

DOI: <https://doi.org/10.63332/joph.v6i2.4017>

Menstrual Pattern Modulation Following Levonorgestrel Intrauterine System Use in Symptomatic Adenomyosis Patients

Rokshana Fathema¹, Sharmeen Mahmood^{2*}, Mehriban Amatullah³, Farzana Sharmin⁴, Nazmul Haque⁵

Abstract

Background: Adenomyosis is a chronic gynecological condition characterized by dysmenorrhea and heavy menstrual bleeding that significantly affects reproductive-aged women. Conservative management strategies that preserve fertility have gained attention due to limitations associated with surgical treatment. The levonorgestrel-releasing intrauterine system has emerged as an effective therapeutic option by delivering localized progestin effects within the uterus. Objective: To evaluate menstrual pattern modulation following levonorgestrel intrauterine system use among symptomatic adenomyosis patients. Methods: A quasi-experimental study was conducted at Bangabandhu Sheikh Mujib Medical University, Dhaka, from August 2023 to July 2024. Thirty women aged 25–45 years with symptomatic adenomyosis were enrolled. Baseline clinical assessment, transvaginal ultrasonography, hemoglobin estimation and visual analog scale scoring were performed. LNG-IUS was inserted during days 5–7 of the menstrual cycle and participants were followed at 3 and 6 months. Statistical analysis was performed using SPSS version 27 with a paired t-test and McNemar test. Results: The mean age of participants was 36.17 ± 5.46 years. Heavy menstrual bleeding decreased from 50% at baseline to 7.14% at the third month and was absent by the sixth month. Normal menstrual flow increased progressively; while spotting and amenorrhea became more common during follow-up. Intermenstrual bleeding declined over time, indicating stabilization of menstrual patterns. Conclusion: LNG-IUS effectively modulates menstrual patterns and reduces heavy menstrual bleeding in women with adenomyosis, supporting its role as a conservative and fertility-preserving treatment option.

Keywords: Adenomyosis, Levonorgestrel intrauterine system, Dysmenorrhea, Menstrual pattern.

Introduction

Adenomyosis is a chronic gynecological disorder characterized by the presence of endometrial glands and stroma within the myometrium, often leading to dysmenorrhea, heavy menstrual bleeding and impaired quality of life among reproductive-aged women [1]. The condition has gained increasing clinical attention due to its impact on fertility, menstrual health and overall reproductive outcomes [2]. Although the exact etiology remains unclear, hormonal imbalance, inflammatory pathways and alterations in estrogen metabolism have been implicated in disease progression [3].

The prevalence of adenomyosis varies widely depending on diagnostic criteria, with imaging

¹ Lecturer, Department of Medicine, Govt. Unani and Ayurvedic Medical College & Hospital; Mirpur-13, Dhaka, Bangladesh

² Associate Professor, Department of Obstetrics and Gynecology, Bangladesh Medical University (BMU), Shahbag, Dhaka, Bangladesh; Email: dr.sharmeenmahmood30@gmail.com

³ Assistant Professor, Department of Department of Obstetrics and Gynecology, Bangladesh Medical University (BMU), Shahbag, Dhaka, Bangladesh

⁴ Assistant Professor, Department of Department of Obstetrics and Gynecology, Bangladesh Medical University (BMU), Shahbag, Dhaka, Bangladesh

⁵ Junior Consultant (Medicine), UHC, Kuliarchar, Kishorganj, Bangladesh; Email:



modalities such as transvaginal ultrasonography playing a pivotal role in early detection and evaluation [4]. Women commonly present with menorrhagia, pelvic pain and enlarged uterine size, which significantly affect physical and psychological well-being [5]. Traditional treatment options include hormonal therapy and hysterectomy, yet many patients seek fertility-preserving alternatives with fewer systemic effects [6].

