

Research Article

Serum Ferritin and Hemoglobin Levels as Predictors of Clinical Severity and Response to Pharmacological Therapy in Women with Heavy Menstrual Bleeding

Asma Ghani¹, Kinza Malik^{2*}, Maryam Khurshid³, Romana Wajid⁴, Zubia Iftikhar⁵, Tahira Jehangir⁶

¹Assistant Professor, Department of Gynaecology and Obstetrics, Mercy Teaching Hospital, Peshawar Medical College, Peshawar, Pakistan.

^{2*}MPhil Pharmacology (Khyber Medical University, Peshawar), Lecturer, Department of Oral Pathology, Women Dental College, Abbottabad, Pakistan.

³MPhil Pharmacology (Khyber Medical University, Peshawar), Lecturer, Department of General Pathology, Women Dental College, Abbottabad, Pakistan.

⁴MPhil Pharmacology (Khyber Medical University, Peshawar), Lecturer, Department of Oral Biology, Women Dental College, Abbottabad, Pakistan.

⁵Assistant Professor, Department of Anatomy, Rai Medical College, Sargodha, Pakistan.

⁶Associate Professor, Department of Pharmacology, Nowshera Medical College, Nowshera, Pakistan.

Corresponding Author: Kinza Malik

MPhil Pharmacology (Khyber Medical University, Peshawar), Lecturer, Department of Oral Pathology, Women Dental College, Abbottabad, Pakistan.

Email: kinzadaniyalmalick@gmail.com

Received: 12.07.2026, Revised: 16.09.2026, Accepted: 26.09.2026

ABSTRACT

Background: Heavy menstruation is a frequent gynecological issue that can cause progressive iron deficiency, tiredness, anemia, and diminished quality of life. Hb is routinely ordered for the evaluation of anemia, and serum ferritin is an estimation of body iron stores and can help detect iron deficiency even before anemia occurs.

Objective: To evaluate serum ferritin and hemoglobin levels as predictors of clinical severity and response to pharmacological therapy in women with heavy menstrual bleeding.

Methodology: This prospective observational study was conducted at Pak International Medical College, Peshawar, from January 2025 to June 2025 and included 75 women with heavy menstrual bleeding. Baseline hemoglobin, serum ferritin, hematocrit, mean corpuscular volume (MCV), and other hematologic parameters were measured, along with clinical severity determined with the Pictorial Blood Loss Assessment Chart (PBAC). Participants were given treatment based on the indications and re-evaluated after therapy. The change in PBAC score, bleeding time, hemoglobin, and serum ferritin was noted. Identifiers of treatment response were done by correlation and multivariate logistic regression.

Results: The mean baseline hemoglobin level was 9.9 ± 1.5 g/dL and mean serum ferritin was 15.8 ± 8.9 ng/mL. Severe heavy menstrual bleeding was associated with significantly lower hemoglobin and ferritin concentrations compared with mild and moderate disease ($p < 0.001$). PBAC scores showed significant inverse correlations with hemoglobin ($r = -0.58$, $p < 0.001$) and serum ferritin ($r = -0.62$, $p < 0.001$). Following pharmacological treatment, mean PBAC score decreased from 186.7 ± 58.4 to 92.6 ± 39.7 , hemoglobin increased to 11.2 ± 1.3 g/dL, and serum ferritin increased to 26.9 ± 12.1 ng/mL (all $p < 0.001$). Overall, 57 women (76.0%) responded to therapy. Higher baseline hemoglobin and ferritin were independently associated with successful treatment response.

Conclusion: Lower serum ferritin and hemoglobin levels were associated with greater clinical severity of heavy menstrual bleeding and poorer response to pharmacological therapy. Combined assessment of hemoglobin and serum ferritin may help stratify disease severity, identify iron depletion, and support individualized therapeutic management.

