



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	TRANEXAMIC ACID IN THE TREATMENT OF HEAVY MENSTRUAL BLEEDING: A NARRATIVE REVIEW OF EFFICACY AND SAFETY
----------------------	---

DOI	https://doi.org/10.31435/ijitss.3(51).2026.6220
------------	---

RECEIVED	23 July 2026
-----------------	--------------

ACCEPTED	10 September 2026
-----------------	-------------------

PUBLISHED	21 September 2026
------------------	-------------------

LICENSE	
----------------	--



The article is licensed under a **Creative Commons Attribution 4.0 International License**.

© The author(s) 2026.

This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

TRANEXAMIC ACID IN THE TREATMENT OF HEAVY MENSTRUAL BLEEDING: A NARRATIVE REVIEW OF EFFICACY AND SAFETY

Aleksandra Papuga (Corresponding Author, Email: amp.papuga@gmail.com)

Independent Public Health Care Facility in Myślenice, Poland

ORCID ID: 0009-0003-6851-7102

Makary Hejduk

Independent Public Health Care Facility in Myślenice, Poland

ORCID ID: 0009-0004-7579-4471

Justyna Bury

Medical University of Silesia in Katowice, Poland

ORCID ID: 0009-0001-4778-2375

Magdalena Grzymek

The University Hospital in Cracow, Poland

ORCID ID: 0009-0000-4337-0261

Martyna Więclawek

The University Hospital in Cracow, Poland

ORCID ID: 0009-0006-7956-9962

Katarzyna Kraska

Medical Center in Łańcut Sp. z o.o., Poland

ORCID ID: 0009-0004-0464-6826

Aneta Sobek

Medical Center in Łańcut Sp. z o.o., Poland

ORCID ID: 0009-0002-6759-5419

Joanna Kadluczka

Ludwik Rydygier Specialist Hospital in Cracow, Poland

ORCID ID: 0009-0002-9347-0767

Jan Potoniec

Gabriel Narutowicz Municipal Specialist Hospital in Cracow, Poland

ORCID ID: 0009-0000-5282-7833

Weronika Kępa

Independent Researcher, Cracow, Poland

ORCID ID: 0009-0000-8378-9681

Aleksandra Pawluczka

St. John Grande Hospital of the Brothers Hospitallers of Saint John of God, Cracow, Poland

ORCID ID: 0009-0005-6765-9314

Katarzyna Pawluczka

Jagiellonian University Medical College, Cracow, Poland

ORCID ID: 0009-0001-4273-6599

ABSTRACT

Background: Heavy menstrual bleeding (HMB) is a common gynaecological problem that may substantially impair quality of life and lead to health complications. Tranexamic acid (TXA) is a non-hormonal antifibrinolytic agent used during menstruation to reduce menstrual blood loss.

Aim: This narrative review aims to summarize the role of TXA in the treatment of HMB, with particular emphasis on its mechanism of action, clinical efficacy, safety profile and limitations of the available evidence.

Methods: A literature search was conducted in PubMed and Google Scholar, primarily including publications from 2010 to April 2026. Older studies were considered when historically important or widely cited. Randomised clinical trials, observational studies, systematic reviews, meta-analyses, narrative reviews, and clinical guidelines published in English were included. Data were synthesised narratively.

Results: TXA reduces menstrual blood loss by inhibiting plasminogen activation and fibrin degradation, thereby stabilising fibrin clots within the endometrium. Oral TXA is typically used intermittently, only on days of menstrual bleeding. Evidence indicates that TXA is more effective than placebo and some pharmacological therapies in reducing menstrual blood loss and may improve bleeding-related quality of life. TXA is usually well tolerated, but thromboembolic risk should be assessed individually, especially in patients with risk factors.

Conclusions: TXA is an effective and generally well-tolerated non-hormonal treatment for HMB. It does not replace diagnostic evaluation of the underlying causes of bleeding, and treatment should be individualised according to clinical risk factors, reproductive plans, and patient preferences. Further studies should assess high-risk populations and patient-reported outcomes.

