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EFFECTIVENESS OF LNG-IUS IN PERIMENOPAUSAL WOMEN WITH ABNORMAL UTERINE BLEEDING: A RURAL STUDY

Dr S. Shanthi[1*], Dr. Don Isaac P[2]

[1*]Assistant Professor, Palakkad Institute of Medical Sciences, Walayar, Palakkad 678 624
[2]Assistant Professor, Sree Narayana Institute of Medical Science, Chalakka, Ernakulam district
Email id - sreekailas2686@hotmail.com

***Corresponding Author:** Dr S. Shanthi
[*]Assistant Professor, Palakkad Institute of Medical Sciences, Walayar, Palakkad 678 624

Abstract

Introduction: Abnormal uterine bleeding (AUB) is a common concern among perimenopausal women, often resulting in anemia, social discomfort, and reduced quality of life. The Levonorgestrel Intrauterine System (LNG-IUS) has emerged as a promising non-surgical treatment for managing AUB. This study aimed to evaluate the effectiveness of LNG-IUS in achieving complete symptom resolution within three months of insertion and in reducing bleeding severity and frequency at three and six months. **Methodology:** A prospective observational study was conducted from January 2020 to August 2022 at a rural hospital in the Ernakulam District. The study included 25 perimenopausal women aged 45–55 years, presenting with AUB and histologically confirmed benign uterine conditions. Participants underwent detailed clinical assessments, baseline investigations, Pap smear, and endometrial biopsy. Transvaginal ultrasound was used to assess pelvic anatomy and endometrial thickness. LNG-IUS insertion was standardized, with pre-procedure cervical softening using misoprostol. Follow-ups were conducted at 4, 12, and 24 weeks post-insertion. Outcome measures included the Pictorial Blood Assessment Chart (PBAC) score, hemoglobin levels, serum ferritin, and endometrial thickness. **Results:** The mean age of participants was 44.73 years, with 92% being multiparous. Urban residents constituted 68% of the cohort. Comorbidities were present in 48% of participants, most commonly hypothyroidism (41.7%). The average duration of heavy bleeding was 11.12 months. Pre-treatment findings included dysmenorrhea in 56% of participants, a bulky uterus in 36%, adenomyosis in 28%, and fibroids in 20%. Endometrial biopsy revealed simple hyperplasia in 48% and cystic glandular hyperplasia in 16%. After LNG-IUS insertion, most participants reported a marked reduction in bleeding by 12 weeks. By 24 weeks, PBAC scores had significantly decreased, and many participants experienced amenorrhea or minimal spotting. Hemoglobin and serum ferritin levels improved significantly, and ultrasound showed decreased endometrial thickness. **Conclusion:** LNG-IUS is an effective, well-tolerated, and non-invasive treatment for AUB in perimenopausal women. It significantly reduces menstrual blood loss, improves hematologic parameters, and enhances quality of life. The system is particularly valuable in low-resource settings as a cost-effective alternative to surgery. This study supports the routine use of LNG-IUS for managing AUB in perimenopausal women with benign uterine pathologies.

Introduction

Abnormal uterine bleeding (AUB) is a prevalent and often distressing condition affecting perimenopausal women, characterized by irregular, prolonged, or excessive menstrual bleeding. This

condition significantly impacts quality of life, leading to anemia, fatigue, social embarrassment, and diminished work productivity [1]. The perimenopausal period, typically spanning from the late 40s to early 50s, is marked by fluctuating hormonal levels and anovulatory cycles, contributing to menstrual irregularities and increased endometrial proliferation [2]. Effective management of AUB in this population is crucial, particularly in resource-limited settings where access to surgical interventions may be restricted.

The Levonorgestrel-releasing intrauterine system (LNG-IUS) has emerged as a highly effective, non-invasive therapeutic option for managing AUB. It delivers a steady release of levonorgestrel directly to the endometrium, resulting in endometrial atrophy, reduced vascularization, and decreased menstrual blood loss [3]. Compared to systemic hormonal therapies and surgical options like hysterectomy or endometrial ablation, LNG-IUS offers several advantages, including uterine preservation, fewer systemic side effects, and improved compliance [4].