Keywords: Heavy Menstrual Bleeding, Serum Ferritin, Hemoglobin, Iron Deficiency, Anemia, PBAC, Pharmacological Therapy.

INTRODUCTION

Heavy menstruation is one of the common menstrual issues seen in gynecological practice and is one of the major causes of morbidity

among women of reproductive age. It is defined as menstrual bleeding that causes one of the following: Physical, social, emotional or occupational dysfunction. Heavy periods can

lead to anemia, weak or tired from lack of blood, headaches, decreased productivity, and poor quality of life. The symptomology can be quite diverse, from having a long period to passing clots frequently to having so much blood that medical or surgical treatment is necessary (1, 2).

The effects of heavy menstruation on the physiology are closely related to progressive anemia due to repeated blood loss. Iron plays a key role in hemoglobin formation, carrying oxygen, metabolism and normal tissue function. Iron losses during menstruation start to deplete iron levels when iron losses are greater than body iron stores or intake. As iron reserves continue to become depleted, eventually hemoglobin production is lowered and iron deficiency anemia results. Thus, women who have heavy periods can become sufficiently iron deficient without having hemoglobin values that are in the range conventionally considered to be anemic (3-5). Hemoglobin concentration is one of the more commonly used laboratory markers used to assess women with heavy menstrual bleeding, and is a simple parameter to determine the severity of anemia. However, the amount of hemoglobin is not sufficient to estimate the total iron stores in the body. Serum ferritin is a more direct measure of stored iron, and may reveal iron depletion before any hematological changes are seen. The levels of both ferritin and hemoglobin may thus offer a more complete measure of the physiological effect of menstrual blood loss. Higher values may also reflect more recent or more severe bleeding, and might be useful to identify women who need more intensive iron replacement and closer clinical monitoring (6-8).

A key role in the treatment of heavy menstrual bleeding is still the use of pharmacological drugs, especially in hemodynamically stable women not requiring emergency surgery. These are the common medications that can be used to treat menorrhagia: tranexamic acid, non-steroidal anti-inflammatory drugs, hormonal therapies, progestogens and iron. Treatment is not only to decrease menstrual bleeding, it is also aimed at correcting any iron deficiency and anemia. Although these therapies are effective, there is some variation in clinical response. Others may have significant reductions in their menses and have improvement in hematological parameters, while others may have persistent symptoms and eventual need for alternative management or procedural intervention (9-11).

Although the association between heavy menstrual bleeding and iron-deficiency anemia is well recognized, fewer clinical studies have simultaneously examined serum ferritin and hemoglobin as indicators of both disease severity and subsequent response to pharmacological treatment. Identifying accessible laboratory markers that predict treatment outcomes may help clinicians recognize women at increased risk of inadequate response and guide the intensity of therapy and follow-up. Therefore, the present study aimed to evaluate the relationship of serum ferritin and hemoglobin levels with the clinical severity of heavy menstrual bleeding and to determine their usefulness in predicting response to pharmacological therapy.

METHODOLOGY

This prospective observational study was conducted at Pak International Medical College, Peshawar, from January 2025 to June 2025. A total of 75 women presenting with heavy menstrual bleeding (HMB) were enrolled during the study period. Heavy menstrual bleeding was defined clinically as excessive menstrual blood loss that interfered with the woman's physical, emotional, social, or daily activities and was further quantified using the Pictorial Blood Loss Assessment Chart (PBAC). Women of reproductive age who presented with a history of increased menstrual flow, prolonged menstrual bleeding, frequent passage of clots, or increased use of sanitary products were screened for eligibility. Ethical approval was obtained from the institutional ethical review committee of Pak International Medical College before commencement of the study, and written informed consent was obtained from all participants after explaining the study objectives, procedures, potential benefits, and confidentiality measures.

