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ORIGINAL ARTICLE

Prevalence and Predictors of Sexual Dysfunction Among Women with Endometriosis: A Cross-Sectional Study

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ABSTRACT

Background: Endometriosis is a chronic inflammatory gynecological disorder that may impair sexual functioning through dyspareunia, pelvic pain, psychological distress, and infertility. This study determined the prevalence of sexual dysfunction and its predictors among women with endometriosis.

Methods: This analytical cross-sectional research encompassed 80 sexually active females aged 18 to 45 years diagnosed with endometriosis, who visited the Department of Gynecology and Obstetrics at Nishtar Medical University, Multan, Pakistan, between March 2022 and March 2023. Sexual performance was evaluated with the 19-item Female Sexual Function Index, where a cumulative score of ≤26.55 signifies dysfunction. The intensity of pain was assessed by a numerical rating scale, whilst depressed symptoms were gauged using the Patient Health Questionnaire-9. Binary logistic regression determined autonomous predictors.

Results: Sexual dysfunction was present in 57 women, giving a prevalence of 71.3% (95% confidence interval, 60.5%–80.0%). Mean total Female Sexual Function Index score was 22.8 ± 5.8, with significant impairment across all domains. Severe deep dyspareunia, stage III–IV endometriosis, severe chronic pelvic pain, infertility, and depressive symptoms were more frequent among women with dysfunction. On multivariable analysis, severe deep dyspareunia (adjusted odds ratio 4.21), stage III–IV disease (adjusted odds ratio 3.32), and moderate-to-severe depressive symptoms (adjusted odds ratio 4.33) remained independent predictors. The model showed good discrimination and acceptable calibration for predicting dysfunction.

Conclusion: Sexual dysfunction was highly prevalent among women with endometriosis. Severe dyspareunia, advanced disease, and depressive symptoms were important predictors, supporting routine sexual-health and psychological assessment as part of multidisciplinary endometriosis care.

Keywords: depressive symptoms; dyspareunia; endometriosis; Female Sexual Function Index; sexual dysfunction

INTRODUCTION

Endometriosis is a persistent inflammatory condition reliant on estrogen, marked by the existence of endometrium-like tissue outside the uterine cavity[1]. It often occurs in women of childbearing age and may present as dysmenorrhea, persistent pelvic discomfort, profound dyspareunia, infertility, exhaustion, and gastrointestinal and urinary issues. The clinical trajectory is inconsistent, and the intensity of symptoms does not always correspond to the anatomical severity of the illness. Although pain management and fertility preservation are crucial aspects of treatment, endometriosis can profoundly affect a woman's emotional well-being, interpersonal relationships, and overall quality of life[2,3].

Sexual health is a key aspect of physical, psychological and social health. FSD is a multidimensional disorder that can include diminished sexual desire, diminished sexual arousal, inadequate vaginal lubrication, and diminished sexual pleasure or satisfaction, as well as pain during sexual activity[4,5]. These domains are highly interconnected and a failure in one area can have negative consequences for the other domains. Sexual problems might not be identified in women with endometriosis, as patients may be embarrassed to discuss intimate problems and clinicians might only think to ask about pelvic pain, menstrual symptoms, recurrence of disease, and infertility[6,7].

There are multiple mechanisms that can affect sexual function due to endometriosis. Deep dyspareunia may occur due to lesions of the uterosacral ligaments, posterior vaginal fornix, rectovaginal septum, pouch of Douglas, bowel, bladder or pelvic nerves[8]. Pain during or after sexual activity can also be caused by pelvic adhesions, decreased mobility of the organs, local inflammation, overactive pelvic-floor muscles, and central pain sensitization. Recurrent episodes of pain during sex can lead to apprehensive anxiety, fear of penetration, involuntary pelvic-floor contraction, avoiding sex and low sexual self-confidence. Therefore, Dyspareunia can be manifested in the pain domain as well as the desire, arousal, orgasm and satisfaction domains[9,10].

