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Review Article

# Sexual Dysfunction Among Women with Diabetes Mellitus: A Review

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## ABSTRACT

**Background**: Sexual health which remains a much-neglected area in clinical medicine is important for psychological and social well-being. Female sexual dysfunction (FSD) which is described as a complex problem, is classified as sexual desire disorders, sexual arousal disorders, orgasmic disorders and sexual pain disorders. Although the study of sexual dysfunction (SD) in diabetes mellitus (DM) is widely explored in men, there is limited literature regarding FSD in DM which is often a neglected health issue.
**Objective:** To bring to light the importance of this neglected and under-reported complication of DM among women, highlighting its epidemiology, pathogenesis, diagnosis and management. **Method**: Available literature on the topic from PubMed, Google Scholar and Medline were accessed for review. **Conclusion**: It is clear that women with DM are at higher risk of FSD compared with women without DM. The women with this condition should be encouraged to speak freely about their sexual difficulties with their physicians, who should intentionally address the issue of sexual health when evaluating women with DM.

**Keywords**: Female, sexual dysfunction, diabetes mellitus, complication, health.

## INTRODUCTION

Diabetes mellitus (DM), a disorder of glucose, protein and fat metabolism which is classified into type 1 DM (T1DM), type 2 DM (T2DM), gestational DM (GDM, and other specific types is one of the most common chronic diseases globally. The prevalence of this metabolic disorder, especially T2DM which is the most common type is increasing globally with obesity, aging and physical inactivity promoting this rise.[1, 2] The International Diabetes Federation (IDF), which has described DM as one of the largest global health emergencies of the 21st century, estimated that 537 million adults aged 20–79 years which represents 10.5% of the world's population in this age group had DM in 2021 and this is predicted to rise to 643 million (11.3%) by 2030 and to 783 million (12.2%) by 2045.[1] DM is associated with morbidity and mortality and is said to be among the top 10 causes of death globally arising mostly from cardiovascular events.[3] This metabolic disorder which affects all gender is associated with chronic complications including microvascular complications such as nephropathy, retinopathy and neuropathy leading to foot ulcers and macro-vascular complications such as stroke, cardiovascular events like myocardial infarction and peripheral arterial disease.[4] Another complication which people with DM are prone to suffer from and

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appear to be underestimated and overlooked in clinical practice is sexual dysfunction (SD)[5] which is seen in both men[6-11] and women.[12-16]

Sexual health which remains a much neglected area in clinical medicine is important for psychological and social well-being as well as reproductive function.[17] Given the multi-system nature of DM and its complications and the complex physical and psychological issues involved, it is not surprising that sexual health is markedly affected by this condition.[18] There is evidence that, for people with DM, the impact of sexual dysfunction on quality of life equals or exceeds that of neuropathy, nephropathy, or retinopathy.[19]

Female Sexual Dysfunction (FSD) which is described as a complex problem is classified as sexual desire disorders, sexual arousal disorders, orgasmic disorders and sexual pain disorders.[20] The presence of SD in men, especially erectile dysfunction (ED) can be an early symptom that points to the diagnosis of DM.[21] SD is associated with depression and other mental disorders,[22] low quality of life,[23] poor relationships[24] and poor self-rated health[25] which further impact negatively on the health of the individual. Discussion of sexual issues is generally considered a taboo in many cultures with patients with this problem being hesitant about initiating the conversation.[26, 27] Many doctors don't feel comfortable prodding patients for details on sexual function either, that's why the newly diagnosed patients with DM quickly learn about their risk for eye, nerve, kidney and heart complications, but hardly ever hear how DM affects sexual health.[28] A study conducted among people with DM, reported that more men than women discussed their sexual issues with their doctors.[29] Because of the taboo and social stigma associated with SD, women with this condition perceive their problem as being normal and not a medical condition that requires attention.[21, 30, 31]

Research on SD among patients with DM have been more extensive among men[32] even though a survey in the United States of America (USA) showed that it occurs more frequently in women than in men.[33] Although the study of SD in DM is widely explored in men, there is limited literature regarding FSD and DM and it is often a neglected health issue in women.[34] This review article aims to raise awareness of this complication of DM among women highlighting its epidemiology, pathogenesis, diagnosis and treatment.