Only women age 18-50 years with clinical diagnosis of heavy menstrual bleeding and scheduled for pharmaceutical treatment were included. Patients had to be hemodynamically stable and able to undergo the treatment and follow-up evaluation. Pregnant women with pregnancy-induced bleeding, women who had a history of bleeding disorder, women with a current diagnosis of malignancy, women with serious hepatic or renal disease, women with acute pelvic infection and women who were taking an anticoagulant therapy were excluded. Severe hemodynamic compromise, the need for emergency surgical intervention (hysterectomy or immediate blood transfusion) were excluded.

Laboratory investigations were incomplete for some participants, and some were lost to follow-up prior to post-treatment evaluation, so these participants were not included in the final analysis. The patients were recruited by consecutive non-probability sampling until the desired number of patients (n=75) was obtained.

Demographic and clinical data were collected in detail at the time of enrolment on a structured data collection form. The variables were age, BMI, parity, duration of heavy menses, length of menstrual cycle, number of days of bleeding per cycle, passing of blood clots, dysmenorrhea, fatigue, dizziness and clinically evident pallor. The amount of blood loss was estimated with the PBAC score, in which participants noted the number and how many times sanitary pads or tampons were completely saturated and how many times they experienced the passage of blood clots. The severity of the menstrual bleeding was classified for analytical purposes as mild, moderate or severe based on clinical findings and on PBAC values. A thorough clinical and gynecological evaluation was conducted to determine the cause of abnormal bleeding and if there is one, to clarify whether there is a structural or a non-structural cause. When available, the relevant ultrasonographic findings were also reviewed to exclude conditions for which the primary treatment is surgery.

Standard aseptic conditions were used to obtain venous blood samples prior to the beginning of pharmacological treatment. Hemoglobin concentration was measured by an automated hematology analyzer and the other parameters were determined as, hematocrit, red blood cell count, mean corpuscular volume and mean corpuscular hemoglobin. The laboratory's standardized immunoassay technique was used to measure serum ferritin, which was reported as ng/mL. The main biochemical indicators used in the study were hemoglobin and ferritin. The patients were then treated with pharmaceuticals as per the clinical judgment and established departmental protocol of the treating gynecologist. Depending on the individual indication and contraindications, the treatment might involve tranexamic acid, non-steroidal anti-inflammatory drugs, oral progestogens, combined hormonal therapy,

and oral iron supplementation. Each participant was counseled on medication adherence, and asked to report menstrual blood loss during future cycles.

Following completion of the planned pharmacological treatment period, participants underwent repeat clinical and laboratory assessment. Score of the Post-Treatment Period, Period of Menstrual Bleeding, Haemoglobin Level, Serum Ferritin, Haematocrit, and Red Blood Cell Indices were noted. The response to treatment was determined by improvement in the level of menstrual blood loss and clinical symptoms, and was classified as responder or non-responder based on the predetermined study criteria. The data was entered and analyzed using SPSS statistics software for IBM. Data were reported as mean $\pm$ SD or as median (IQR) if they were continuous variables, and as frequencies and percentages if they were categorical variables. The differences between pre- and post-treatment Continuous variables were determined using appropriate paired sample statistical tests and differences between severity groups and treatment-response groups were determined using appropriate parametric or non-parametric tests. Pearson or Spearman correlation analysis was used to examine the relationship of baseline hemoglobin and serum ferritin with PBAC scores. After adjustment for relevant clinical covariates, multivariable logistic regression was used to determine the independent variables associated with successful treatment response. Odds ratios (OR) with 95% confidence intervals (CI) were calculated and p-values less than 0.05 were considered significant.

RESULTS

A total of 75 women with heavy menstrual bleeding (HMB) were included in the study. The average age of the participants was 34.8 ± 7.1 years and the mean BMI was 25.9 ± 4.2 kg/m². The median duration of heavy menstrual bleeding was 8 months (IQR: 5–14 months). The majority of women (57.3%) said that they experienced blood clots during menstruation, 52.0% reported fatigue, 37.3% dizziness and 33.3% clinically evident pallor. The mean period length of bleeding was 7.4 ± 1.8 days per cycle.