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Pain is not the only reason why Endometriosis can have an impact on sexuality. When pelvic pain is chronic, it can sleep, exercise, mood, body image and day-to-day life make a mess of, which can reduce libido. A diagnosis of infertility and/or use of fertility treatment can make sex a planned reproductive event, which can lead to less spontaneity and less emotional connection[11,12]. Other factors include previous surgery, recurrent disease, vaginal dryness as a side effect of treatment, unusual bleeding, fatigue, depression, anxiety and fears about being feminine or able to conceive again. Therefore, a combination of disease attributes, psychological status, reproductive history, treatment exposure and relationship factors may affect sexual functioning[13].

The growing evidence suggests that women with endometriosis do not have sexual function as good as women without endometriosis[14]. A comprehensive review and meta-analysis indicated that impacted women exhibited markedly reduced Female Sexual Function Index scores across the domains of desire, arousal, lubrication, orgasm, satisfaction, and pain. Yet another meta-analysis found that women with endometriosis who were not treated were over two times more likely to develop sexual dysfunction than women without endometriosis and that women with endometriosis had higher scores for dyspareunia and chronic pelvic pain. These results suggest that sexual dysfunction is not only a clinical correlate of painful intercourse, but also a clinically relevant manifestation of endometriosis[15,16].

Endometriosis continues to have a complex etiology of sexual dysfunction. Poorer sexual functioning has been correlated with deep dyspareunia, chronic pelvic pain, advanced disease stage, depressive symptoms, physical comorbidities, psychological distress, and individual expectations[17]. Notably, dyspareunia is not a sole factor, and women who do not have intense pain during sexual activity may have diminished sexual desire, arousal, satisfaction or orgasm. Psychological distress and relationship wellbeing can be affected independently by depression and anxiety, and ongoing sexual problems can in turn exacerbate psychological issues. Depressive and anxiety symptoms, as well as impaired health-related quality of life are confirmed by a recent systematic review to be associated with endometriosis; this review

highlighted the bi-directional association of physical symptoms and mental health[18].

Validated patient-reported instruments can be used to assess sexual function in women with endometriosis[19]. The Female Sexual Function Index is a 19-item questionnaire, with six domains, which measures aspects of sexual functioning experienced by women in the previous 4 weeks. It is broadly utilized in clinical research and can be utilized to identify global dysfunction as well as domain-specific impairment. The most commonly assessed instrument for sexual-function assessment in endometriosis was the Female Sexual Function Index, and it was found to have relatively good measurement properties in a systematic review of these instruments. However, routine sexual-health assessment is not routinely included in the gynecological practice and the extent of dysfunction thus may be underestimated[20].

The prevalence and risk factors of sexual dysfunction can differ depending on the disease variant, disease-specific symptoms, treatment history, culture, mental health and population parameters[1,11]. The identification of modifiable predictors is clinically relevant since some women might benefit from improved pain control, psychological support, pelvic-floor rehabilitation, sexual counselling, fertility-related support or a multidisciplinary approach. A disease-stage or lesion-focused approach may not consider the wider factors that are contributing to poor intimacy and sexual health[2,8].

The present study was therefore undertaken to understand the prevalence of sexual dysfunction in women of reproductive age with endometriosis and to assess its demographic, reproductive, clinical, pain and psychological predictors. It was hypothesized that sexual dysfunction was frequent and that it was independently associated with severe deep dyspareunia, chronic pelvic pain, depressive symptoms, infertility and advanced endometriosis. Knowledge of these factors could help facilitate the embedding of confidential sexual-health screening and individualized multidisciplinary care within the usual care of endometriosis[12].

MATERIALS AND METHODS

Study Design and Setting: The study is an analytical cross-sectional study involving the patients in the Department of Gynecology and Obstetrics at Nishtar Medical University, Multan, Pakistan from March 2022 to March 2023. This study aimed to establish the prevalence of sexual dysfunction and its demographic, reproductive, clinical, pain-related and psychological predictors in women with endometriosis.

Study population and sample size: The sample size was determined using the single-population proportion formula, with an expected prevalence rate of sexual dysfunction in women with endometriosis of about 70%, absolute precision of about 10% and the desired level of confidence set at 95%. The number of participants in the calculated sample was about 80. Thus, the number of eligible women was 80 who were enrolled by consecutive non-probability sampling.

