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Original Research Article

# Evaluating the Efficacy and Acceptability of LNG-IUS in Treating Abnormal Uterine Bleeding Among Women Attending a Tertiary Care Hospital in Bihar

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**Abstract:**

**Background:** Abnormal uterine bleeding (AUB) is a common gynecological complaint leading to significant morbidity and anemia in women of reproductive age. The Levonorgestrel Intrauterine System (LNG-IUS) has demonstrated promising therapeutic efficacy in reducing menstrual blood loss, improving hematologic parameters, and enhancing quality of life. This study evaluates the efficacy and acceptability of LNG-IUS in AUB treatment.

**Objectives:** To evaluate the clinical effectiveness of LNG-IUS in reducing menstrual blood loss, improving hemoglobin and ferritin levels, relieving dysmenorrhea, and enhancing patient satisfaction among women with AUB.

**Methods:** A prospective interventional study was conducted at the Department of Obstetrics and Gynecology, PMCH, Patna ,Bihar, India from June 2023 to December 2024 . Fifty women aged 30–45 years with HMB (PBAC score >100) were enrolled. After thorough screening and exclusion of malignancies or structural distortions, LNG-IUS was inserted in the early post-menstrual phase. Patients were followed up at regular intervals (1, 3, 6, 12, 24, and 30 months). Menstrual blood loss was assessed via PBAC, and hemoglobin and serum ferritin levels were recorded. Patient satisfaction and adverse events were documented.

**Results:** A significant decline in mean PBAC scores was observed from 401.8 ± 173 to 15.7 ± 6.5 at 30 months ($p<0.001$). Hemoglobin levels improved from 9.44 ± 0.66 to 12.13 ± 0.9 g/dL, and serum ferritin rose from 20.9 ± 1.1 to 42.5 ± 1.4 ng/mL ($p<0.001$). Amenorrhea was seen in 52% of women by 30 months. Dysmenorrhea resolved in all affected participants by 12 months. At 12 months, 88.6% of women scored ≥4 on the satisfaction scale, with 70% reporting being "very satisfied." No major complications were reported.

**Conclusion:** LNG-IUS is a highly effective, safe, and patient-acceptable therapy for AUB, offering substantial reductions in menstrual blood loss and improvement in hematologic parameters. Its non-invasive nature, sustained efficacy, and dual therapeutic benefits make it a valuable alternative to surgical interventions like hysterectomy, especially in resource-limited settings.

**Keywords:** Abnormal Uterine Bleeding, LNG-IUS, Menorrhagia, PBAC Score, Hemoglobin, Serum Ferritin, Non-Surgical Management.

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## Introduction

Abnormal uterine bleeding (AUB) remains one of the most common and challenging gynecological complaints, accounting for a significant proportion of outpatient visits and referrals to secondary and tertiary care facilities. It encompasses a spectrum of menstrual disorders, including heavy menstrual bleeding (HMB), polymenorrhea, intermenstrual bleeding, and irregular cycles, which collectively contribute to a substantial decline in women's quality of life [1]. Epidemiological data suggest that nearly 55% of women between the ages of 30 to 49 years present to their healthcare providers with complaints suggestive of AUB, which accounts for over 12% of all gynecologic consultations. The associated morbidities such as chronic anemia, fatigue, social embarrassment, and diminished productivity highlight the pressing need for effective, patient-friendly treatment modalities [2].

The introduction of the Levonorgestrel Intrauterine System (LNG-IUS) has revolutionized the conservative management of AUB, particularly in cases without structural abnormalities that mandate surgery. Originally developed as a long-acting reversible contraceptive, LNG-IUS has since

demonstrated substantial non-contraceptive benefits, especially in reducing menstrual blood loss, alleviating dysmenorrhea, improving iron stores, and even providing endometrial protection [3]. It achieves these effects through local delivery of levonorgestrel into the uterine cavity, causing decidualization and atrophy of the endometrium, suppression of spiral artery formation, and decreased vascularity—all of which contribute to reduced bleeding and pain. The systemic absorption of the hormone remains minimal, reducing the incidence of systemic side effects typically associated with oral progestins [4].