Table 1. Baseline Demographic and Clinical Characteristics of Study Participants (N = 75)

Variable	Result
Age, years	34.8 ± 7.1

BMI, kg/m ²	25.9 ± 4.2
Duration of HMB, months, median (IQR)	8 (5–14)
Menstrual bleeding duration, days	7.4 ± 1.8
PBAC score	186.7 ± 58.4
Passage of clots	43 (57.3%)
Fatigue	39 (52.0%)
Dizziness	28 (37.3%)
Pallor	25 (33.3%)
Dysmenorrhea	32 (42.7%)

Values are presented as mean ± SD, median (IQR), or n (%).

The average (mean) hemoglobin level was 9.9 ± 1.5 g/dL and the average (mean) serum ferritin level was 15.8 ng/mL at baseline. Forty-nine women (65.3%) had iron deficiency with reduced serum ferritin while 55 women (73.3%) had anemia based on the baseline

hemoglobin level. The mean MCV and MCH were 77.9 ± 8.1 fL and 25.2 ± 3.4 pg, respectively. The lower hemoglobin and serum ferritin levels were seen in women with increasing severity of menstrual bleeding.

Table 2. Hematological Parameters According To Severity of Heavy Menstrual Bleeding

Parameter	Mild HMB (n = 17)	Moderate HMB (n = 33)	Severe HMB (n = 25)	p-value
Hemoglobin (g/dL)	11.3 ± 1.0	10.0 ± 1.1	8.8 ± 1.2	<0.001
Serum ferritin (ng/mL)	25.1 ± 9.4	15.7 ± 6.7	9.6 ± 5.0	<0.001
Hematocrit (%)	35.1 ± 3.8	31.5 ± 3.9	27.9 ± 4.2	<0.001
MCV (fL)	84.1 ± 5.8	78.3 ± 6.5	73.2 ± 7.1	<0.001
PBAC score	118.5 ± 18.7	178.9 ± 27.5	243.4 ± 41.2	<0.001

A strong negative correlation was noted between the baseline PBAC and hemoglobin as well as serum ferritin. There were negative correlations between higher menstrual blood-loss score and lower hemoglobin level ($r = -0.58$, $p < 0.001$) and lower serum ferritin level ($r = -0.62$, $p < 0.001$) indicating progressive decrease in iron stores and circulating hemoglobin levels with increasing blood-loss score. After pharmacologic therapy, there were substantial improvements in menstrual blood

loss and haematologic parameters. The mean PBAC score decreased from 186.7 ± 58.4 at baseline to 92.6 ± 39.7 after treatment ($p < 0.001$). Mean hemoglobin increased from 9.9 ± 1.5 g/dL to 11.2 ± 1.3 g/dL ($p < 0.001$), while mean serum ferritin increased from 15.8 ± 8.9 ng/mL to 26.9 ± 12.1 ng/mL ($p < 0.001$). Also, the mean period of menstrual bleeding was significantly reduced from 7.4 ± 1.8 days to 5.6 ± 1.4 days ($p < 0.001$).

Table 3. Changes in Clinical and Hematological Parameters Following Pharmacological Treatment

Parameter	Baseline	Post-treatment	Mean change	p-value
PBAC score	186.7 ± 58.4	92.6 ± 39.7	-94.1 ± 45.3	<0.001
Hemoglobin (g/dL)	9.9 ± 1.5	11.2 ± 1.3	+1.3 ± 0.9	<0.001
Serum ferritin (ng/mL)	15.8 ± 8.9	26.9 ± 12.1	+11.1 ± 8.6	<0.001
Hematocrit (%)	31.0 ± 4.8	34.8 ± 4.1	+3.8 ± 3.0	<0.001
Menstrual bleeding duration (days)	7.4 ± 1.8	5.6 ± 1.4	-1.8 ± 1.2	<0.001