The levonorgestrel-releasing intrauterine system (LNG-IUS) has emerged as a promising conservative treatment modality due to its localized progestogenic effects on the endometrium and myometrium [7]. By inducing endometrial decidualization and suppressing estrogen receptor activity, LNG-IUS reduces menstrual blood loss and alleviates dysmenorrhea [8]. Several clinical studies have demonstrated improvements in pain scores and menstrual patterns among women with adenomyosis using LNG-IUS therapy [9].

Previous investigations reported significant reductions in uterine volume and symptomatic relief following LNG-IUS placement, suggesting its role as an effective non-surgical intervention [10]. Additionally, LNG-IUS therapy has been associated with improved hemoglobin levels and quality of life outcomes in patients experiencing chronic heavy menstrual bleeding [11]. Despite these promising findings, variations in menstrual pattern modulation over time remain insufficiently explored, particularly in South Asian populations.

Furthermore, most available studies have focused on long-term outcomes or imaging findings rather than detailed evaluation of early menstrual changes and symptom progression [12]. Understanding these patterns is clinically important for counseling patients regarding expected outcomes and potential side effects during follow-up.

Therefore, this study aimed to evaluate menstrual pattern modulation, dysmenorrhea improvement and hematological changes following the insertion of LNG-IUS among symptomatic patients with adenomyosis. By assessing both clinical and ultrasonographic parameters over six months, the study seeks to contribute evidence supporting conservative management strategies that preserve fertility while improving symptom control.

Materials & Methods

This quasi-experimental study was conducted at the Department of Obstetrics and Gynecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbagh, Dhaka, Bangladesh. The study period extended from August 2023 to July 2024. The study population included 30 married women aged 25 to 45 years diagnosed with symptomatic adenomyosis presenting with dysmenorrhea and heavy menstrual bleeding and eligible for LNG-IUS insertion.

Inclusion Criteria

1. Women aged 25 to 45 years.
2. Diagnosed symptomatic adenomyosis confirmed clinically and by transvaginal ultrasonography.
3. Uterine size ≤ 12 gestational weeks.
4. Participants are willing to provide written informed consent.

Exclusion Criteria

1. Pregnancy or intention for immediate conception.
2. Presence of fibroid uterus, ovarian endometrioma, structural uterine abnormality, or endometrial polyp.
3. Severe anemia with hemoglobin < 8 g/dL.
4. Undiagnosed vaginal bleeding or bleeding disorders.
5. Renal, cardiac, hepatic, thyroid disorders or pelvic inflammatory disease.
6. History of premalignant or malignant uterine or cervical disease.

Study Procedure

After obtaining institutional review board approval, eligible participants were recruited purposively from the outpatient department. Written informed consent was obtained following detailed counseling regarding the procedure, benefits, risks and alternative treatments. Baseline data collection included socio-demographic information, menstrual history, clinical examination, body mass index measurement, hemoglobin estimation, pain assessment using the visual analog scale and transvaginal ultrasonography to measure uterine dimensions and volume. LNG-IUS devices were inserted between days 5 and 7 of the menstrual cycle under aseptic precautions according to standard clinical protocols. Participants were followed at the 3rd and 6th months post-insertion, during which menstrual patterns, dysmenorrhea severity, uterine volume, adverse events and hemoglobin levels were assessed. Data were recorded using a semi-structured questionnaire to maintain uniformity and reliability of information. Laboratory analyses were conducted using standardized automated hematology analyzers to ensure accuracy. Confidentiality of patient information was strictly maintained through coded data sheets and restricted access to records. Descriptive statistics including frequency, percentage, mean and standard deviation, were used to summarize variables. Inferential statistics were applied using McNemar tests for categorical variables and paired t-tests for continuous outcomes. A p-value <0.05 was considered statistically significant. All statistical analyses were performed using SPSS version 27 software.