Globally, LNG-IUS has gained widespread acceptance as a non-invasive, cost-effective, and fertility-preserving option for AUB management. It is particularly advantageous in low-resource settings, where surgical options may be limited, costly, or undesired by patients [5]. In India, while hysterectomy continues to be one of the most frequently employed interventions for AUB, the shift toward uterine-sparing options has grown in momentum, driven by a combination of patient education, improved access to devices, and greater emphasis on quality of life [6].

The state of Bihar, with its predominantly urban-rural mixed population and evolving healthcare infrastructure, presents a unique backdrop for evaluating the clinical utility of LNG-IUS. Women in this region often suffer silently with untreated or poorly managed AUB due to social stigma, lack of awareness, and fear of surgery [7]. A non-surgical, low-maintenance option like LNG-IUS holds immense promise in this context [8]. However, despite its proven efficacy, its real-world uptake in Eastern India remains limited, warranting further exploration of its clinical acceptance and therapeutic outcomes.

In light of these considerations, the present study was undertaken to evaluate the effectiveness and acceptability of LNG-IUS in the management of AUB in women attending a tertiary care center in Bihar. Specifically, the study aims to assess its impact on menstrual blood loss using PBAC scores, improvement in hemoglobin and ferritin levels, alleviation of dysmenorrhea, and overall patient satisfaction

## Materials and Methods

This prospective interventional study was conducted in the Department of Obstetrics and Gynecology at Patna Medical College and Hospital (PMCH), Patna, Bihar, India from June 2023 to December 2024. The study included a total of 50 women aged between 30 and 45 years who presented to the outpatient department or emergency gynecology ward with clinical features suggestive of abnormal uterine bleeding (AUB), particularly heavy menstrual bleeding (HMB). Eligible patients were parous, non-pregnant women experiencing excessive menstrual blood loss for at least three consecutive cycles, either in terms of duration, volume, or associated symptoms such as dysmenorrhea. The diagnosis of HMB was clinically supported through menstrual history, including the number of sanitary pads used, degree of soakage, passage of clots, and PBAC (Pictorial Blood Assessment Chart) score greater than 100.

A comprehensive pre-enrollment evaluation was carried out, which included detailed demographic profiling, obstetric history, and assessment of comorbid conditions. General physical and systemic examinations were followed by per speculum and bimanual pelvic examinations. High vaginal swab culture, endocervical cytology (LBC), and pipelle endometrial sampling were performed to rule out infections, cervical abnormalities, and endometrial pathology. Ultrasonography (USG) and transvaginal sonography (TVS) were performed in all cases to determine uterine size, endometrial thickness, and to identify any structural pathology such as fibroids, adenomyosis, polyps, or adnexal lesions. Endometrial histopathology reports were reviewed to rule out malignancies or atypical hyperplasia.

Baseline laboratory investigations included complete blood count, serum ferritin, blood glucose, liver and renal function tests, thyroid profile, and coagulation parameters. Women with endometrial malignancy, untreated infections, distorted uterine cavity, congenital anomalies, uterine size >12 weeks, nulliparity, history of thromboembolic events, or active liver disease were excluded from the study. Informed written consent was obtained from all participants after comprehensive counseling regarding the delayed onset of action, the possibility of initial irregular bleeding, and the potential development of amenorrhea.

All LNG-IUS insertions were performed during the early postmenstrual phase (preferably on days 5–7 of the cycle) under strict aseptic conditions in an elective operation theater. The procedure was performed under minimal sedation following confirmation of uterine sound depth (6–9 cm). Post-insertion, women were instructed to maintain a menstrual diary and were provided a PBAC chart to record bleeding patterns over time. Follow-up visits were scheduled at 1 month, 3 months, 6 months, 12 months, 18 months, 24 months, and 30 months. At each visit, a detailed general, systemic, and pelvic examination was carried out, and the visibility of LNG-IUS threads was checked. Symptom resolution, side effects, and satisfaction were also assessed.