There was a total of 57 women who were responders to pharmacological therapy (76.0%) and 18 women (24.0%) with inadequate clinical response. The hemoglobin and ferritin levels of the responders were significantly higher compared to non-responders. There was a significant difference between the mean baseline hemoglobin of

responders and non-responders (10.2 ± 1.3 g/dL versus 8.9 ± 1.4 g/dL, $p < 0.001$). Likewise, baseline ferritin level was 17.8 ± 8.6 ng/mL in responders and 9.5 ± 6.4 ng/mL in non-responders ($p < 0.001$). Baseline PBACs were also higher in non-responders and there was more severe HMB.

Table 4. Comparison of Baseline Characteristics between Treatment Responders and Non-Responders

Variable	Responders (n = 57)	Non-responders (n = 18)	p-value
Age, years	34.3 ± 6.9	36.4 ± 7.5	0.273
Baseline hemoglobin (g/dL)	10.2 ± 1.3	8.9 ± 1.4	<0.001
Baseline ferritin (ng/mL)	17.8 ± 8.6	9.5 ± 6.4	<0.001
Baseline PBAC score	174.1 ± 49.8	226.6 ± 65.2	0.001
Severe HMB	14 (24.6%)	11 (61.1%)	0.004
Fatigue	25 (43.9%)	14 (77.8%)	0.013
Pallor	14 (24.6%)	11 (61.1%)	0.004

Multivariable logistic regression was used to identify independent predictors of successful response to pharmacological treatment. Both baseline hemoglobin and serum ferritin were independent of age, BMI, baseline PBAC score, and duration of heavy bleeding and associated with treatment response. The baseline hemoglobin level increased by 1 g/dL, with a corresponding 1.9-fold increase in the

likelihood of treatment response (AOR = 1.91; 95% CI: 1.20–3.04; p = 0.006). Likewise, there was a positive association between higher serum ferritin levels and clinical response (AOR = 1.58; 95% CI: 1.11–2.26; p = 0.011). However, a higher baseline PBAC score was independently associated with lower odds of treatment success.

Table 5. Multivariable Logistic Regression for Predictors of Successful Pharmacological Treatment Response

Predictor	Adjusted OR	95% CI	p-value
Baseline hemoglobin, per 1 g/dL increase	1.91	1.20–3.04	0.006
Serum ferritin, per 5 ng/mL increase	1.58	1.11–2.26	0.011
Baseline PBAC score, per 10-point increase	0.88	0.79–0.98	0.019
Age, per year	0.97	0.90–1.05	0.438
BMI, per kg/m ²	0.95	0.84–1.07	0.392
Duration of HMB, per month	0.96	0.90–1.02	0.184

These findings demonstrate that lower serum ferritin and hemoglobin levels were associated with greater clinical severity of heavy menstrual bleeding and a reduced likelihood of successful response to pharmacological therapy.

Improvement in menstrual blood loss following treatment was accompanied by significant recovery of hemoglobin concentration and iron stores