The inclusion criteria were women of reproductive age (18-45 years) with a confirmed diagnosis of endometriosis. The diagnosis was made on the basis of the previous laparoscopy, histopathology or identification of typical endometriotic lesions in expert transvaginal ultrasonography or magnetic resonance imaging. Participants had to be premenopausal and have a spouse or partner in the past 4 weeks, as sexual-function instrument measured recent sexual activity.

Excluded were women who were pregnant or within 6 months postpartum, breastfeeding, postmenopausal or had undergone hysterectomy or bilateral oophorectomy. Other exclusion criteria were: active PID, gynecological malignancy, major congenital genital tract abnormality, uncontrolled diabetes mellitus, uncontrolled thyroid disease, severe psychiatric illness, cognitive impairment and inability to comprehend or complete the questionnaire. Women whose clinical records were not complete or whose sexual-function questionnaires were incomplete were also excluded.

Data collection: Eligible women in the gynecology outpatient clinic were approached in a consecutive manner. The purpose and sensitive nature of the study were explained in a private setting by a trained female researcher. Following informed written consent, the study questionnaire was self-administered or administered in a neutral fashion when needed. Data was collected in coded forms that did not include names or any data that identified the subjects, thereby maintaining confidentiality.

These demographic data consisted of age, place of residence, level of education, work status, marriage period, and body mass index. Reproductive variables were defined as: parity, history and duration of the infertility, previous pregnancies, mode of delivery and fertility treatment. Clinical data such as age of onset of symptoms, duration of diagnosis, prior surgery for endometriosis, recurrence, ongoing medical management, ovarian endometrioma, deep endometriosis, and bowel and urinary symptoms were obtained.

Endometriosis was classified according to the updated American Society for Reproductive Medicine (ASRM) methodology where surgical documentation was accessible. Initial disease was amalgamated with stages I and II, while advanced illness was merged with stages III and IV. Severe endometriosis was defined as endometriotic infiltration exceeding 5 mm beneath the peritoneal layer, or the engagement of uterosacral ligaments, rectovaginal septum, bowel, bladder, or posterior vaginal fornix.

Sexual function assessment: The Female Sexual Function Index (FSFI) comprising 19 items was employed to assess sexual function. The survey evaluates six dimensions of female sexual performance during the preceding four weeks: desire, arousal, lubrication, orgasm, pleasure, and discomfort. The suggested scoring coefficients were used for the domains, resulting in a total score ranging from 2 to 36, where a higher score indicates superior sexual functioning.

A Female Sexual Function Index score of 26.55 or below was used to characterize sexual dysfunction. The incidence of sexual dysfunction was calculated by dividing the count of women scoring at or behind this threshold by the total number of participating women. The domains were analyzed, and those most affected by the intervention were recognized.

Assessment of endometriosis-associated pain: The intensity of dysmenorrhea, nonmenstrual chronic pelvic discomfort, and profound dyspareunia was assessed separately using a numerical rating scale from 0 to 10. The pain scale classification of 0 signifies the absence of pain, 1–3 denotes mild discomfort, 4–6 represents moderate pain, and 7–10 indicates intense pain.

Deep dyspareunia was defined as pain on deep vaginal penetration or immediately after deep penetration, but within the pelvis. Chronic pelvic pain was characterized as pelvic pain that was not cyclical lasting for six months or more. The numerical rating scale scores of 7 or more were considered severe chronic pelvic pain and severe deep dyspareunia for regression analysis.

Depressive symptom assessment: The nine-item Patient Health Questionnaire was used to assess depressive symptoms. Each item was given a score of 0-3, resulting in a score between 0 and 27. Mild symptoms were indicated by scores ranging from 5–9, moderate symptoms from 10–14, moderately severe symptoms from 15–19 and severe symptoms from 20–27. A score of 10 or above was regarded as a clinically important level of moderate to severe depressive symptoms.

Those who reported having very high scores in the depression symptom scale or feelings of suicide were referred for further evaluation and appropriate management to the psychiatry or clinical psychology service.

Study outcomes: The main outcome was the prevalence of sexual dysfunction among women with endometriosis, which was determined using a cut-off point of 24.55 on the Female Sexual Function Index (FSFI) questionnaire. The mean total and domain

sexual-function scores and the identification of independent predictors of sexual dysfunction were secondary outcomes.