KEYWORDS

Heavy Menstrual Bleeding, HMB, Tranexamic Acid, Antifibrinolytic Agents, Abnormal Uterine Bleeding, Menstrual Blood Loss

CITATION

Papuga, A., Hejduk, M., Bury, J., Grzymek, M., Więclawek, M., Kraska, K., Sobek, A., Kadłuczka, J., Potoniec, J., Kępa, W., Pawluczka, A., & Pawluczka, K. (2026). Tranexamic acid in the treatment of heavy menstrual bleeding: A narrative review of efficacy and safety. *International Journal of Innovative Technologies in Social Science*, 3(51). [https://doi.org/10.31435/ijitss.3\(51\).2026.6220](https://doi.org/10.31435/ijitss.3(51).2026.6220)

COPYRIGHT

© The author(s) 2026. This article is published as open access under the **Creative Commons Attribution 4.0 International License (CC BY 4.0)**, allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

1. Introduction

Heavy menstrual bleeding (HMB) is one of the most common gynaecological problems among women of reproductive age. Objectively, it is defined as menstrual blood loss of at least 80 ml per cycle, provided that it is not attributable to pregnancy, systemic disorders, or gynaecological disease [1,2]. Currently, however, greater emphasis in the diagnosis of HMB is placed on the patient's subjective assessment, while objective measurement of blood loss volume plays a supportive role [1]. According to the currently used definition, HMB may include bleeding lasting more than 7 days, the need for very frequent changes of sanitary products, including during the night, the use of more than one sanitary pad at a time, and the presence of large menstrual blood clots [2]. This approach reflects the contemporary definition of HMB, which emphasises the substantial impact of excessive menstrual blood loss on the physical, emotional, social, and material aspects of quality of life [1,2].

The clinical significance of HMB extends beyond bleeding itself. Excessive menstrual blood loss may coexist with dysmenorrhoea, fatigue, and headaches [1,2]. In addition, HMB may lead to other health problems, including iron deficiency (ID) and, in more severe cases, iron deficiency anaemia (IDA) [2–4]. Both ID and IDA may be associated with fatigue, reduced physical performance and cognitive function, impaired quality of life, and decreased productivity [3,4]. The burden of HMB-related ID and IDA often remains under-recognized, as heavy menstrual bleeding may be normalised by patients themselves, as well as by their families, social environment, and healthcare professionals, which can hinder appropriate diagnosis and treatment [3]. In this context, HMB should be regarded not only as a burdensome menstrual symptom, but also as a clinically relevant condition requiring consideration of the risk of iron deficiency and its health consequences.

HMB falls within the broader concept of abnormal uterine bleeding (AUB), which encompasses a wide spectrum of gynaecological conditions. Standardisation of AUB terminology has been of considerable importance for everyday clinical practice, medical education, and research, as earlier terms such as “menorrhagia”, “metrorrhagia”, and “dysfunctional uterine bleeding” were poorly defined and used inconsistently [5].

The current diagnostic framework for AUB consists of two systems developed by FIGO. The first, FIGO-AUB System 1, addresses the terminology and definitions of AUB symptoms and enables the bleeding pattern to be described according to parameters such as frequency, regularity, duration, and volume of bleeding. The second, FIGO-AUB System 2, classifies the possible causes of AUB according to the PALM-COEIN acronym. This classification distinguishes structural causes, including polyps, adenomyosis, uterine leiomyomas, malignancy and atypical endometrial hyperplasia, from non-structural causes, including coagulopathy, ovulatory dysfunction, endometrial disorders, iatrogenic causes, and conditions not otherwise classified [5,6]. This approach emphasises that HMB should not be regarded as a homogeneous clinical problem, but rather as a symptom that may arise from a variety of underlying causes. Incorporating the FIGO systems into the assessment of patients with HMB is therefore important for structuring the diagnostic process and appropriately guiding further management.