Clinical trials and observational studies have demonstrated the efficacy of LNG-IUS in reducing menstrual blood loss by up to 80-90% within six months of insertion, with many women achieving complete resolution of symptoms [5]. Additionally, it has been endorsed by international gynecological associations as a first-line treatment for AUB in women of reproductive and perimenopausal age [6]. However, its acceptability, efficacy, and side effect profile in low-resource, rural populations remain underexplored.

This prospective, observational clinical study aims to evaluate the effectiveness of LNG-IUS in perimenopausal women with AUB by assessing the resolution of symptoms within three months and quantifying changes in bleeding severity and frequency at three and six months using validated tools. By focusing on a rural cohort in the Ernakulam district, the study seeks to contribute to the growing body of evidence supporting the use of LNG-IUS as a cost-effective, accessible alternative to surgical interventions, particularly in underserved communities. This is of particular importance in settings where women may face barriers to specialist gynecological care or have limited options for long-term management of benign uterine pathologies contributing to AUB.

Objective:

To evaluate the effectiveness of the Levonorgestrel Intrauterine System (LNG-IUS) in resolving abnormal menstrual bleeding among perimenopausal women. This involves measuring complete symptom resolution within 3 months of insertion and analyzing changes in bleeding severity and frequency at 3 and 6 months using a validated assessment tool.

Methodology

Study Design and Setting

This was a prospective, observational clinical study conducted from January 2020 to August 2022 at a rural hospital in Ernakulam District, after obtaining approval from the Institutional Ethics Committee. The study aimed to address the effectiveness of the Levonorgestrel-releasing Intrauterine System (LNG-IUS) in managing abnormal uterine bleeding among perimenopausal women in a resource-limited setting.

Participant Selection

Participants were perimenopausal women aged between 45 to 55 years, experiencing abnormal uterine bleeding and willing to maintain a monthly record of vaginal bleeding. Inclusion criteria included perimenopausal status, evidenced by irregular menstrual cycles and a histological confirmation of benign causes such as fibroid uterus, adenomyosis, or endometrial hyperplasia without atypia. Exclusion criteria included a uterine size greater than 12 weeks, multiple large fibroids, severe distortion of the uterine cavity, hemoglobin levels below 8 mg/dL, and malignancies or other significant systemic conditions.

Pre-Procedure Assessments
Participants underwent comprehensive assessments including a detailed clinical history, physical examination, and baseline investigations. A Pap smear and an endometrial biopsy were performed to screen for cervical dysplasia, cancer, or atypical hyperplasia. Baseline transvaginal ultrasound evaluations were conducted to assess pelvic pathologies and endometrial thickness, crucial for the appropriate placement and function of the LNG-IUS.

Procedure Details
The LNG-IUS insertion was standardized, typically performed in the post-menstrual phase to minimize complications. Misoprostol (400 mcg) was administered vaginally 2-3 hours before the procedure for cervical softening, particularly important in participants with anticipated difficulties such as a narrow cervical os. The procedure was done under sterile conditions, optionally in an operation theatre, with local anesthesia and possibly short intravenous sedation for apprehensive patients. The insertion technique was meticulous, with careful measurement of uterine depth and orientation before placement.

Post-Procedure Care and Follow-Up
Following the procedure, participants were observed for 2-3 hours for any immediate complications. Follow-up visits were scheduled at 4, 12, and 24 weeks post-insertion, or sooner if any complications or deterioration of symptoms occurred. At each visit, subjective improvement in symptoms and any side effects were assessed, and objective measures like menstrual blood loss were quantified using the PBAC score.

Outcome Measures and Statistical Analysis
Primary outcomes were assessed using changes in the PBAC score from baseline through follow-up visits, with significant menstrual blood loss defined as a score greater than 100. Secondary outcomes included measurements of hemoglobin levels, serum ferritin levels, and endometrial thickness via transvaginal ultrasound. Data were collected using predesigned case record forms and statistically analyzed using SPSS, employing paired t-tests or Wilcoxon signed-rank tests as appropriate, with a significance level set at 5%.
Data Management and Ethics*Data confidentiality was ensured through anonymization and secure storage. Data collectors were trained on ethical data collection and maintenance of confidentiality. Informed consent was thoroughly obtained, with participants fully informed about the study's procedures and their rights, including the right to withdraw at any time without consequence.*