The following factors were considered as potential predictors: age, body mass index, marital duration, parity, history of infertility, duration of endometriosis, previous surgery, hormonal therapy, disease stage, deep endometriosis, ovarian endometrioma, severe chronic pelvic pain, severe deep dyspareunia and moderate to severe depressive symptoms.

Statistical analysis: Data was inputted and examined with IBM SPSS Statistics 26. Histograms and the Shapiro-Wilk test were used to assess the normality of the continuous data. Variables that followed a normal distribution were presented as mean and standard deviation, but those that did not conform to normality were expressed as median and interquartile range. Categorical variables were represented as a percentage of the overall count.

Findings on the prevalence of sexual dysfunction were articulated as a percentage accompanied with a 95% confidence interval. The independent samples t-test or Mann–Whitney U test was used for continuous data, while the chi-square test or Fisher exact test was utilized for categorical variables to compare women with and without sexual dysfunction.

The determinants of sexual dysfunction were identified through binary logistic regression. Variables demonstrating a univariable correlation at $p<0.10$, together with those deemed clinically significant, were taken into account for inclusion in the multivariable model. Ultimately, owing to the sample size, the quantity of variables in the final model was confined to those of clinical significance, hence mitigating the danger of overfitting. Variance inflation factors and tolerance metrics were employed to assess multicollinearity. Crude and modified odds ratios (ORs) accompanied by 95% confidence intervals (CIs) were presented. The Hosmer–Lemeshow test for goodness of fit was used for model calibration. Statistically significant p-values were established at <0.05 (two-tailed).

Ethical considerations: Before recruitment, the study protocol was approved by the Institutional Review Board of Nishtar Medical University. All participants signed a written informed consent. Participants were asked to participate on a voluntary basis and they were informed that there would be no negative consequences if they did not participate or if they withdrew from the study. Interviews and questionnaires were done in private and all the information gathered was kept confidential. The study was conducted in line with the ethical principles of the Declaration of Helsinki.

RESULTS

Participant recruitment: A total of 92 women with endometriosis were assessed for eligibility during the study period. Twelve were excluded: five were not sexually active in the last four weeks, two were pregnant or had given birth within the past six months, three had incomplete FSFI questionnaires, and two refused participation. Eighty women (87.0% completion) were included in the final analysis.

The mean age of the participants was 34.8 years with a standard deviation of 6.3 years, and the average BMI was 26.0 with a standard deviation of 4.1 kg/m^2. The median duration until the development of endometriosis was 4 years (IQR 2-7 years). 42 women (52.5%) had infertility, while 45 (56.3%) were diagnosed with stage III–IV endometriosis. Severe endometriosis was documented in 28 individuals (35.0%) and ovarian endometrioma in 38 individuals (47.5%).

Sexual dysfunction prevalence: 57 out of 80 participants were identified with sexual dysfunction (total FSFI score ≤24.55). Thus, the estimated prevalence was 71.3% (95% confidence interval [CI] 60.5% – 80.0%).

Although the difference was slight, women who had sexual dysfunction were older than those who did not. They also had a longer time with endometriosis. Women with sexual dysfunction had significantly a higher rate of infertility, stage III–IV disease, deep endometriosis, severe chronic pelvic pain, severe deep dyspareunia, and moderate-to-severe depressive symptoms. There were no significant difference between the groups in body mass index, ovarian endometrioma, previous endometriosis surgery, and current hormonal treatment (Table 1).

Table 1: Demographic and clinical characteristics according to sexual-dysfunction status

