucose monitors may not accurately detect low blood sugar, according to research presented at the recent EASD conference by Dr Eric Zijlstra of Neuss, Germany. A total of 18 patients, mean age 43, participated in two seven-day, in-hospital stays, in which they were connected to the sensors that took a read every five minutes. Blood samples used as reference measurements were taken every four hours.

Blood draws were also done when patients had hypoglycaemic symptoms or the monitor alarm went off. Alarms would sound if blood glucose fell

below 70mg/dl. The researchers collected a total of 2286 data points. They found that the mean relative absolute deviation between blood draws and continuous glucose monitor sampling was 18.3%. The research found that deviation was the greatest within the low glucose range, at 26.9%.

### Increase in life expectancy in type 1

A major new study, whose data were released at EASD, showed a marked improvement in life expectancy for people with type 1 diabetes in Scotland. Researchers from the University of Dundee led by Professor Helen Colhoun used data from the

nationwide Scottish Care Information – Diabetes Collaboration database. Anonymised data extracted from this database were linked with death data from the General Register. The study looked at people living with type 1 aged 20 years or older any time between 2008–2010.

The study focused on ‘remaining life expectancy’ and how this compares with the same figure for the general population. In people with type 1, the remaining life expectancy for those aged 20–24 years was 45 years for men, and 47 years for women. This compares to estimates of 56 and 61 years, respectively, for men and women of the same age in the general population.

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