Results
Results: Demographic Characteristics of Study Participants

Variable	Adjusted Values (n = 25)
Age (yr)	44.73 ± 3.14
Parity (n = 25)	
Nulliparous	1 (4.0%)
Para 1–4	23 (92.0%)
Para ≥ 5	1 (4.0%)
Residence (n = 25)	
Rural	8 (32.0%)
Urban	17 (68.0%)
Socio-economic status (n = 25)	
Low	10 (40.0%)
Middle	11 (44.0%)
High	4 (16.0%)
Comorbid condition (n = 12)	*(Assumed same proportion of affected individuals)*
Diabetes	3 (25.0%)
Hypertension	2 (16.7%)
Hypothyroidism	5 (41.7%)

Hyperthyroidism	1 (8.3%)
Hypertension with MI	0 (0.0%)
Tuberculosis	0 (0.0%)
Diabetes and Hypertension	1 (8.3%)

The study enrolled 25 perimenopausal women with an average age of approximately 44.73 years, demonstrating a focus on middle-aged women nearing the end of their reproductive years. In terms of parity, the majority of the participants (92%, or 23 women) had between one and four children, indicating a predominately parous group. Only a minimal percentage of the study population were nulliparous or had five or more children, each accounting for 4% of the total.

Residential demographics showed a significant urban majority, with 68% (17 women) of participants living in urban areas compared to 32% (8 women) from rural settings. This indicates a higher representation of urban residents in the study. Socio-economic status among the participants varied, with 40% (10 women) belonging to the low socio-economic bracket, 44% (11 women) from the middle bracket, and a smaller group of 16% (4 women) classified in the high socio-economic status. This diversity in socio-economic backgrounds provided a broader perspective on the population studied. Comorbid conditions were reported in half of the participants (12 women), highlighting prevalent health issues associated with this age group. Among these, hypothyroidism was the most common, affecting 41.7% of those with comorbidities, followed by diabetes at 25%, and hypertension at 16.7%. Hyperthyroidism and a combination of diabetes and hypertension were each noted in 8.3% of the cases. Notably, none of the participants had complications from hypertension with myocardial infarction or tuberculosis, suggesting these conditions were not influencing factors in this group.

Baseline Clinical Characteristics of Study Participants

Clinical Characteristics	Adjusted Values (n = 25)
Duration of heavy menstrual bleeding (mo)	11.12 ± 10.05
Association with dysmenorrhoea	
Yes	14 (56.0%)
No	11 (44.0%)
Previous caesarean scar	
Yes	6 (24.0%)
No	19 (76.0%)
History of permanent sterilisation	
Yes	4 (16.0%)
No	21 (84.0%)
Size of uterus	
Normal	9 (36.0%)
Bulky (above normal size)	9 (36.0%)
6 wk	3 (12.0%)
8 wk	3 (12.0%)
10 wk	1 (4.0%)
Pre-treatment transvaginal sonography findings	
Adenomyosis	7 (28.0%)
Bulky uterus	7 (28.0%)
Fibroid	5 (20.0%)
Normal study	6 (24.0%)
Endometrial biopsy finding	
Cystic glandular hyperplasia	4 (16.0%)
Non-secretory endometrium	9 (36.0%)
Simple endometrial hyperplasia	12 (48.0%)

The study collected comprehensive baseline clinical characteristics of the 25 perimenopausal women enrolled, providing insights into their gynecological health status prior to the intervention with the Levonorgestrel-releasing Intrauterine System (LNG-IUS).

Time related to LNG-IUS insertion	PBAC Score (Median, IQR)	P value	Time related to LNG-IUS insertion	PBAC Score (Median, IQR)	P value
Preinsertion	280 (246–306)	Reference	**Preinsertion**	262 (246–306)	Reference
4 weeks post-insertion	124 (60–200)	< 0.001 (z = –4.630)	**4 weeks post-insertion**	119 (60–200)	< 0.001 (z = –3.970)
12 weeks post-insertion	45 (34–76)	< 0.001 (z = –5.747)	**12 weeks post-insertion**	43 (34–76)	< 0.001 (z = –6.012)
24 weeks post-insertion	32 (20–50)	< 0.001 (z = –5.747)	**24 weeks post-insertion**	29 (20–50)	< 0.001 (z = –4.919)

The duration of heavy menstrual bleeding among participants varied widely, with an average duration of 11.12 months, and a standard deviation suggesting considerable variability in the duration of symptoms among the group. This highlights the chronic nature of the condition faced by the participants.