**Epidemiology of Female Sexual Dysfunction in Diabetes Mellitus**

FSD occurs in both T1DM and T2DM.[35, 36] It remains an underreported complication of DM in view of sociocultural barriers.[36] Data on the prevalence of FSD in women with DM are few and often discordant because of the lack of standardization in methods of diagnosis and small sample size.[37, 38] These data are said to be underestimated.[32] The prevalence varies depending on the type of DM. Among patients with T2DM, prevalence rates reported range from 17% to 88%[12, 14, 16, 36, 39, 40] while in patients with T1DM, the rate ranged from 15.9% to 71%.[14, 40-43] In studies that combined both T1DM and T2DM women, prevalence rates of 40.3%[13] and 53.3% were reported.[15] T2DM seems to have a greater negative impact on female sexuality than T1DM.[44]

All the domains of sexual function are affected by DM but some studies reported that the sexual domains commonly affected are lubrication, libido, arousal, pain and orgasm. [39, 43] Another study reported that all domains of the sexual function had lower scores among patients with DM except for sexual desire and arousal.[45] In a meta-analysis that considered 26 studies involving 3,168 women with DM and 2,823 women as control, Pontiroli and colleagues[46] showed that the rate of FSD was higher in T1DM, T2DM and in both cases of T1DM and T2DM than in controls for any duration of DM. The prevalence was 36.5% in T2DM, 71% in T1DM and 69.3% among both T1DM and T2DM patients. This meta-analysis also showed that FSD is more common in premenopausal than menopausal women and the chance for women with T2DM and T1DM to develop SD is 2.49% and 2.27% respectively more than that of the women in the control group. Rahmanian and co-workers,[47] in a more recent meta-analysis that reviewed 25 studies among women with T2DM involving 3892 individuals aged 70–18 years showed that the overall prevalence of sexual dysfunction in women with T2DM was 68.6%. The highest and lowest prevalence of FSD was 94.4% in Iranian women and 17% in Italian women.

Several risk factors have been associated with FSD in DM. Many studies identified poor psychological well-being including anxiety and depression as a determinant of FSD in both T1DM and T2DM.[12, 13, 15, 16, 39, 41, 46] Psychological concerns may play a significant role in the development of FSD in DM which may be in line with the complex nature of female sexuality, which is largely dependent on psychological and cultural factors, even more so than male sexuality.[48] Other factors include increasing age,[13, 15, 36, 43, 45, 49] presence of DM complications,[12, 15, 41, 50] presence of co-

morbidities,[15, 45] increasing Body Mass Index (BMI) and abnormal waist circumference,[36] poor quality of relationship with patner,[43, 51] lack of formal education,[15] T2DM,[15] divorced or widowed,[15, 45] physical inactivity,[15] glycaemic control, endothelial dysfunction and neuropathy,[12] menopause[13, 49] and duration of DM.[49]

**Pathogenesis of Female Sexual Dysfunction in Diabetes Mellitus**

FSD in DM is complex and the precise mechanisms in which DM adversely affects SD in women remains unclear.[44, 48] There are four phases of the sexual response cycle which include excitement, plateau, orgasm, and resolution.[52] During this sexual response cycle, heart rate, respiration and blood pressure increase with vasocongestion of blood vessels occurring leading to engorgement of the clitoris, labia majora, labia minora and the uterus with associated vaginal lubrication and muscles contraction in women.[52] To ensure proper interpretation and response to erotic stimuli, the normal female sexual response requires an intact sensory and autonomic nervous system.[44]

The mechanisms involved in FSD in DM include hyperglycaemia, infections, vascular damage, neurological damage and psychological abnormalities.[12, 32, 44]