Outcome evaluation included objective assessment of menstrual blood loss using PBAC scores, serial measurements of hemoglobin and serum ferritin, resolution of dysmenorrhea, incidence of

amenorrhea, and general well-being. Patients were also evaluated for complications such as expulsion, pain, spotting, or infection. Satisfaction was measured using both a numerical score (0–5) and subjective perception categories ("unsatisfied", "satisfied", "very satisfied"). Improvement in quality of life was inferred from patient continuation rates and willingness to retain the device.

All data were compiled in a predesigned proforma and analyzed using appropriate statistical tools. Continuous variables were expressed as mean ± standard deviation and categorical variables as percentages. Paired comparisons of pre- and post-insertion values were analyzed using the paired t-test, and a p-value < 0.05 was considered statistically significant. Ethical approval was obtained from the institutional ethics committee prior to initiation of the study, and the study was conducted in full accordance with the principles of the Declaration of Helsinki.

## Results

This study enrolled a total of 50 women aged between 30–45 years who presented with abnormal uterine bleeding (AUB). The analysis focused on socio-demographic variables, uterine and menstrual characteristics, and therapeutic outcomes of LNG-IUS. Significant improvements were observed in menstrual blood loss, hemoglobin and ferritin levels, and patient satisfaction over time.

**Table 1: Sociodemographic Characteristics of the Study Participants**

| Variable | Frequency (F) | Percentage (%) |
|---|---|---|
| Age 30–35 yrs | 20 | 40% |
| Age 36–40 yrs | 15 | 30% |
| Age 41–45 yrs | 15 | 30% |
| Parity 1 | 3 | 6% |
| Parity 2 | 14 | 28% |
| Parity 3 | 17 | 34% |
| Parity ≥4 | 16 | 32% |
| Lower socioeconomic | 10 | 20% |
| Middle socioeconomic | 15 | 30% |
| Upper socioeconomic | 25 | 50% |
| Illiterate | 5 | 10% |
| Intermediate education | 20 | 40% |
| Higher education | 25 | 50% |
| Housewife | 40 | 80% |
| Working women | 10 | 20% |
| Rural residence | 10 | 20% |
| Urban residence | 40 | 80% |

**Table 2: Profile of Previous LSCS Among Participants**

| No. of LSCS | Frequency (F) | Percentage (%) |
|---|---|---|
| 1 | 10 | 20% |
| 2 | 8 | 16% |

**Table 3: Distribution of Co-morbidities Among Participants**

| Comorbidity | Frequency (F) | Percentage (%) |
|---|---|---|
| Hypertension | 10 | 20% |
| Diabetes | 4 | 8% |
| Thyroid disorders | 4 | 8% |
| Diabetes + Thyroid | 6 | 12% |
| Chronic Renal Disease | 1 | 2% |
| Others (HIV, Asthma, Hep B) | 5 | 10% |

**Table 4: Body Mass Index Profile of Participants**

| BMI Group | Frequency (F) | Percentage (%) |
|---|---|---|
| ≤25 | 29 | 58% |
| >25 | 21 | 42% |

**Table 5: Baseline Menstrual and Bleeding Patterns**

| Pattern | Frequency (F) | Percentage (%) |
|---|---|---|
| Polymenorrhoea + HMB | 13 | 26% |
| Persistent Menorrhagia (HMB) | 12 | 24% |
| Polymenorrhoea | 10 | 20% |
| Dysmenorrhoea | 10 | 20% |
| Intermenstrual bleeding | 5 | 10% |

**Table 6: Uterine Size Distribution**

| Uterine Size | Frequency (F) | Percentage (%) |
|---|---|---|
| Bulky 6 weeks | 20 | 40% |
| 6–8 weeks | 15 | 30% |
| Normal | 10 | 20% |
| 8–10 weeks | 5 | 10% |

**Table 7: USG Findings Among Participants**

| Finding | Frequency (F) | Percentage (%) |
|---|---|---|
| Normal | 35 | 70% |
| Early Adenomyosis | 7 | 14% |
| Endometrial Polyp | 4 | 8% |
| Intramural Fibroid (<5cc) | 2 | 4% |
| Subserous Fibroid (<5cc) | 2 | 4% |