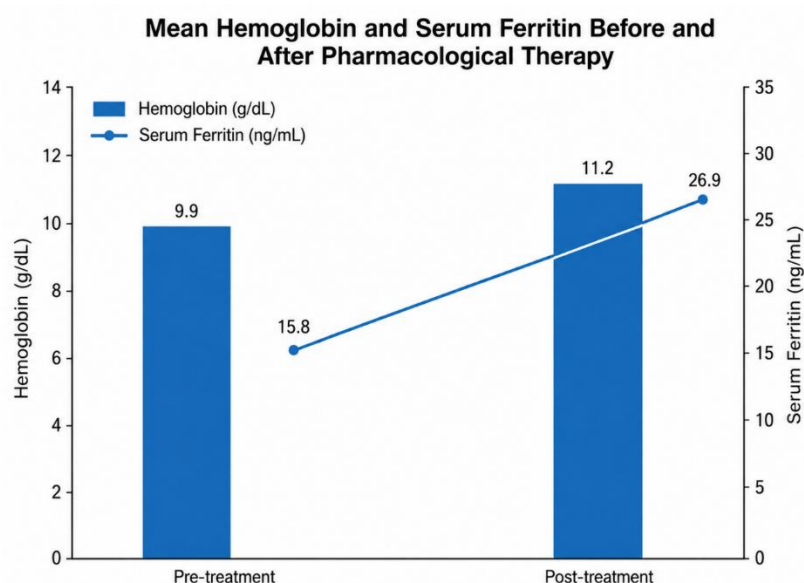


Figure 1. Comparison of Mean Hemoglobin and Serum Ferritin Levels Before and After Pharmacological Therapy in Women with Heavy Menstrual Bleeding.

DISCUSSION

The present study evaluated the role of serum ferritin and hemoglobin as predictors of clinical severity and response to pharmacological treatment in women with heavy menstrual bleeding. The findings demonstrated a clear relationship between worsening menstrual blood loss and deterioration in hematological parameters. Women with severe heavy menstrual bleeding had substantially lower hemoglobin and ferritin levels than those with mild or moderate disease, while PBAC scores increased progressively across severity groups. The inverse correlations observed between PBAC score and both hemoglobin and serum ferritin further support the biological relationship between excessive menstrual blood loss, progressive depletion of iron stores, and subsequent development of anemia. These findings highlight the importance of assessing iron status in women presenting with heavy menstrual bleeding rather than relying only on symptoms or hemoglobin concentration (12-14).

Serum ferritin appeared particularly useful because it reflects body iron stores and may decline before a marked reduction in hemoglobin becomes apparent. In this study, about two-thirds of the subjects had iron deficiency and nearly three-quarters were anemic at the beginning of the study. Patients with heavier periods had significantly lower levels of serum ferritin, decreased Hct and decreased mean corpuscular volume, reflecting the progression of iron depletion with ongoing menstrual blood loss. The clinical manifestation of a patient with iron-depleted stores is usually fatigue, dizziness, weakness, diminished exercise tolerance and decreased daily functioning prior to significant anemia. Consequently, it is advisable to take hemoglobin and serum ferritin levels together to obtain more comprehensive information about the physiological effect of heavy menstruation (15-17).

There was a significant improvement in both the menstrual and hematological outcomes with the pharmacological treatment. Post treatment, the mean PBAC score was significantly reduced, the duration of menstrual bleeding was significantly reduced and significant increase in hemoglobin and serum ferritin was observed. These changes indicate that effective reduction in menstrual blood loss can allow gradual recovery of circulating hemoglobin and replenishment of iron stores, particularly when iron supplementation is

provided where indicated. The increases in hematocrit and other red-cell indices further reflects restoration of hematological status. The clinical implications of these results are that control of the excessive bleeding and correction of the associated iron deficiency are both important in the treatment of heavy bleeding (18, 19).

A key finding of this study was that both baseline hemoglobin and baseline serum ferritin were independently linked to treatment response. Women who responded to the pharmacologic therapy had higher baseline hemoglobin and ferritin levels than those who failed the therapy; women with lower levels were more likely to experience severe bleeding and to have an inadequate clinical response. Multivariable analysis also showed that higher level of hemoglobin and ferritin at baseline were associated with the likelihood of successful treatment, while higher baseline level of PBAC score was associated with the less likely of successful treatment. This could be a result of the patients' physiology being more depleted due to more severe and longstanding blood loss and therefore necessitating prolonged therapy, more intense iron therapy, alternative drugs, or evaluation for intrinsic structural disease. Therefore, baseline haematological status could help the clinician to identify women that need more careful monitoring or escalation of treatment (20).