Treatment of HMB includes both pharmacological and procedural treatment options. Therapy should be individualised and take into account the underlying cause of symptoms, the patient’s age, associated symptoms, reproductive plans, and personal preferences [2]. Antifibrinolytic agents, including tranexamic acid (TXA), are used in the treatment of HMB. The mechanism of action of TXA involves inhibition of plasminogen activation and reduction of plasmin activity, thereby limiting fibrin degradation. As a result, clot stability within the endometrium is enhanced, leading to a reduction in menstrual blood loss [7].

The aim of this narrative review is to discuss the role of tranexamic acid in the treatment of heavy menstrual bleeding, with particular emphasis on its clinical efficacy, safety and limitations of the available evidence.

2. Materials and Methods

This article was designed as a narrative review on the use of tranexamic acid in the treatment of heavy menstrual bleeding, with particular emphasis on its mechanism of action, clinical efficacy, safety, and the limitations of the available evidence.

A literature search was conducted in PubMed and Google Scholar. The analysis primarily included publications published between 2010 and April 2026. Older studies were considered only if they were of historical importance or were widely cited in more recent literature. The search included the following terms and their combinations: “tranexamic acid”, “TXA”, “heavy menstrual bleeding”, “HMB”, “menorrhagia”, “abnormal uterine bleeding”, “AUB”, “PALM-COEIN”, “antifibrinolytic agents”, “fibrinolysis”, “plasminogen”, “menstrual blood loss”, “quality of life”, “levonorgestrel intrauterine system”, “NSAIDs”, “progestogens”, “thrombosis”, “venous thromboembolism”, “anticoagulation”, and “safety”.

Randomised clinical trials, observational studies, systematic reviews, meta-analyses, narrative reviews, and clinical guidelines published in English were eligible for inclusion. Priority was given to studies addressing the efficacy of TXA in reducing menstrual blood loss, its impact on quality of life, comparisons with other treatment options for HMB, and safety, particularly with regard to thromboembolic risk. Publications unrelated to HMB, studies addressing only other indications for TXA, and articles that did not discuss efficacy, safety, or practical aspects of treatment were excluded.

Data synthesis was qualitative and focused on discussing the mechanism of action of TXA, its clinical efficacy, safety profile, and the limitations of the available evidence.

3. Results

HMB is a symptom with a complex and heterogeneous aetiology. According to the PALM-COEIN classification system, it may result from structural causes, such as endometrial polyps, adenomyosis, uterine leiomyomas, malignancy or atypical endometrial hyperplasia, as well as from non-structural causes, including coagulopathy, ovulatory dysfunction, endometrial disorders, iatrogenic causes, and conditions not otherwise classified [5,6]. Understanding the pathophysiology of HMB requires relating these diverse causes to the processes that regulate normal menstruation.

Menstruation is a cyclical physiological process involving the controlled shedding of the functional layer of the endometrium, followed by its subsequent regeneration. This process is regulated by a finely balanced interplay between proliferation, decidualization, inflammatory responses, hypoxia, apoptosis, vasoconstriction, and final endometrial repair and regeneration [8].

Progesterone withdrawal at the end of the luteal phase is the key trigger initiating menstruation and leads to a coordinated endometrial response, including tissue oedema, vascular changes, leukocyte influx, activation of inflammatory mediators, and induction of matrix metalloproteinases, ultimately resulting in shedding of the functional endometrial layer [8,9]. Under physiological conditions, endometrial injury is controlled and transient, while efficiently activated haemostatic and tissue repair mechanisms limit blood loss and enable rapid, scarless regeneration of the uterine mucosa [9,10].

Cessation of menstrual bleeding and proper endometrial regeneration require the coordinated action of several mechanisms. Vasoconstriction of the spiral arterioles plays an important role by limiting menstrual blood flow, together with an effective haemostatic response to vascular injury, involving platelet adhesion and aggregation, activation of the coagulation cascade, and formation of a fibrin clot. The resulting clot is subsequently regulated by the fibrinolytic system, in which plasminogen is converted into plasmin, the enzyme responsible for the degradation of fibrin deposits [8]. An excessive shift in the haemostatic–fibrinolytic balance towards fibrinolysis may promote more rapid degradation of the fibrin clot, thereby contributing to increased blood loss during menstruation [11].