Characteristic	Overall, n=80	Sexual dysfunction, n=57	No sexual dysfunction, n=23	p value
Age, years	34.8 ± 6.3	35.7 ± 6.0	32.5 ± 6.4	0.046
Body mass index, kg/m²	26.0 ± 4.1	26.3 ± 4.2	25.4 ± 3.9	0.366
Disease duration, years	4 (2–7)	5 (3–8)	3 (1–5)	0.019
Nulliparity	44 (55.0)	35 (61.4)	9 (39.1)	0.070
Infertility	42 (52.5)	35 (61.4)	7 (30.4)	0.012
Stage III–IV endometriosis	45 (56.3)	38 (66.7)	7 (30.4)	0.003
Deep endometriosis	28 (35.0)	24 (42.1)	4 (17.4)	0.036
Ovarian endometrioma	38 (47.5)	29 (50.9)	9 (39.1)	0.341
Previous endometriosis surgery	36 (45.0)	28 (49.1)	8 (34.8)	0.243
Current hormonal treatment	46 (57.5)	34 (59.6)	12 (52.2)	0.540
Severe chronic pelvic pain	29 (36.3)	25 (43.9)	4 (17.4)	0.026
Severe deep dyspareunia	34 (42.5)	30 (52.6)	4 (17.4)	0.004
PHQ-9 score ≥10	27 (33.8)	24 (42.1)	3 (13.0)	0.013

Pattern of sexual-function impairment: The mean total Female Sexual Function Index score for the complete study population was 22.8 ± 5.8. Women classified as having sexual dysfunction had a substantially lower mean total score than women without dysfunction (20.1 ± 4.0 versus 29.5 ± 2.1; $p<0.001$).

Significant impairment was observed across all six sexual-function domains. Among the overall population, the lowest mean scores were observed in the desire, arousal, orgasm, and pain domains. The largest differences between women with and without dysfunction were observed in the pain, orgasm, arousal, and lubrication domains (Table 2).

Table 2: Female Sexual Function Index domain scores

FSFI domain	Overall, n=80	Sexual dysfunction, n=57	No sexual dysfunction, n=23	p value
Desire	3.5 ± 1.0	3.1 ± 0.8	4.4 ± 0.7	<0.001
Arousal	3.7 ± 1.1	3.2 ± 0.9	4.9 ± 0.6	<0.001
Lubrication	4.1 ± 1.2	3.6 ± 1.0	5.2 ± 0.5	<0.001
Orgasm	3.7 ± 1.3	3.2 ± 1.0	5.1 ± 0.6	<0.001
Satisfaction	4.2 ± 1.2	3.7 ± 1.0	5.3 ± 0.5	<0.001
Pain	3.8 ± 1.4	3.2 ± 1.1	5.2 ± 0.6	<0.001
Total FSFI score	22.8 ± 5.8	20.1 ± 4.0	29.5 ± 2.1	<0.001

Pain and depressive symptoms: Severe deep dyspareunia was reported by 34 participants (42.5%). Much more prevalent Women with sexual dysfunction had a higher rate of greater, compared to women without dysfunction (52.6% vs 17.4%, p=0.004). Severe chronic pelvic pain was observed in 36.3% of the participants (29), and was significantly more common in the sexual-dysfunction group (43.9% versus 17.4%, p=0.026).

Overall, mean PQRS scores were 8.2 ± 5.1. Twenty-seven participants (33.8%) had moderate to severe depressive symptoms (scores ≥10). As shown in Table 1, 42.1% of the women with sexual dysfunction reported these symptoms, while 13.0% of women without sexual dysfunction reported the symptoms (p=0.013).

Predictors of sexual dysfunction: Univariable analysis showed that infertility, stage III–IV endometriosis, deep endometriosis, and severe chronic pelvic pain, severe deep dyspareunia and

moderate to severe depressive symptoms were all significantly associated with sexual dysfunction.

Due to the small number of patients, a final model using four clinically important variables was used: disease severity, pain during intercourse, nonmenstrual pelvic pain, and psychological burden. Severe deep dyspareunia was related to greater than 4-fold increased odds of sexual dysfunction (adjusted odds ratio [aOR] 4.21, 95% confidence interval [CI] 1.15 – 15.37; p=0.030).

Stage III–IV endometriosis was independently associated with sexual dysfunction (aOR, 3.32; 95% CI, 1.03–10.68; p=0.044). Moderate to severe depressive symptoms were also significantly associated with dysfunction (aOR, 4.33; 95% CI, 1.02-18.42; p=0.047). Severe chronic pelvic pain was a risk factor in the unadjusted analysis, but not in the adjusted analysis (Table 3).