Results

Table 1: Age Distribution of the study population (n = 30)

Age (in years)	Frequency (n)	Percentage (%)
26 – 30	6	20
31 – 35	9	30
36 – 40	8	26.7
41 – 45	7	23.3
Mean $\pm$ SD	36.17 $\pm$ 5.46	

Table 1 presents the age distribution of the study population, showing that the majority of participants were between 31 and 35 years (30%), followed by 36 to 40 years (26.7%). Women aged 41 to 45 years accounted for 23.3%, while 20% were aged 26 to 30 years. The mean age of participants was 36.17 $\pm$ 5.46 years, indicating that most subjects belonged to the late reproductive age group.

Table 2: Distribution of the study subjects according to menstrual history at enrollment (n = 30)

Parameters	Mean $\pm$ SD	Minimum-maximum
Menstrual cycle (in days)	28.53 $\pm$ 1.66	26 – 32
Duration of menstrual period (in days)	7.50 $\pm$ 2.57	4 – 12

Table 2 shows the menstrual characteristics of participants at enrollment. The mean menstrual cycle length was 28.53 $\pm$ 1.66 days, with a range of 26 to 32 days. The mean duration of menstrual bleeding was 7.50 $\pm$ 2.57 days, varying between 4 and 12 days among the study subjects.

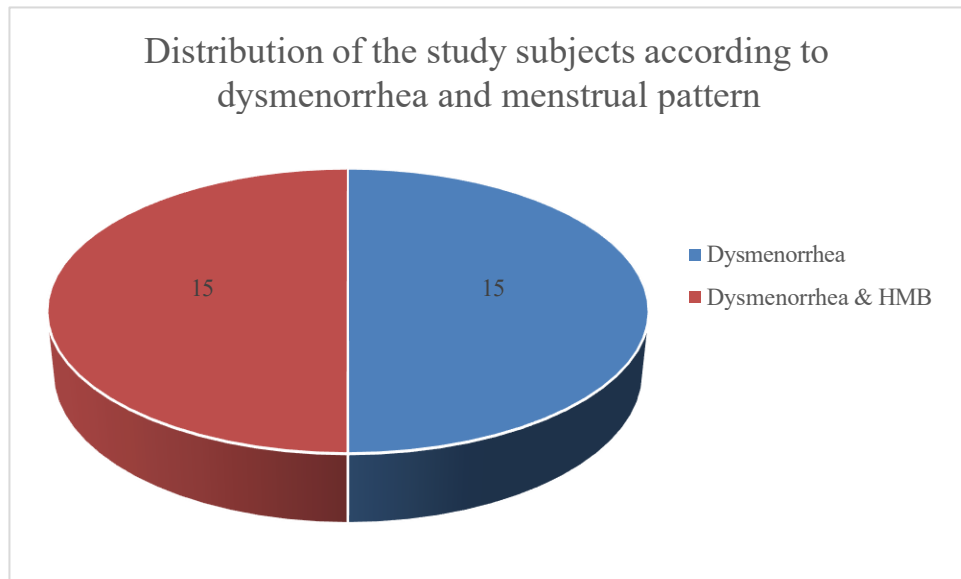


Figure 1: Distribution of the study subjects according to dysmenorrhea and menstrual pattern before LNG-IUS insertion (n = 30)

Figure 1 presents the baseline distribution of dysmenorrhea and menstrual patterns before LNG-IUS insertion. Half of the participants (50%) reported dysmenorrhea alone, while the remaining 50% experienced dysmenorrhea combined with heavy menstrual bleeding.

Table 3: Distribution of the study subjects according to menstrual pattern before and after placement of the LNG-IUS (n = 28)

Parameter	Pre-insertion (n=28)		F/U time after placement of LNG-IUS					
			3rd Month (n=28)		p-value	6th Month (n=28)		p-value
	n	%	n	%		n	%	
HMB	14	50	2	7.14	< 0.001	0	0	< 0.001
Normal flow	14	50	3	10.71	0.001	6	21.43	0.02

Table 3 presents changes in menstrual patterns before and after LNG-IUS placement. Heavy menstrual bleeding decreased from 50% at baseline to 7.14% at the 3rd month and was absent at the 6th month follow-up. Normal menstrual flow increased progressively from baseline to 21.43% at the 6th month.

