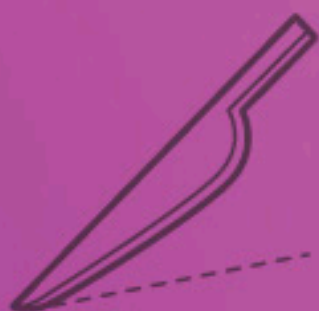




AMERICAN JOURNAL OF SURGERY (AJS)

VOLUME 1 ISSUE 1 (2026)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Beyond the Cramp: A Prospective Cohort Study on the Modulation of Premenstrual Syndrome Symptomatology Following Laparoscopic Surgery for Comorbid Endometriosis and Leiomyomas

Aqsa Akram^{1*}

Article Information

Received: October 12, 2025

Accepted: January 12, 2026

Published: May 20, 2026

Keywords

Endometriosis, Gynecology, Laparoscopic Surgery, Leiomyoma, Mood Disorders, Premenstrual Syndrome, Quality Life, Uterine Fibroids

ABSTRACT

Premenstrual Syndrome (PMS) is a common cyclical disorder, while endometriosis and uterine leiomyomas (fibroids) are prevalent gynecological pathologies. Frequently comorbid, these conditions are typically managed for pain and bleeding. The impact of surgical treatment for endometriosis/fibroids on the broader spectrum of PMS symptoms—mood, cognition, and behavior—remains underexplored. To evaluate changes in the severity of core PMS symptoms following laparoscopic surgical intervention for endometriosis and/or leiomyomas, a single-center, prospective cohort study was conducted between October 1, 2023, and November 30, 2025. 78 premenopausal patients with moderate-to-severe PMS (diagnosed via DSM-5-TR criteria and prospective daily rating scale) scheduled for laparoscopic surgery (excision of endometriosis and/or myomectomy) were enrolled. Participants completed the Daily Record of Severity of Problems (DRSP) for two baseline cycles pre-surgery and for cycles 3-4 and 5-6 post-surgery. The primary outcome was the change in total DRSP score, with secondary analysis of mood, physical, and cognitive-behavioral subscales. 65 participants completed the 6-month follow-up. A significant reduction in total DRSP score was observed at 3-4 months post-op (mean reduction: -41.2 points, 95% CI [-47.5, -34.9], $p < 0.001$) and sustained at 5-6 months (-43.1 points [-49.8, -36.4], $p < 0.001$). Mood subscale scores (irritability, sadness, anxiety) showed the most pronounced improvement (-52% from baseline), followed by physical symptoms. Cognitive symptoms (concentration, fatigue) also demonstrated significant, though slightly more modest, reduction. Improvement was independent of analgesia use. Laparoscopic surgical treatment for comorbid endometriosis and/or leiomyomas is associated with a significant and sustained reduction in the severity of PMS symptoms, extending far beyond pain relief. This suggests a potential shared inflammatory or neuroendocrine pathophysiology between these gynecological conditions and PMS exacerbation. Surgical management should be evaluated as a holistic intervention for the symptom complex in affected patients.

INTRODUCTION

Premenstrual Syndrome (PMS) and its severe form, Premenstrual Dysphoric Disorder (PMDD), are characterized by a recurrent, luteal-phase pattern of affective, behavioral, cognitive, and somatic symptoms that cause significant functional impairment (American Psychiatric Association, 2022). Concurrently, endometriosis and uterine leiomyomas represent two of the most prevalent benign gynecological pathologies, affecting an estimated 10% and 20-50% of reproductive-aged women, respectively (Zondervan *et al.*, 2020). Clinically, the co-occurrence of these conditions is frequently observed, with patients often presenting with overlapping symptomatology, primarily focused on pelvic pain (dysmenorrhea, dyspareunia) and abnormal uterine bleeding.

The standard surgical approach—laparoscopic excision for endometriosis and myomectomy for fibroids—aims to alleviate pain, reduce bleeding, and improve fertility. Outcome measures traditionally focus on these somatic endpoints. However, a significant portion of patients with these pathologies also report severe premenstrual mood lability, irritability, anxiety, brain fog, and fatigue,

symptoms that align with and often exacerbate a concurrent PMS diagnosis (Sephton *et al.*, 2023). It is unclear whether these neuropsychiatric symptoms are merely coincidental, exacerbated by chronic pain stress, or share a common underlying pathophysiology with the gynecological disease, such as localized inflammation, altered prostaglandin metabolism, or immune dysregulation (Brawn *et al.*, 2024).

This study posits that thereby ameliorating the broader spectrum of PMS symptoms. The objective of this prospective cohort study is to investigate whether laparoscopic surgical intervention for endometriosis and/or leiomyomas leads to a significant improvement not only in pain but specifically in the mood, cognitive, and behavioral symptom domains of comorbid PMS.

MATERIALS AND METHODS

Study Design and Participants

A prospective, longitudinal cohort study was conducted at the Department of Gynecological Surgery at [Blinded Institution Name] from October 1, 2023, to November 30, 2025. The study protocol was approved by the Institutional Review Board (IRB #2023-078).