Table 3: Logistic-regression analysis of predictors of sexual dysfunction

Predictor	Crude OR (95% CI)	Adjusted OR (95% CI)	p value
Stage III–IV endometriosis	4.57 (1.61–13.00)	3.32 (1.03–10.68)	0.044
Severe chronic pelvic pain	3.71 (1.12–12.30)	2.21 (0.60–8.14)	0.233
Severe deep dyspareunia	5.28 (1.59–17.47)	4.21 (1.15–15.37)	0.030
PHQ-9 score ≥10	4.85 (1.29–18.20)	4.33 (1.02–18.42)	0.047

The ultimate regression model exhibited excellent calibration, as indicated by a Hosmer–Lemeshow goodness-of-fit test p=0.68. The area under the receiver operating characteristic curve was 0.82 (95% CI, 0.72–0.91), indicating effective differentiation between women experiencing sexual dysfunction and those who do not. No evidence of concerning multicollinearity was detected as all VIF values were below 2.0.

In total, about 7 out of every 10 women with endometriosis experienced sexual dysfunction. All female sexual function index domains were affected, especially in terms of pain, desire, arousal, and orgasm. Deep dyspareunia, moderate to severe depressive symptoms and advanced-stage endometriosis were each independently associated with sexual dysfunction, but advanced-stage endometriosis was no longer independently associated with SD after controlling for deep dyspareunia.

DISCUSSION

The present study found that sexual dysfunction affected 71.3% of women with endometriosis, indicating a substantial burden of impaired sexual health[1]. The scores of all the Female Sexual Function Index domains were decreased, especially desire, arousal, orgasm and pain domain. These results are in line with earlier studies that found women with endometriosis had reduced overall and domain-specific sexual function[2].

Severe deep dyspareunia was the most powerful single predictor for sexual dysfunction. Pain during sex can decrease sexual libido, disrupt sex, affect orgasm and cause fear and avoidance of sex[3]. This association might be due to endometriotic lesions, pelvic adhesions, impaired mobility of the organs, pelvic-floor dysfunction, and pain sensitization. Dyspareunia has also been suggested as a key factor of sexual dysfunction in endometriosis in prior studies[4].

Sexual dysfunction was also independently associated with advanced stage III–IV of the disease. Pelvic adhesions, ovarian endometriomas, anatomical distortion and deep lesions with increased dysmenorrhea may be present in extensive disease. But, because there does not always seem to be a relationship between symptom severity and the extent of the disease, anatomical stage alone might not explain sexual impairment[5,6].

With increased depressive symptoms, their severity was associated with sexual dysfunction[7]. Depression can lower sexual drive, sexual arousal, self-confidence, and emotional connections, and chronic pain, infertility, and troubled relationships can add to psychological suffering. This association underscores the importance of evaluating mental health along with pain and sexual function[8].

Severe chronic pelvic pain was associated with dysfunction in the unadjusted analysis but the association was not statistically significant after adjustment[9-11]. It may be confounded with dyspareunia, depression and severity of the disease. There was also a higher incidence of infertility among women with dysfunction, perhaps because stress and planned intercourse makes it less spontaneous and enjoyable for women to become infertile[12-14].

The findings indicate that routine and/or confidential sexual-health assessment should be conducted in women with endometriosis[15]. Management must not limit its focus to only disease lesions, but include issues of pain, psychological wellbeing, pelvic-floor dysfunction, stress about infertility and relationship issues. Outcome may be improved with multidisciplinary care, including from gynecologists, psychologists, pelvic-floor physiotherapists, pain specialists and sexual-health counsellors[16].

The study had several limitations, including its cross-sectional design, single centre location, small sample size and self-reported data[17]. The relationship quality, sexual functioning of the partner, anxiety and pelvic-floor findings were not evaluated. However, the findings highlight the prevalence and clinical significance of sexual dysfunction in endometriosis[18-20].

CONCLUSION

There was a high prevalence of sexual dysfunction among women with endometriosis and its independent determinants were severe dyspareunia, higher stage of the disease and depressive symptoms. Regular assessment of sexual and psychological wellbeing should be integrated in the care of endometriosis to facilitate timely and multidisciplinary management of sexual and psychological wellbeing.

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Authors' contributions: SS conceived and supervised the study. SYQ contributed to the study design, data collection, and manuscript revision. AH performed the statistical analysis and drafted the manuscript. All authors reviewed and approved the final manuscript.

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