Table 4: Distribution of the study subjects according to menstrual pattern following insertion of the LNG-IUS (n = 28)

Parameter	F/U time after insertion of LNG-IUS				p-value
	3rd Month(n=28)		6th Month(n=28)		
	n	%	n	%	
HMB	2	7.14	0	0	0.49

Normal flow	3	10.71	6	21.43	0.47
Hypomenorrhea	3	10.71	2	7.14	1
Spotting	9	32.14	10	35.71	0.78
Amenorrhea	5	17.86	8	28.57	0.34
IMB	6	21.43	2	7.14	0.25

Table 4 shows the distribution of menstrual patterns following LNG-IUS insertion during follow-up visits. Spotting was the most common pattern at both the 3rd and 6th months, followed by amenorrhea, which increased from 17.86% to 28.57%. Intermenstrual bleeding declined over time, while hypomenorrhea and normal flow were observed in smaller proportions.

Discussion

The present study demonstrated significant modulation of menstrual patterns and reduction of heavy menstrual bleeding following LNG-IUS insertion in women with symptomatic adenomyosis. The marked decline in heavy menstrual bleeding from baseline to the sixth month supports the therapeutic role of local progestin delivery in controlling abnormal uterine bleeding. Benagiano et al. described adenomyosis as a hormone-dependent condition where progesterone-mediated endometrial suppression can reduce symptom burden, which aligns with the findings of this study [1]. Similarly, Bianchi et al. reported that LNG-IUS exerts localized anti-proliferative effects on the endometrium, resulting in decreased menstrual blood loss and improved bleeding patterns [8].

The progressive increase in normal menstrual flow observed during follow-up suggests gradual endometrial adaptation to levonorgestrel exposure. Fraser highlighted that intrauterine hormonal systems modify vascular stability and endometrial receptivity, leading to reduced bleeding over time [13]. Comparable findings were reported by Cho et al., who observed significant improvements in dysmenorrhea and menstrual regularity among adenomyosis patients using LNG-IUS [9]. The reduction in heavy menstrual bleeding in this study is consistent with earlier reports by Sheng et al., where sustained improvement in menstrual symptoms was noted during longitudinal follow-up [14].

Spotting and amenorrhea were common patterns during follow-up, particularly at the sixth month. This transitional bleeding pattern is consistent with physiological responses to intrauterine progestin exposure. Xu et al. explained that LNG-IUS initially induces irregular bleeding due to endometrial thinning before achieving stable suppression [15]. Giraldo et al. also documented increased spotting during the early months after insertion, followed by stabilization of menstrual cycles [16]. The increase in amenorrhea in the present study reflects effective endometrial suppression, which has been reported as a favorable therapeutic outcome rather than a complication in adenomyosis management.

The observed decline in intermenstrual bleeding over time further indicates stabilization of endometrial function. Villavicencio and Allen suggested that irregular bleeding episodes are typically transient during hormonal adaptation and decrease as local progestin effects become sustained [17]. Findings from Li et al. demonstrated that LNG-IUS significantly improves pain and bleeding symptoms within six months, supporting the timeline observed in this research [12]. The reduction in dysmenorrhea among participants may be explained by decreased uterine contractility and modulation of inflammatory mediators, as discussed by Choi et al., who reported reduced nerve growth factor expression following LNG-IUS therapy [18].

The age distribution of participants, with a mean age in the mid-thirties, reflects the

epidemiological pattern of adenomyosis described by Upson and Missmer, who noted higher prevalence among women in late reproductive years [19]. Symptom improvement observed in this cohort corresponds with clinical trials conducted by Bragheto et al., where LNG-IUS effectively reduced menorrhagia and pelvic pain without the need for surgical intervention [10]. Additionally, Ishizawa et al. emphasized that LNG-IUS improves quality of life outcomes through sustained control of heavy menstrual bleeding, reinforcing the clinical relevance of the present findings [11].