There are some limitations to the present study. It was carried out in a single institution, with a relatively small sample of 75 participants, and might not be representative of other populations. The amount of blood loss during menstruation was estimated by the PBAC method and treatment may not have been consistent across participants. Furthermore, there was a variety of pharmacological treatments depending on individual indications, which might have affected the degree of response. The nutritional status and dietary intake of iron were not measured in detail, nor was uterine disease or inflammatory conditions affecting ferritin concentration. To identify clinically relevant threshold values for ferritin and hemoglobin to predict treatment response, future multicenter studies with larger numbers of patients, with standard treatment protocols, longer follow-up periods, and with repeated assessment of iron indices are recommended.

CONCLUSION

Serum ferritin and hemoglobin levels were significantly associated with the clinical severity

of heavy menstrual bleeding and the subsequent response to pharmacological therapy. Women with severe menstrual blood loss had lower baseline hemoglobin and ferritin concentrations, while successful treatment was accompanied by significant reductions in menstrual blood loss and improvements in hematological parameters. Higher baseline hemoglobin and ferritin levels were independently associated with a greater likelihood of favorable treatment response. Routine assessment of both hemoglobin and serum ferritin may therefore help identify the extent of iron depletion, stratify clinical severity, and recognize women who may require more intensive or individualized management. Integrating iron-status assessment with evaluation of menstrual blood loss may improve the overall management of women presenting with heavy menstrual bleeding.

REFERENCES

1. Munro MG, Disorders FCoM. Abnormal uterine bleeding: A well-travelled path to iron deficiency and anemia. *International Journal of Gynecology & Obstetrics*. 2020;150(3):275-7 DOI: <https://doi.org/10.1002/ijgo.13180>.
2. Mansour D, Hofmann A, Gemzell-Danielsson K. A Review of Clinical Guidelines on the Management of Iron Deficiency and Iron-Deficiency Anemia in Women with Heavy Menstrual Bleeding. *Adv Ther*. 2021;38(1):201-25 DOI: 10.1007/s12325-020-01564-y.
3. Beelen P, van den Brink MJ, Herman MC, Geomini P, Dekker JH, Duijnhoven RG, et al. Levonorgestrel-releasing intrauterine system versus endometrial ablation for heavy menstrual bleeding. *American journal of obstetrics and gynecology*. 2021;224(2):187.e1-.e10 DOI: 10.1016/j.ajog.2020.08.016.
4. Ilyin AB, Khasanov AA, Suturina LV, Borisova NI, Reshetov ZS, Foidart JM, et al. Comparison of two levonorgestrel-releasing intrauterine systems for the treatment of heavy menstrual bleeding: a randomised, controlled, phase 3 trial. *The European journal of contraception & reproductive health care : the official journal of the European Society of Contraception*. 2021;26(6):491-8 DOI: 10.1080/13625187.2021.1942447.
5. Rahman S, Khan FS, Samin KA, Afridi N, Ahmed M. Efficacy of Oral Tranexamic Acid Versus Combined Oral Contraceptives for Heavy Menstrual Bleeding. *Cureus*. 2021;13(10):e19122 DOI: 10.7759/cureus.19122.
6. Rodpetch T, Manonai J, Angchaisuksiri P, Boonyawat K. A quality-of-life questionnaire for heavy menstrual bleeding in Thai women receiving oral antithrombotics: Assessment of the translated Menstrual Bleeding Questionnaire. *Res Pract Thromb Haemost*. 2021;5(7):e12617 DOI: 10.1002/rth2.12617.
7. Hagraš AM, Hussein NA, Abdelazim I, Elhamamy N. Ferric carboxymaltose for treatment of iron deficiency and iron deficiency anemia caused by abnormal uterine bleeding. *Przegląd menopauzalny = Menopause review*. 2022;21(4):223-8 DOI: 10.5114/pm.2022.124013.
8. MacGregor R, Jain V, Hillman S, Lumsden MA. Investigating abnormal uterine bleeding in reproductive aged women. *BMJ*. 2022;378:e070906 DOI: 10.1136/bmj-2022-070906.
9. Perelló J, Pujol P, Pérez M, Artés M, Calaf J. Heavy Menstrual Bleeding-Visual Analog Scale, an Easy-to-Use Tool for Excessive Menstrual Blood Loss That Interferes with Quality-of-Life Screening in Clinical Practice. *Women's health reports (New Rochelle, NY)*. 2022;3(1):483-90 DOI: 10.1089/whr.2021.0139.
10. Bofill Rodriguez M, Dias S, Jordan V, Lethaby A, Lensen SF, Wise MR, et al. Interventions for heavy menstrual bleeding; overview of Cochrane reviews and network meta-analysis. *The Cochrane database of systematic reviews*. 2022;5(5):Cd013180 DOI: 10.1002/14651858.CD013180.pub2.
11. Chen S, Liu J, Peng S, Zheng Y. LNG-IUS vs. medical treatments for women with heavy menstrual bleeding: A systematic review and meta-analysis. *Front Med (Lausanne)*. 2022;9:948709 DOI: 10.3389/fmed.2022.948709.
12. Christelle K, Norhayati MN, Jaafar SH. Interventions to prevent or treat heavy menstrual bleeding or pain associated with intrauterine-device use. *The Cochrane database of systematic reviews*. 2022;8(8):Cd006034 DOI: 10.1002/14651858.CD006034.pub3.
13. Munro MG, Mast AE, Powers JM, Kouides PA, O'Brien SH, Richards T, et al. The relationship between heavy menstrual