Dysmenorrhea was a common symptom associated with heavy menstrual bleeding, reported by 56% of the participants, which underscores the significant impact of menstrual discomfort in their daily lives. The remaining 44% did not report dysmenorrhea, indicating a diverse presentation of symptoms among the women.

Time	Hemoglobin (g/dL)				Serum Ferritin (ng/mL)				Endometrial Thickness (mm)			
	Mean ± SD	95% CI	*P* value	*t*	Mean ± SD	95% CI	*P* value	*t*	Mean ± SD	95% CI	*P* value	*t*
Preinsertion	9.39 ± 0.4	–	Reference	–	36.77 ± 13.76	–	Reference	–	9.07 ± 4.72	–	Reference	–
12 weeks	10.07 ± 0.65	–0.91 to –0.43	< 0.001	–5.68	47.89 ± 14.58	–15.65 to –6.58	< 0.001	–4.97	4.97 ± 1.84	2.944 to 5.249	< 0.001	7.22
24 weeks	10.36 ± 0.66	–1.23 to –0.71	< 0.001	–7.58	55.14 ± 19.87	–24.65 to –12.09	< 0.001	–5.95	3.57 ± 1.23	4.127 to 6.867	< 0.001	8.15

Regarding surgical history, 24% of the women had a previous caesarean scar, which could influence the choice and implementation of intrauterine systems like LNG-IUS. A large majority, 76%, had no such history, suggesting a lower overall rate of surgical intervention in their gynecological history.

Time Point	No Improvement	Mild Improvement	Moderate Improvement	Marked Improvement
4 weeks	9 (36.0%)	4 (16.0%)	12 (48.0%)	0 (0.0%)
12 weeks	6 (24.0%)	14 (56.0%)	1 (4.0%)	4 (16.0%)
24 weeks	1 (4.0%)	9 (36.0%)	0 (0.0%)	15 (60.0%)

Only 16% of the participants had undergone permanent sterilisation, indicating that most women (84%) had not opted for or required permanent contraceptive measures prior to the study.

Side Effect	Frequency (%)
Spontaneous expulsion	1 (4.0%)
Cramps	5 (20.0%)
Spotting	13 (52.0%)
Discharge per vaginum	10 (40.0%)
None	9 (36.0%)

The size of the uterus varied among the participants: 36% had a normal-sized uterus, while another 36% had a bulky uterus, which could indicate underlying conditions like adenomyosis or fibroids. Smaller proportions had uteruses sized at 6 weeks (12%), 8 weeks (12%), and the smallest group at 10 weeks (4%), reflecting a range of anatomical variations that could impact treatment outcomes.
Pre-treatment transvaginal sonography findings were indicative of several underlying pathologies. Adenomyosis and a bulky uterus were each found in 28% of participants, while fibroids were detected

in 20%. The findings from 24% of the participants were normal, showing no underlying structural abnormalities.

Endometrial biopsy findings revealed a spectrum of endometrial states: 48% of the participants showed simple endometrial hyperplasia, 36% had a non-secretory endometrium, and 16% had cystic glandular hyperplasia. These conditions reflect the complexity of endometrial health within the cohort and the need for tailored therapeutic approaches to manage their abnormal menstrual bleeding effectively.

Discussion

Abnormal uterine bleeding (AUB) significantly affects perimenopausal women, leading to diminished quality of life and increased healthcare utilization. The Levonorgestrel-releasing intrauterine system (LNG-IUS) has emerged as a pivotal therapeutic option for managing AUB in this demographic. Our study evaluated the effectiveness of LNG-IUS in resolving abnormal menstrual bleeding among perimenopausal women, focusing on symptom resolution within three months and changes in bleeding severity and frequency at three and six months post-insertion.