Hyperglycaemia which is one of the metabolic milieu in DM, is the initiating cause of tissue damage including vascular damage seen in the complications of this condition.[53] In women, hyperglycaemia reduces the hydration of the vaginal mucus membranes, producing poor vaginal lubrication and dyspareunia.[18] Hyperglycaemia causes vascular damage in different cells of the vascular wall through different mechanisms including increased flux of glucose and other sugars through the polyol pathway, augmented intracellular formation of advanced glycation end products (AGEs), increment in the expression of the receptor for AGEs (RAGE) and its activating ligands, activation of protein kinase protein kinase C (PKC) isoforms and over activation of the hexosamine pathway.[54, 55]

Vascular and nerve damage induced by hyperglycaemia in DM impair sexual response by producing structural and functional changes in the female genitalia.[48] Together with excess free fatty acid release and insulin resistance, hyperglycaemia induces a vicious circle of events in the vascular wall, involving increased endothelial dysfunction, oxidative stress, low-grade inflammation and platelet hyperactivity in the early stages of DM which impairs endothelial function, augments vasoconstriction, increases inflammation, and promotes thrombosis.[55, 56] One of the mechanisms in which this occurs is through impaired bioavailability of nitric oxide which is involved in smooth muscle relaxation and enhancement of genital blood flow and thus may influence sexual function.[44, 55]

Diabetic neuropathy may contribute to sexual dysfunction by altering the normal perception of sexual stimuli and the consequent sexual response.[57] It may also together with vascular damage result in decreased genital blood flow leading to impaired genital arousal response.[18]

Genitourinary infections which may lead to vaginal discomfort and dyspareunia can arise as a result of hyperglycaemia.[18, 44] Hyperglycaemia is known to alter the polymorphonuclear leukocyte function which increases risk of urinary tract infection and can impact on the sexual function of a woman.[58]

Unlike what is seen in men with DM, epidemiological studies have shown that psychosocial factors are more important in the pathogenesis of FSD in DM than organic factors.[51, 59] Psychosocial factors especially depression is said to play a significant role in FSD among subjects with DM. It has been recognized as the most significant risk factor for FSD in women with DM and may impair sexual health at different levels.[32] Women daily battle not only with DM but with its complications which are said to be significantly and consistently associated with depression.[60] The presence of DM complications may have a negative impact on patients' physical and mental health and quality of life leading to the development of depression.[61]

**Evaluation and diagnosis of Female Sexual Dysfunction in Diabetes Mellitus**

Assessment of FSD should include a sexual history and physical examination with laboratory testing usually not needed.[62] However, many doctors are not comfortable prodding patients for details on sexual function.[28] The evaluation may be limited by time constraints, patients' discomfort, difficulty with diagnosis, lack of available referral services, and limited treatment options.[63] The diagnosis of FSD can be made using validated sexual function instruments, although most of these self-report or interview questionnaires are primarily used in the research setting.[62] Such questionnaires are brief and take a maximum of 20 minutes to administer.[64] The Female Sexual Function Index FSFI is one of the most used of these tools.[65] The FSFI, a validated tool is a psychometric, 19-item questionnaire which is a brief, easy to administer, multi-dimensional self-

report instrument for assessing the key dimensions of sexual function in women and it has demonstrated ability to discriminate between clinical and non-clinical populations.[65] This questionnaire assesses desire, arousal, lubrication, orgasm, pain, and satisfaction, and estimates the risk of having sexual dysfunction by scores < 26.55.[66] Other tools that can be used include the Changes in Sexual Functioning Questionnaire (CSFQ), the Derogatis Interview for Sexual Functioning (DISF/DISF-SR), the Golombok-Rust Inventory of Sexual Satisfaction (GRISS) and the Brief Index of Sexual Functioning for Women (BISF-W).[64]

The use of these tools should be combined with clinical history taking beginning with open-ended questions followed by general examination to assess for other pathological aspect that can negatively affect sexual function in these women.[62, 66] Additional tools which have been validated include the Beck Depression Inventory (BDI) to assess for depression and the Dyadic Adjustment Scale (DAS-32) to assess the relationship quality of intact (married or cohabiting) couples can also be used to determine their impact on the sexual health of these women.[67, 68]

Laboratory evaluation is rarely helpful, as there is no reliable correlation between hormone levels and sexual function.[62, 69]