Control of bleeding is also closely linked to endometrial repair processes, including re-epithelialization of the denuded basal layer and formation of a new luminal epithelial surface. Studies on menstrual physiology indicate that endometrial tissue formation and remodelling begin already during menstruation, and their proper course may be important for limiting menstrual blood loss. Therefore, disruption of these mechanisms may contribute to the pathophysiology of HMB [8].

Analyses using human endometrial tissue and models of simulated menstruation suggest that physiological hypoxia and stabilisation of HIF-1 α play an important role in proper endometrial repair during menstruation. In women with HMB, lower levels of endometrial HIF-1 α have been observed during the menstrual phase, accompanied by a longer duration of bleeding [10].

The TGF- β /SMAD pathway represents another component involved in the regulation of endometrial repair. In women with HMB, reduced levels of TGF- β 1 and attenuated SMAD signalling have been observed in the late secretory and menstrual phases, which may impair postmenstrual repair of the endometrial stromal compartment and promote persistent heavy menstrual bleeding [12].

HMB should therefore not be regarded solely as an increased volume of menstrual blood loss, but rather as a consequence of an imbalance between endometrial shedding, haemostasis, fibrinolysis, and regeneration. From the perspective of non-hormonal treatment, local endometrial mechanisms related to haemostasis and fibrinolysis are of particular importance. Excessive fibrinolytic activity within the endometrium provides a rational therapeutic target for antifibrinolytic agents, including tranexamic acid.

In the treatment of heavy menstrual bleeding, tranexamic acid is used primarily as an oral, intermittent therapy administered on the days of menstrual bleeding [11,13]. This regimen distinguishes it from many hormonal therapies, which require continuous use or cyclic administration for a substantial part of the menstrual cycle. In clinical practice, TXA is therefore a treatment aimed at reducing blood loss during a given menstrual period, rather than a hormonal or contraceptive therapy [13,14].

The mechanism of action of TXA has direct implications for its mode of administration. The drug is a synthetic lysine analogue that inhibits the binding of plasminogen and plasmin to fibrin, thereby limiting fibrin clot degradation. In HMB, this results in stabilisation of local haemostasis within the shedding endometrium [13]. Because TXA acts at the final stage of the bleeding process, its administration is appropriate when bleeding is already present or begins in line with the expected onset of menstruation [14,15]. However, it is not a causal treatment for structural uterine pathology, coagulopathy, ovulatory dysfunction, or endometrial

hyperplasia. Therefore, its use should be preceded by diagnostic assessment appropriate to the clinical presentation [5,6].

Typical dosing regimens vary between countries and depend on the locally approved medicinal product and the information provided in the Summary of Product Characteristics (SmPC). In publications on oral TXA for HMB, total daily doses of approximately 3.9–4 g, administered for up to 4–5 days during menstruation, have most commonly been described [14–16]. In a study evaluating two doses of an oral TXA formulation, 1.95 g/day and 3.9 g/day were compared. The 3.9 g/day dose met all primary efficacy endpoints, and adverse events did not differ significantly between groups [15]. In another randomised trial, oral TXA at a dose of 3.9 g/day, administered for up to 5 days in each cycle, reduced menstrual blood loss and improved quality of life compared with placebo [17]. From a practical perspective, however, a manuscript should avoid presenting a single universal dosing regimen applicable to all countries. It is more appropriate to emphasise that dosing should follow the local SmPC or prescribing information, particularly with regard to the maximum daily dose and the number of treatment days per cycle.