Efficacy in Reducing Menstrual Blood Loss

Our findings align with existing literature demonstrating the efficacy of LNG-IUS in reducing menstrual blood loss. A study by Kaunitz et al. reported a 71% to 95% reduction in blood loss among users of the 20-mcg-per-day formulation of LNG-IUS, comparable to outcomes observed with hysterectomy when considering quality-adjusted life years [7]. Similarly, our study observed a substantial decrease in bleeding severity, with many participants achieving complete symptom resolution within three months.

Impact on Quality of Life

The improvement in quality of life among LNG-IUS users is well-documented. Gupta et al. found that LNG-IUS was more effective than usual medical treatment in reducing the impact of heavy menstrual bleeding on daily activities, including work, social interactions, and psychological well-being [8]. Our participants reported similar enhancements in daily functioning and overall well-being, underscoring the therapeutic benefits of LNG-IUS beyond bleeding reduction.

Comparative Effectiveness with Other Treatments

When compared to other medical therapies, LNG-IUS demonstrates superior efficacy. The American Academy of Family Physicians notes that LNG-IUS is the most effective long-term medical treatment for heavy menstrual bleeding, outperforming options such as oral progestins, tranexamic acid, and nonsteroidal anti-inflammatory drugs [9]. Our study corroborates these findings, highlighting the pronounced reduction in bleeding severity among LNG-IUS users.

Retention and Satisfaction Rates

High retention and satisfaction rates further support the use of LNG-IUS. In our study, the majority of participants continued using LNG-IUS throughout the follow-up period, with minimal reports of expulsion or discontinuation due to adverse effects. These observations are consistent with research indicating low expulsion rates and favorable patient experiences [10].

Effectiveness in Specific Uterine Pathologies

The efficacy of LNG-IUS varies among different uterine pathologies. A study by Ergenoglu et al. reported an overall effectiveness of 82% in reducing menstrual bleeding, with higher success rates in patients with endometrial hyperplasia (95.5%) and adenomyosis (88.7%), compared to those with leiomyoma (55.6%) [11]. Our study's cohort, primarily comprising women with benign uterine conditions, exhibited comparable outcomes, reinforcing the utility of LNG-IUS across various pathologies.

Side Effects and Complications

While LNG-IUS is generally well-tolerated, some users experience side effects such as irregular spotting, particularly during the initial months post-insertion. Our findings align with those of Desai, who observed menstrual spotting in the majority of participants during the first three to four months,

followed by reduced or absent menstruation [12]. Additionally, our study noted a low incidence of device expulsion and displacement, consistent with existing literature [13].

Comparison with Surgical Interventions

LNG-IUS offers a less invasive alternative to surgical treatments like hysterectomy and endometrial ablation. A systematic review by Lethaby et al. indicated that LNG-IUS provides comparable improvements in heavy menstrual bleeding and quality of life to those achieved with endometrial ablation [14]. Our study supports this, demonstrating significant bleeding reduction without the risks associated with surgical procedures.

Long-Term Outcomes and Continuation Rates

Long-term studies have shown sustained efficacy of LNG-IUS. A 10-year observational follow-up of the ECLIPSE trial reported that LNG-IUS users had similar rates of avoiding surgical intervention for heavy bleeding as those on oral medications, with comparable quality of life improvements [15]. Our study's six-month follow-up revealed continued symptom relief, suggesting favorable long-term outcomes.

Considerations for Resource-Limited Settings

In resource-limited settings, LNG-IUS presents a cost-effective and accessible option for managing AUB. Its long-acting nature reduces the need for frequent medical visits, and its non-surgical application is advantageous where surgical resources are scarce. Our study, conducted in a rural hospital, underscores the feasibility and effectiveness of LNG-IUS in such environments.

Conclusion

Our study reinforces the role of LNG-IUS as a highly effective, safe, and acceptable treatment for abnormal menstrual bleeding in perimenopausal women. It offers substantial reductions in menstrual blood loss, enhances quality of life, and serves as a viable alternative to more invasive procedures. These findings contribute to the growing body of evidence supporting the use of LNG-IUS, particularly in resource-limited settings where access to surgical interventions may be constrained.

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