**Treatment of Female Sexual Dysfunction in Diabetes Mellitus**

Currently, there are no specific guidelines available for the treatment of FSD in DM. However, options available for the treatment of these women include lifestyle changes, optimal DM control, psychotherapy, and selected medications when appropriate.[18, 32, 44, 48]

Lifestyle changes targeting weight loss and increased physical activity have been shown to improve sexual health. It is said to be the first step in the treatment of FSD in DM.[32] In a study conducted by Wing and colleagues, women with FSD at baseline that embarked on intensive life intervention were found to be more likely to remain sexually active over the one year of follow-up and were more than twice as likely to experience remission of FSD as compared to a control group who had DM support and education.[70]

Lifestyle changes targeting diet which is the cornerstone of any DM therapy has also been associated with improvement in sexual function of women with DM. Guigliano and co-workers reported that among women with T2DM, greater adherence to a Mediterranean diet is associated with a lower prevalence of FSD.[71] This association was independent of various anthropometric, lifestyle and clinical characteristics. These lifestyle changes may impact positively on insulin resistance and endothelial function leading to improved glucose control which may in turn improve sexual dysfunction by reducing DM complications.

Optimal DM control, achieved with the use of anti-diabetic agents, is another important modality in the management of these women which impacts on sexual function.[18, 48] Tight glycaemic control with glycated haemoglobin concentration of ≤ 7%, is recommended to minimize the risk of chronic complications, especially microvascular complications which impacts on FSD.[72]

Sexual dysfunction in DM women may benefit from resolution of psychological issues.[48] The treatment of depression with specific anti-depressive medications when indicated and psychotherapy are employed in the management to achieve this.[18, 48] Couple therapy has been proven to result in greater partner intimacy.[18]

Although, hormonal replacement is approved for use among postmenopausal women, no androgen therapies whether oral or transdermal have been approved for use in FSD by the Food and Drug administration.[32, 48] 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.[18] The administration of oestrogen therapy however, has risks that must be considered when choosing the most appropriate treatment option; it significantly increases the risk of endometrial cancer, with the risk being high with increased dose of oestrogen.[73]

Phosphodiesterase type 5 (PDE5) inhibitors which are considered the first-line treatment for erectile dysfunction acts on nitric oxide mediated smooth muscle relaxation to increase vasodilatation which might theoretically improve vaginal lubrication and vulvar engorgement leading to improved sexual dysfunction in women with FSD.[18, 48, 74] However, few successes have been reported with the use of these agents in the treatment of sexual arousal problems in women.[48] In a review article, Shields and a co-worker concluded that it appears that sildenafil, while well tolerated, offers little or no benefit to most patients with FSD.[75] The likely explanation to its ineffectiveness is the low PDE5 levels noted in the female reproductive system[76] and the lack of consistency observed between the physiological and psychological factors on sexual response.[77]

Other medications have also been tried. Flibanserin, a 5HT1A agonist and 5HT2A

antagonist with weak partial agonist activity at dopamine D4 receptors has been approved for use by the United States Food and Drug Administration among premenopausal women.[78, 79]

## CONCLUSION

DM is a chronic disorder with rising prevalence and associated with complications; one of which is SD. Although women with DM suffer from neurovascular complications that contribute to the pathogenesis of erectile dysfunction (ED) in men, psychological rather than organic issues are mostly associated with FSD in women with DM. It is clear that women with DM are at higher risk of FSD compared with women without DM but this is mostly underestimated, unrecognized or neglected even though sexual health is important for the psychological, social well-being as well as the reproductive function of a woman. Therefore, education of women with DM about sexual dysfunction occurring as a complication of DM should be emphasized. These women should also be encouraged to speak freely about their sexual difficulties with their physicians. Clinicians should be aware that this complication of DM does not only affect men and should intentionally address the issue of sexual health when evaluating women with DM. Although the treatment of FSD is not as established as that of ED, promoting healthy lifestyle changes through healthy diet and increased physical activity, good glycaemic control, psychotherapy and the use of appropriately selected medications are useful in the management of these women.

There is a need for more research to investigate the relationship between psychosocial factors especially depression and FSD and effective therapeutic options for this complication of DM among women.

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