- bleeding, iron deficiency, and iron deficiency anemia. American journal of obstetrics and gynecology. 2023;229(1):1-9 DOI: 10.1016/j.ajog.2023.01.017.
- 2024;8(3):102389
10.1016/j.rpth.2024.102389. DOI:
14. Munro MG. Heavy menstrual bleeding, iron deficiency, and iron deficiency anemia: Framing the issue. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics. 2023;162 Suppl 2:7-13 DOI: 10.1002/ijgo.14943.
 15. Leung TW, Damodaran P, Torres R, Chuncharunee S, Chu MY, Gamilla Z, et al. Expert consensus on improving iron deficiency anemia management in obstetrics and gynecology in Asia. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics. 2023;163(2):495-509 DOI: 10.1002/ijgo.14804.
 16. Creinin MD, Barnhart KT, Gawron LM, Eisenberg D, Mabey RG, Jr., Jensen JT. Heavy Menstrual Bleeding Treatment With a Levonorgestrel 52-mg Intrauterine Device. Obstet Gynecol. 2023;141(5):971-8 DOI: 10.1097/aog.0000000000005137.
 17. Matteson KA, Valcin J, Raker CA, Clark MA. A randomized trial comparing the 52-mg levonorgestrel system with combination oral contraceptives for treatment of heavy menstrual bleeding. American journal of obstetrics and gynecology. 2023;229(5):532.e1-.e13 DOI: 10.1016/j.ajog.2023.07.049.
 18. Lancaster D, Kopp Kallner H, Hale G, Wood B, Ashcroft L, Driscoll H. Development of a brief menstrual quality of life measure for women with heavy menstrual bleeding. BMC Women's Health. 2023;23(1):105 DOI: 10.1186/s12905-023-02235-0.
 19. Chaturvedi J, K R, Bahadur A, Heda A, Mundhra R. Comparative analysis of ferric carboxymaltose and iron sucrose in treating iron deficiency anemia in perimenopausal women with heavy menstrual bleeding: a randomized controlled trial. Obstetrics & gynecology science. 2024;67(6):565-73 DOI: 10.5468/ogs.24065.
 20. VanderMeulen H, Tang GH, Sholzberg M. Tranexamic acid for management of heavy vaginal bleeding: barriers to access and myths surrounding its use. Res Pract Thromb Haemost.