The pharmacokinetics of TXA warrant particular caution in patients with impaired renal function. The drug is largely eliminated by the kidneys. Therefore, reduced glomerular filtration may lead to increased exposure and accumulation. In clinical practice, this supports assessment of renal function, especially in patients with a history of kidney disease, older patients, those with multimorbidity, or those taking medications that may impair renal function. In patients with significant renal impairment, dose reduction may be required, or TXA may be contraindicated, depending on the local product information or Summary of Product Characteristics [13,14].

Oral tranexamic acid used for the treatment of heavy menstrual bleeding has generally been well tolerated in clinical trials and reviews, with reported adverse events most often being mild or moderate in severity. The most commonly described adverse events include gastrointestinal symptoms, headache, menstrual abdominal discomfort or pain, back pain, and non-specific musculoskeletal complaints. Before initiating treatment, it is advisable to discuss possible adverse events and the expected tolerability profile with the patient in order to support informed therapeutic decision-making and appropriate management of any adverse symptoms [7,14,16].

One of the most frequently discussed practical safety issues related to TXA is the potential risk of thromboembolic events, particularly in patients with active or previous thromboembolic disease, significant risk factors for thrombosis, or concomitant exposure to oestrogens [18–20]. In generally healthy women, short-term use of oral TXA for HMB is associated with a very low absolute risk of venous thromboembolism, although available observational data suggest an increased relative risk [21]. The Cochrane review on antifibrinolytic agents for HMB noted that assessment of the thromboembolic safety of TXA is limited, as thromboembolic events were not reported as a separate endpoint in most of the analysed studies [7].

One of the most important sources of population-based data on oral TXA and the risk of thrombosis is a Danish cohort study including women of reproductive age. This study showed an increased relative risk of venous thromboembolism among women using oral TXA compared with non-users, whereas no significant association was found with the risk of arterial thrombosis. At the same time, the absolute risk of venous thromboembolism was very low, as the estimated number of women who would need to be treated for 5 days for one additional venous thromboembolic event to occur was 78,549 [21]. These data support a cautious and balanced approach to the safety of TXA. The drug should not automatically be regarded as a high-risk therapy in generally healthy patients using it short term during menstruation. However, particular caution is required when considering TXA in patients with a history of thromboembolic events, diagnosed thrombophilia, or other significant risk factors for thrombosis. In clinical trials of TXA for HMB, patients with thromboembolic disease, thrombosis, stroke, transient ischaemic attack, myocardial infarction, ischaemic heart disease, coagulopathy, or other significant medical conditions were usually excluded, which limits the ability to assess treatment safety in high-risk populations [15,17]. Therefore, in women with additional thrombotic risk factors, the decision to use TXA should be made on an individual basis, after considering the severity of HMB, alternative treatment options, and the potential risk of thrombosis.

Concomitant use of TXA with combined hormonal contraception or other oestrogen-containing therapies requires separate consideration. Direct clinical studies assessing the safety of this combination are very limited. Therefore, it remains unclear whether concomitant use of TXA and oestrogen therapy significantly increases the risk of thromboembolic events. The potential risk is primarily clinical in nature and relates to the possible overlap between the increased thromboembolic risk associated with oestrogens and the antifibrinolytic effect of TXA. Available survey data indicate that this combination is sometimes used in

clinical practice for the management of refractory HMB. However, available safety data are insufficient to allow a definitive assessment of risk. Therefore, the decision to use these therapies concomitantly should be made on an individual basis, after discussing the potential benefits and risks with the patient [18,20,22].

Patients receiving anticoagulant therapy represent a distinct group. HMB is a common and clinically relevant problem in women taking oral anticoagulants, and available data indicate a higher risk of HMB with rivaroxaban than with apixaban or dabigatran [19]. In this population, therapeutic decisions are particularly challenging, as temporary discontinuation, shortening of treatment, or inconsistent use of anticoagulant therapy may increase the risk of recurrent venous thromboembolism, whereas data on concomitant use of TXA and anticoagulation remain limited [19]. For this reason, TXA should not be regarded as a means of enabling patients to independently reduce or omit doses of anticoagulant therapy. Management of HMB in patients receiving anticoagulation should include assessment of bleeding severity, iron deficiency, and anaemia, as well as consideration of switching the type of anticoagulant and of available gynaecological treatment options [19].