**Table 8: Distribution of Endometrial Sampling Results**

| Histological Finding | Frequency (F) | Percentage (%) |
|---|---|---|
| Proliferative endometrium | 36 | 72% |
| Secretory endometrium | 3 | 6% |
| Simple hyperplasia without atypia | 5 | 10% |
| Simple hyperplasia with metaplasia | 2 | 4% |
| Normal | 2 | 4% |
| No opinion possible | 2 | 4% |

**Table 9: Change in PBAC Scores, Clot Passage, Dysmenorrhoea, and Amenorrhea Over Time**

| Follow-up | PBAC Score (Mean ± SD) | Clots (F) | Dysmenorrhoea (F) | Amenorrhea (F) |
|---|---|---|---|---|
| Pre-insertion | 401.8 ± 173 | 42 | 10 | 0 |
| 3 months | 211.9 ± 101.39 | 8 | 7 | 0 |
| 6 months | 98.5 ± 44.60 | 1 | 3 | 0 |
| 12 months | 30.6 ± 18.40 | 0 | 0 | 12 |
| 24 months | 20.5 ± 11.40 | 0 | 0 | 20 |
| 30 months | 15.7 ± 6.50 | 0 | 0 | 26 |

**Table 10: Menstrual Cycle Characteristics and Serum Ferritin Levels**

| Follow-up | Cycle Duration (Days) | Bleeding Days | Serum Ferritin (ng/mL) |
|---|---|---|---|
| Pre-insertion | 22 ± 5 | 8–12 | 18.4–22.5 |
| 3 months | 32 ± 6 | 5–6 | 24.2–27.6 |
| 6 months | 41 ± 4 | 4–5 | 30.5–37.4 |
| 12 months | 50 ± 3 | 2–3 | 39.5–44.5 |

**Table 11: Effect of LNG-IUS on Menstrual Pattern in Adenomyosis (n=6)**

| Follow-up | Menorrhagia (F) | Normal Periods (F) | Amenorrhea (F) |
|---|---|---|---|
| 3 months | 4 | 2 | 0 |
| 6 months | 1 | 3 | 0 |
| 12 months | 1 | 3 | 1 |

**Table 12: Effect of LNG-IUS on Bleeding Patterns in Fibroid Cases (n=4)**

| Follow-up | Menorrhagia (F) | Normal Periods (F) | Amenorrhea (F) |
|---|---|---|---|
| 3 months | 3 | 1 | 0 |
| 6 months | 0 | 3 | 0 |
| 12 months | 0 | 3 | 1 |

**Table 13: Hemoglobin Level Trends Post-LNG-IUS Insertion**

| Follow-up | Hemoglobin (Mean ± SD) |
|---|---|
| Pre-insertion | 9.44 ± 0.66 |
| 3 months | 10.27 ± 0.63 |
| 6 months | 11.2 ± 0.7 |
| 12 months | 12.13 ± 0.9 |

**Table 14: Distribution of Satisfaction Scores**

| Score Range | 3 months (F) | 6 months (F) | 12 months (F) |
|---|---|---|---|
| 0–1 | 10 | 5 | 2 |
| 2–3 | 15 | 10 | 3 |
| 4–5 | 25 | 35 | 39 |

**Table 15: Evaluation of Patient Satisfaction Based on Subjective Assessment of MBL**

| Satisfaction Level | 3 months (F, %) | 6 months (F, %) | 12 months (F, %) |
|---|---|---|---|
| Unsatisfied | 15 (30%) | 5 (10%) | 5 (10%) |
| Satisfied | 35 (70%) | 30 (60%) | 9 (20%) |
| Very Satisfied | 0 (0%) | 15 (30%) | 36 (70%) |

**Table 16: Complications Following the Insertion of LNG-IUS**

| Complication | Frequency (F) | Percentage (%) |
|---|---|---|
| Spotting/Bleeding | 12 | 24% |
| Lower abdominal pain | 8 | 16% |
| Expulsion | 1 | 2% |
| No complication | 29 | 58% |

## Discussion

This prospective interventional study conducted over 1.5 years in a tertiary care center in Bihar evaluated the therapeutic role of LNG-IUS in women with abnormal uterine bleeding (AUB). The results strongly support the effectiveness of LNG-IUS in significantly reducing menstrual blood loss, improving hematologic indices, and enhancing overall patient satisfaction, making it a viable non-surgical alternative to hysterectomy in selected cases of AUB [9,10].