Changes in menstrual characteristics observed in this study also support the concept of individualized conservative therapy. Harada et al. highlighted that current management strategies for adenomyosis increasingly favor fertility-preserving options such as LNG-IUS due to favorable safety profiles and long-term symptom relief [20]. Furthermore, Sharara et al. explained that localized levonorgestrel release downregulates estrogen receptors within the myometrium, which may explain improvements in dysmenorrhea severity and menstrual patterns [21]. The decline in abnormal bleeding patterns and increase in amenorrhea seen in this study are therefore consistent with established mechanisms of action.

Overall, the findings demonstrate that LNG-IUS provides effective modulation of menstrual patterns within a relatively short follow-up period. The results corroborate earlier clinical observations reported by Song et al., where sustained improvement in adenomyosis symptoms was achieved with continued device use [22]. Collectively, these outcomes reinforce the role of LNG-IUS as a minimally invasive and clinically effective option for managing symptomatic adenomyosis while preserving reproductive potential.

Limitations and Recommendations

The study involved a relatively small sample size and short follow-up duration. Larger multicenter studies with longer observation periods are recommended to evaluate long-term outcomes, recurrence patterns and comparative effectiveness with other medical therapies.

Conclusion

Levonorgestrel-releasing intrauterine system demonstrated significant modulation of menstrual patterns among symptomatic adenomyosis patients, with marked reduction in heavy menstrual bleeding and progressive stabilization of menstrual flow during follow-up. The increase in amenorrhea and decline in intermenstrual bleeding indicate effective endometrial suppression. LNG-IUS appears to be a safe, fertility-preserving and clinically effective conservative treatment option for improving menstrual symptoms and enhancing overall gynecological outcomes.

Funding: None

Conflicts of interest: There are no conflicts of interest.

References

- Benagiano G, Brosens I, Habiba M. Adenomyosis: a life-cycle approach. *Reproductive BioMedicine Online*. 2015 Mar 1;30(3):220-32.
- Khan KN, Fujishita A, Mori T. Pathogenesis of human adenomyosis: current understanding and its association with infertility. *Journal of clinical medicine*. 2022 Jul 13;11(14):4057.
- Artymuk N, Zotova O, Gulyaeva L. Adenomyosis: genetics of estrogen metabolism. *Hormone Molecular Biology and Clinical Investigation*. 2019 Feb 25;37(2):20180069.
- Chapron C, Vannuccini S, Santulli P, Abrão MS, Carmona F, Fraser IS, Gordts S, Guo SW, Just PA, Noël JC, Pistofidis G. Diagnosing adenomyosis: an integrated clinical and imaging approach. *Human reproduction update*. 2020 Apr 15;26(3):392-411.
- Peric H, Fraser IS. The symptomatology of adenomyosis. *Best practice & research Clinical obstetrics & gynaecology*. 2006 Aug 1;20(4):547-55.