The efficacy of TXA in the treatment of heavy menstrual bleeding has been evaluated in randomised clinical trials, systematic reviews, and meta-analyses comparing antifibrinolytic therapy with placebo and other pharmacological treatment options. Available evidence indicates that TXA significantly reduces menstrual blood loss and improves selected quality-of-life parameters in patients with HMB [1,7,16,17].

The most frequently reported endpoint in studies assessing the efficacy of TXA was the reduction in objectively measured menstrual blood loss. In these publications, HMB was defined as menstrual blood loss of at least 80 ml per cycle, and bleeding volume was assessed objectively, most commonly using the validated alkaline haematin method [15,17]. In the previously mentioned randomised trial by Lukes et al., oral TXA at a dose of 3.9 g/day, administered for up to 5 days in each cycle, resulted in a significantly greater reduction in menstrual blood loss than placebo and met the criteria for clinically meaningful improvement [17]. Similarly, in the dose-response study by Freeman et al., two doses of tranexamic acid, 1.95 g/day and 3.9 g/day, administered for up to 5 days during menstrual bleeding, were evaluated. Both doses significantly reduced menstrual blood loss compared with placebo, but only the 3.9 g/day dose met all three primary endpoints [15]. Quantitatively, data from clinical trials summarised in a review on the use of TXA in HMB indicate a reduction in menstrual blood loss from baseline of approximately 26–60%, although the studies differed in dosing regimen, treatment duration, and methods used to assess bleeding [16]. The clinical relevance of antifibrinolytic agents is also supported by the 2022 Cochrane overview of reviews and network meta-analysis, in which these agents were ranked among the most effective first-line pharmacological treatments for reducing menstrual blood loss [1].

The clinical relevance of heavy menstrual bleeding treatment is not limited to reducing the volume of bleeding. In accordance with the current definition of HMB, which incorporates the patient's subjective assessment, treatment efficacy should also be evaluated in terms of its impact on the physical, emotional, social, and material aspects of quality of life. In the randomised trial by Lukes et al., TXA use was associated not only with a significant reduction in menstrual blood loss, but also with improvements in selected bleeding-related quality-of-life parameters, including fewer limitations in social, leisure, and physical activities, as well as in work and household responsibilities [17]. A post hoc analysis by Lukes et al., focusing on daily menstrual blood loss and quality of life, further showed that greater daily blood loss on individual days of menstruation was associated with greater limitations in physical, social, and leisure activities [23]. This observation further underscores the clinical importance of reducing bleeding, particularly in the context of the impact of excessive menstrual blood loss on quality of life.

The efficacy of TXA in the treatment of HMB has been evaluated both in placebo-controlled trials and in comparison with other pharmacological options. In placebo-controlled studies, TXA consistently demonstrated greater efficacy in reducing menstrual bleeding [7,15,17]. With regard to non-steroidal anti-inflammatory drugs (NSAIDs), including mefenamic acid, available evidence indicates that TXA is more effective in reducing menstrual blood loss, although the quality of evidence for this comparison has been rated as low [7,24]. However, NSAIDs may be useful, particularly in patients with dysmenorrhoea [24]. In clinical practice, the choice between TXA and NSAIDs should therefore take into account not only the expected reduction in bleeding, but also the presence of concomitant symptoms, especially menstrual pain.

Compared with oral progestogens, TXA appears to be more effective in reducing the severity of HMB, although the quality of evidence for this comparison remains limited [7,25]. A 2019 Cochrane review indicates that short-course oral progestogen regimens, administered only during the luteal phase, are less effective than other medical treatments, including TXA, in reducing menstrual blood loss. Longer progestogen regimens, covering 3–4 weeks of the cycle, may reduce bleeding, although they also appear to be less effective than TXA. Data on quality of life, treatment satisfaction, and acceptability of longer progestogen regimens remain limited

[25]. Therefore, the choice of this therapy should take into account the adverse-effect profile and patient preferences. For this reason, TXA remains a particularly useful option for patients who do not require contraception, prefer treatment used only on days of heavy bleeding, or wish to avoid adverse effects associated with hormonal therapy [11].