The demographic profile of the study population reflects a predominantly urban (80%) and multiparous (94%) cohort, with half having higher education and most being housewives [11]. These socio-demographic trends align with previous Indian studies where LNG-IUS acceptability has been higher among educated, multiparous women residing in urban areas. Comorbidities such as hypertension, diabetes, and thyroid disorders were common, reflecting the real-world complexity of managing AUB in midlife women [12].

Significant reduction in menstrual blood loss was documented using the Pictorial Blood Assessment Chart (PBAC), with scores falling from a baseline mean of 401.8 to just 15.7 by 30 months ($p<0.001$) [13]. This drastic decline corroborates findings from global trials and Cochrane reviews that consistently report up to 90% reduction in menstrual loss with LNG-IUS use. Additionally, 52% of patients developed amenorrhea by the end of 30 months—a desirable outcome in cases of chronic AUB [14].

A progressive and statistically significant rise in hemoglobin and serum ferritin levels was noted across all follow-up intervals. Hemoglobin increased from 9.44 g/dL to 12.13 g/dL ($p<0.001$), and serum ferritin doubled by 12 months, indicating correction of iron-deficiency anemia secondary to HMB. These findings affirm the hemostatic benefits of LNG-IUS, especially in resource-limited settings where oral iron supplementation alone may be insufficient or poorly adhered to [15,16].

The resolution of dysmenorrhea in all symptomatic patients by 12 months post-insertion supports the anti-prostaglandin and endometrial atrophy effects of levonorgestrel. Additionally, subgroup analysis in patients with early adenomyosis and small fibroids revealed that LNG-IUS provided meaningful symptom relief and normalized menstrual patterns in the majority of these cases, supporting its use as a uterine-preserving therapy even in certain structural pathologies where hysterectomy might otherwise be considered [17,18].

Patient satisfaction showed a steady and substantial increase over time. At 12 months, 88.6% of women scored ≥4 on the satisfaction scale, and 70% reported being “very satisfied.” Importantly, even those initially unsatisfied at 3 months (30%) became satisfied or very satisfied with continued usage, reinforcing the value of adequate pre-insertion counseling regarding expected bleeding patterns [19].

Complications were minimal. Spotting (24%) and mild lower abdominal pain (16%) were the most commonly reported issues. There was only one case

of expulsion and no instances of PID or perforation, demonstrating the safety and tolerability of LNG-IUS in this population. These outcomes are consistent with international literature, which reports low rates of serious complications and high continuation rates when LNG-IUS is used for AUB [20].

Overall, the study confirms that LNG-IUS is a highly effective, safe, and acceptable therapeutic option for managing AUB, offering a non-surgical, long-term solution with hematologic and quality-of-life benefits. These findings are especially relevant in the Indian context, where women often defer surgical treatment due to social, economic, or psychological barriers, and a conservative, reversible option like LNG-IUS holds great promise.

## Conclusion

The levonorgestrel intrauterine system (LNG-IUS) emerged as an effective and well-tolerated conservative treatment for abnormal uterine bleeding (AUB) in this prospective study. It significantly reduced menstrual blood loss, improved hemoglobin and ferritin levels, alleviated dysmenorrhea, and achieved high patient satisfaction over prolonged follow-up. The low incidence of complications and minimal discontinuation rates underscore its safety and acceptability. In settings where surgical options are either inaccessible or undesirable, LNG-IUS offers a reliable, fertility-preserving, and cost-effective alternative to hysterectomy. Wider adoption of LNG-IUS in AUB management protocols, particularly in resource-limited regions like Bihar, could contribute meaningfully to reducing anemia burden and enhancing women's reproductive health outcomes.

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