- Etrusco A, Barra F, Chiantera V, Ferrero S, Bogliolo S, Evangelisti G, Oral E, Pastore M, Izzotti A, Venezia R, Ceccaroni M. Current medical therapy for adenomyosis: from bench to bedside. *Drugs*. 2023 Nov;83(17):1595-611.
- Chrisman C, Ribeiro P, Dalton VK. The levonorgestrel-releasing intrauterine system: an updated review of the contraceptive and noncontraceptive uses. *Clinical obstetrics and gynecology*. 2007 Dec 1;50(4):886-97.
- Bianchi P, Guo SW, Habiba M, Benagiano G. Utility of the levonorgestrel-releasing intrauterine system in the treatment of abnormal uterine bleeding and dysmenorrhea: a narrative review. *Journal of Clinical Medicine*. 2022 Oct 1;11(19):5836.
- Cho S, Nam A, Kim H, Chay D, Park K, Cho DJ, Park Y, Lee B. Clinical effects of the levonorgestrel-releasing intrauterine device in patients with adenomyosis. *American journal of obstetrics and gynecology*. 2008 Apr 1;198(4):373-e1.
- Bragheto AM, Caserta N, Bahamondes L, Petta CA. Effectiveness of the levonorgestrel-releasing intrauterine system in the treatment of adenomyosis diagnosed and monitored by magnetic resonance imaging. *Contraception*. 2007 Sep 1;76(3):195-9.
- Ishizawa C, Hirota Y, Iida R, Kaku T, Hirata T, Fukui Y, Omura E, Akaeda S, Hiraoka T, Matsuo M, Osuga Y. Levonorgestrel-releasing intrauterine system improves menorrhagia-related quality of life in patients with symptomatic adenomyosis. *Reproductive Sciences*. 2023 Mar;30(3):966-73.
- Li L, Leng J, Jia S, Lang J. Treatment of symptomatic adenomyosis with the levonorgestrel-releasing intrauterine system. *International Journal of Gynecology & Obstetrics*. 2019 Sep;146(3):357-63.
- Fraser IS. Non-contraceptive health benefits of intrauterine hormonal systems. *Contraception*. 2010 Nov 1;82(5):396-403.
- Sheng J, Zhang WY, Zhang JP, Lu D. The LNG-IUS study on adenomyosis: a 3-year follow-up study on the efficacy and side effects of the use of levonorgestrel intrauterine system for the treatment of dysmenorrhea associated with adenomyosis. *Contraception*. 2009 Mar 1;79(3):189-93.
- Xu X, Ruan X, Rabe T. Intrauterine contraception and menstrual bleeding. *Global Health Journal*. 2021 Jun 1;5(2):66-9.
- Giraldo PC, Souza TC, Henrique GL, Monteiro I, Amaral R, Machado RB, Discacciati MG, Sanches JM. Reactional changes in short-term levonorgestrel-releasing intrauterine system (lmg-ius) use. *Revista da Associação Médica Brasileira*. 2019 Jul 22; 65:857-63.
- Villavicencio J, Allen RH. Unscheduled bleeding and contraceptive choice: increasing satisfaction and continuation rates. *Open Access Journal of Contraception*. 2016 Mar 31:43-52.
- Choi YS, Cho S, Lim KJ, Jeon YE, Yang HI, Lee KE, Heena K, Seo SK, Kim HY, Lee BS. Effects of LNG-IUS on nerve growth factor and its receptors expression in patients with adenomyosis. *Growth Factors*. 2010 Dec 1;28(6):452-60.
- Upton K, Missmer SA. Epidemiology of adenomyosis. In *Seminars in reproductive medicine* 2020 May (Vol. 38, No. 02/03, pp. 089-107). Thieme Medical Publishers, Inc..
- Harada T, Taniguchi F, Guo SW, Choi YM, Biberoglu KO, Tsai SJ, Alborzi S, Al-Jefout M, Chalermchokcharoenkit A, Sison-Aguilar AG, Fong YF. The Asian Society of Endometriosis and Adenomyosis guidelines for managing adenomyosis. *Reproductive Medicine and Biology*. 2023 Sep 10;22(1):e12535.

- Sharara FI, Kheil MH, Feki A, Rahman S, Klebanoff JS, Ayoubi JM, Moawad GN. Current and prospective treatment of adenomyosis. *Journal of clinical medicine*. 2021 Jul 30;10(15):3410.
- Song SY, Lee SY, Kim HY, Park DB, Kim DE, Lee KH, Lee S, Yang JB, Yoo HJ. Long-term efficacy and feasibility of levonorgestrel-releasing intrauterine device use in patients with adenomyosis. *Medicine*. 2020 May 29;99(22):e20421.