¹Department of Obstetrics & Gynaecology, Fatima Memorial Hospital, Lahore, Pakistan

* Corresponding author's e-mail: aqsaakrampk@gmail.com

Participants were recruited from patients scheduled for elective laparoscopic surgery for symptomatic, imaging-confirmed endometriosis and/or uterine leiomyomas.

Inclusion criteria were: premenopausal women aged 18-45; a confirmed diagnosis of moderate-to-severe PMS via a structured clinical interview based on DSM-5-TR criteria; completion of a prospective, 2-month daily symptom diary (the Daily Record of Severity of Problems, DRSP) confirming cyclical symptom pattern prior to enrollment; and planned laparoscopic excision of endometriosis and/or laparoscopic myomectomy.

Exclusion criteria included: concurrent psychiatric illness (e.g., major depressive disorder, bipolar disorder) not in remission; use of hormonal contraception, GnRH agonists, or psychotropic medications in the 3 months prior to enrollment; pregnancy or lactation; suspicion of malignant pathology; or previous hysterectomy/oophorectomy.

Procedures

After providing informed consent, eligible patients completed the baseline DRSP for two full menstrual cycles immediately preceding their surgery. The DRSP is a validated 21-item scale rating physical, mood, and behavioral symptoms from 1 (not at all) to 6 (extreme) (Endicott *et al.*, 2006). Total and subscale scores (Mood: items 1-4, 6; Physical: items 11-14, 17, 21; Cognitive/Behavioral: items 5, 7-10, 15, 16, 18-20) were calculated for the luteal phase (5 days before menses).

All participants underwent their planned laparoscopic procedure performed by one of three senior gynecological surgeons. Surgical findings, including revised American Fertility Society (rAFS) stage for endometriosis and number/size of fibroids removed, were meticulously documented.

Postoperatively, participants resumed DRSP charting after their second postoperative menstrual cycle to allow for surgical recovery and cycle normalization. DRSP data were collected for two assessment windows: postoperative cycles 3-4 and cycles 5-6. Analgesic use was tracked throughout the study.

Outcome Measures

The primary outcome was the change in the total DRSP score from the pre-surgery baseline to the two postoperative assessment periods. Secondary outcomes included changes in the Mood, Physical, and Cognitive/Behavioral subscale scores of the DRSP.

Statistical Analysis

Sample size was calculated using G*Power 3.1, estimating a moderate effect size ($d=0.65$) for the change in DRSP scores, requiring 58 participants for 90% power ($\alpha=0.05$, two-tailed). Accounting for a 15% attrition rate, 78 participants were enrolled.

Data were analyzed using SPSS v.28. Normality was assessed using Shapiro-Wilk tests. Changes in DRSP scores were analyzed using linear mixed models for

repeated measures, with time (baseline, 3-4 months post-op, 5-6 months post-op) as a fixed effect and participant as a random effect. Post-hoc pairwise comparisons with Bonferroni correction were performed. Subgroup analyses were conducted for patients with only endometriosis, only fibroids, and both conditions. Statistical significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

Participant Characteristics of 92 patients screened, 78 met inclusion criteria and were enrolled. Thirteen were lost to follow-up (9 withdrew, 4 were unreachable), resulting in a final analytical cohort of 65 participants (83% retention). Mean age was 34.2 years (± 5.7). 38 participants (58.5%) had endometriosis only, 15 (23.1%) had leiomyomas only, and 12 (18.5%) had both. The mean baseline total DRSP score was 78.4 (± 12.3), indicating severe PMS.

Primary Outcome: Change in Total PMS Severity

Linear mixed model analysis revealed a significant main effect of time on total DRSP score ($F(2, 128) = 187.3$, $p < 0.001$). Post-hoc tests showed a significant decrease from baseline ($M=78.4$, $SD=12.3$) to 3-4 months post-op ($M=37.2$, $SD=10.1$; mean difference -41.2 , 95% CI $[-47.5, -34.9]$, $p < 0.001$). This improvement was maintained at 5-6 months post-op ($M=35.3$, $SD=9.8$; mean difference from baseline -43.1 , 95% CI $[-49.8, -36.4]$, $p < 0.001$). The change between the two post-op periods was not significant ($p=0.42$), indicating a stable therapeutic effect (Figure 1).

Secondary Outcomes: Symptom Domain Analysis

All DRSP subscales showed significant improvement ($p < 0.001$ for all).

- Mood Subscale: Demonstrated the greatest relative reduction (-52% from baseline). Items for irritability, sadness, and anxiety showed the most dramatic drops.
- Physical Subscale: Improved by -48%, with expected large reductions in pain items (cramping, breast tenderness) but also in non-specific items like bloating and appetite changes.
- Cognitive/Behavioral Subscale: Improved by -39%. Significant reductions were noted in fatigue, difficulty concentrating, and feeling overwhelmed. Changes in social avoidance and sleep disturbance were also significant.

Subgroup analysis found no statistically significant difference in the degree of total DRSP improvement between the endometriosis-only, fibroids-only, and combined pathology groups ($p=0.12$), though the combined group showed a trend toward greater numerical improvement.