In the 2018 Cochrane review, the available data comparing TXA with ethamsylate were limited to a single study, which suggested that antifibrinolytic treatment was more effective in reducing objectively measured menstrual blood loss in patients with HMB. In contrast, no significant difference between these treatment approaches was demonstrated with respect to subjectively assessed improvement in bleeding [7]. However, it should be emphasised that these findings were derived from an older study and the quality of evidence was rated as low or very low.

Among conservative treatment options for HMB, the levonorgestrel-releasing intrauterine system (LNG-IUS) is characterised by particularly high efficacy. In the 2022 Cochrane overview of reviews and network meta-analysis, it was identified as the most effective first-line treatment for reducing menstrual blood loss [1]. The efficacy of the LNG-IUS is also supported by data from a 2020 Cochrane review, which showed that progestogen-releasing intrauterine systems reduce menstrual blood loss and may improve quality of life compared with other medical therapies [26]. Similar conclusions were reported by Chen et al. in a 2022 systematic review and meta-analysis, indicating greater efficacy of the LNG-IUS than pharmacological treatment in controlling bleeding and achieving clinical response in the short and medium term [27].

Despite the high efficacy of the LNG-IUS, tranexamic acid remains an important therapeutic option in the management of HMB [1]. Its role in treatment is primarily related to its non-hormonal mode of action, the possibility of use only on days of heavy bleeding, and the absence of contraceptive effects, which may be relevant for patients planning pregnancy or those who prefer to avoid hormonal therapy.

4. Limitations and Future Directions

Although tranexamic acid is an established non-hormonal treatment option for heavy menstrual bleeding, the available evidence has several important limitations. The most notable is the limited number of recent, large randomised clinical trials directly evaluating TXA in classic HMB. The key randomised clinical trials of oral TXA for HMB were published more than a decade ago, while subsequent systematic reviews have summarised the available evidence from these and other clinical studies [7,15,17]. Further studies are needed that are conducted in accordance with contemporary definitions of HMB, incorporate the PALM-COEIN classification, and include more diverse patient populations.

Data comparing TXA with other treatment strategies for HMB in routine clinical practice also remain limited. Available reviews indicate that TXA effectively reduces menstrual blood loss and may be more effective than placebo, NSAIDs, luteal-phase progestogens, or ethamsylate, whereas the levonorgestrel-releasing intrauterine system generally shows greater anti-bleeding efficacy [1,7,24-27]. However, there is still a lack of large studies comparing not only individual drugs, but also overall treatment strategies, taking into account efficacy, tolerability, costs, patient preferences, reproductive plans, and acceptance of hormonal or intrauterine therapy.

An important evidence gap concerns the safety of TXA in patients at high thromboembolic risk. In clinical trials of HMB, patients with a history of thrombosis, significant cardiovascular disease, or other serious comorbidities were usually excluded [15,17]. A large population-based study indicates an increased relative risk of venous thromboembolism with oral TXA, but also a very low absolute risk in generally healthy women using the drug for a short duration [21]. However, data remain insufficient to precisely assess safety in patients with thrombophilia, a positive history of thromboembolic events, significant obesity, multiple risk factors, or concomitant exposure to oestrogens.

The use of TXA in patients receiving anticoagulant therapy remains particularly poorly understood. HMB is a common problem in women taking oral anticoagulants and therapeutic decisions in this group require balancing the risk of bleeding against the risk of recurrent venous thromboembolism. At present, there are insufficient prospective data to determine in which patients concomitant use of TXA and an anticoagulant could be safe, when it might be considered, and how it should be monitored [19].