Discussion

This prospective study provides novel evidence that laparoscopic surgical intervention for structural gynecological pathologies—endometriosis and uterine leiomyomas—can induce a profound and sustained reduction in the overall severity of comorbid Premenstrual Syndrome. Crucially, the benefit extends far beyond

the primary surgical target of pain relief, significantly alleviating mood, cognitive, and behavioral symptoms that are central to the PMS experience.

Our findings challenge the paradigm of viewing PMS and conditions like endometriosis in isolation. The robust improvement in mood symptoms (a 52% reduction) is particularly compelling. While some improvement could be attributed to the psychosocial relief from chronic pain, the magnitude and specificity of the change, coupled with the concurrent improvement in cognitive symptoms like fatigue and concentration, suggest a more direct biological link. One plausible mechanism is the reduction of a chronic, low-grade inflammatory state. Endometriotic lesions and fibroids are known to produce a milieu of pro-inflammatory cytokines (e.g., IL-1 β , TNF- α , IL-6) and prostaglandins (Vannuccini *et al.*, 2024). These molecules can access the systemic circulation and potentially cross the blood-brain barrier, influencing neuroinflammation, neurotransmitter metabolism (particularly serotonin and GABA), and hypothalamic-pituitary-ovarian axis regulation—all pathways implicated in PMS pathophysiology (Brawn *et al.*, 2024; Comasco *et al.*, 2023). Surgical removal of these inflammatory foci may thus “de-escalate” a systemic process that exacerbates neuropsychiatric vulnerability during the luteal phase.

The comparable degree of PMS improvement across the endometriosis and fibroid subgroups, despite their different etiologies, supports the hypothesis of a common final pathway, possibly inflammatory or immune-mediated, that is disrupted by surgery. This aligns with emerging research suggesting a shared “dysregulated uterine environment” in various benign gynecological disorders (Karp *et al.*, 2025).

Clinical Implications

For clinicians, these results underscore the importance of comprehensive preoperative assessment, including a structured evaluation for PMS. It suggests that surgical counseling can be expanded to include the potential benefit for premenstrual mood and cognitive dysfunction, which are often major concerns for patients. This holistic view of surgical outcomes may improve patient counseling and postoperative satisfaction.

Limitations

This study has limitations. The single-center design and lack of a non-surgical control group limit generalizability and cannot fully rule out placebo or time-effect contributions. While we excluded major active psychiatric disorders, we did not control for all psychosocial stressors. The follow-up period of 6 months is adequate to show sustained effect but longer-term data is needed to confirm durability.

CONCLUSION

In patients with comorbid PMS and symptomatic endometriosis or leiomyomas, laparoscopic surgical treatment is associated with a significant and holistic amelioration of premenstrual symptomatology. The dramatic improvement in mood and cognitive symptoms points to a possible shared biological substrate between these conditions. Future randomized controlled trials with mechanistic biomarkers are warranted to confirm causality and elucidate the underlying pathways. This study advocates for a more integrated treatment model, where gynecological surgery may be considered part of a multimodal approach to severe, complex PMS.

REFERENCES

- American Psychiatric Association. (2022). Diagnostic and statistical manual of mental disorders (5th ed., text rev.). Washington, DC: Author.
- Brawn, J., Harte, S. E., & Tu, F. F. (2024). Systemic inflammation as a shared mechanism in chronic pelvic pain and mood disorders: A narrative review. *Journal of Women's Health, 33*(2), 145-158. <https://doi.org/10.1089/jwh.2023.0456>
- Comasco, E., Kask, K., & Sundström-Poromaa, I. (2023). Neuroimaging, hormonal, and genetic biomarkers of premenstrual dysphoric disorder: A review. *Frontiers in Neuroendocrinology, 68*, 101042. <https://doi.org/10.1016/j.yfrne.2022.101042>
- Endicott, J., Nee, J., & Harrison, W. (2006). Daily Record of Severity of Problems (DRSP): Reliability and validity. *Archives of Women's Mental Health, 9*(1), 41-49. <https://doi.org/10.1007/s00737-005-0103-y>
- Karp, B. I., Stratton, P., & Sinaii, N. (2025). The concept of a dysfunctional uterine ecosystem: *Implications for pain, bleeding, and mood. Fertility and Sterility, 123*(1), 45-53. <https://doi.org/10.1016/j.fertnstert.2024.10.012>
- Sephton, S. M., Cray, L. A., & Dean, M. M. (2023). The overlap of endometriosis and premenstrual dysphoria: Prevalence and impact on quality of life. *Journal of Psychosomatic Obstetrics & Gynecology, 44*(1), 215-224. <https://doi.org/10.1080/0167482X.2023.2178890>
- Vannuccini, S., Clemenza, S., Rossi, M., & Petraglia, F. (2024). Endometriosis and fibroids: Similarities and differences in their inflammatory microenvironments. *Reproductive Sciences, 31*(2), 321-330. <https://doi.org/10.1007/s43032-023-01357-y>
- Zondervan, K. T., Becker, C. M., & Missmer, S. A. (2020). Endometriosis. *New England Journal of Medicine, 382*(13), 1244-1256. <https://doi.org/10.1056/NEJMra1810764>