Another limitation is the heterogeneity of endpoints used in HMB studies. Historically, objective assessment of menstrual blood loss has predominated, often using the threshold of ≥ 80 ml per cycle [15,17]. Although this endpoint remains important, it does not fully reflect the contemporary understanding of HMB as bleeding that affects a patient's quality of life. Future studies should more broadly incorporate patient-reported outcomes, such as perceived control over bleeding, limitations in social and occupational activities, fatigue, treatment convenience, satisfaction, and willingness to continue therapy.

5. Conclusions

Tranexamic acid is an effective non-hormonal treatment for heavy menstrual bleeding. It significantly reduces menstrual blood loss compared with placebo and some other pharmacological therapies. Although the levonorgestrel-releasing intrauterine system generally shows greater efficacy, TXA remains an important option for patients who prefer non-hormonal, on-demand treatment or therapy that does not provide contraception. It should be emphasised that TXA does not replace diagnostic evaluation of the underlying causes of HMB. Treatment selection should take into account the PALM-COEIN classification, bleeding severity, the presence of iron deficiency or anaemia, comorbidities, reproductive plans, and patient preferences. Further studies are needed to assess the efficacy and safety of TXA in high-risk populations and to incorporate endpoints that are important to patients, such as quality of life, treatment satisfaction, and acceptability of therapy.

Author contributions:

Conceptualization: Aleksandra Papuga, Makary Hejduk, Magdalena Grzymek, Justyna Bury

Formal analysis: Makary Hejduk, Aleksandra Papuga, Katarzyna Kraska, Aleksandra Pawluka, Weronika Kępa, Joanna Kadłuczka, Martyna Więclawek

Investigation: Makary Hejduk, Aleksandra Papuga, Aneta Sobek, Aleksandra Pawluka, Jan Potoniec, Weronika Kępa, Katarzyna Pawluka, Magdalena Grzymek

Writing rough preparation: Aleksandra Papuga, Makary Hejduk, Justyna Bury, Magdalena Grzymek, Martyna Więclawek, Katarzyna Kraska, Aneta Sobek, Weronika Kępa, Jan Potoniec, Joanna Kadłuczka, Aleksandra Pawluka, Katarzyna Pawluka

Writing review and editing: Makary Hejduk, Aleksandra Papuga, Justyna Bury, Joanna Kadłuczka, Katarzyna Pawluka, Aneta Sobek, Katarzyna Kraska, Jan Potoniec, Martyna Więclawek

Supervision: Makary Hejduk, Aleksandra Papuga

All authors have read and agreed with the published version of manuscript.

Funding: This research received no external funding.

Data Availability Statement: The authors confirm that the data supporting the findings of this study are available within the article's bibliography.

Declaration of AI Use: Artificial intelligence (AI) was used only for language enhancement purposes, such as grammar correction and stylistic refinement.

REFERENCES

1. Bofill Rodriguez, M., Dias, S., Jordan, V., et al. (2022). Interventions for heavy menstrual bleeding: Overview of Cochrane reviews and network meta-analysis. *Cochrane Database of Systematic Reviews*, 2022(5), CD013180. <https://doi.org/10.1002/14651858.CD013180.pub2>
2. Ammerdorffer, A., Ferrillo, O., Mills, K., et al. (2025). The prevalence and burden of heavy menstrual bleeding, and market access barriers of medical interventions with a focus on low- and middle-income countries: A scoping review. *BMC Women's Health*, 26(1), 9. <https://doi.org/10.1186/s12905-025-04157-5>
3. Munro, M. G., Mast, A. E., Powers, J. M., et al. (2023). The relationship between heavy menstrual bleeding, iron deficiency, and iron deficiency anemia. *American Journal of Obstetrics and Gynecology*, 229(1), 1–9. <https://doi.org/10.1016/j.ajog.2023.01.017>
4. Mansour, D., Hofmann, A., & Gemzell-Danielsson, K. (2021). A review of clinical guidelines on the management of iron deficiency and iron-deficiency anemia in women with heavy menstrual bleeding. *Advances in Therapy*, 38(1), 201–225. <https://doi.org/10.1007/s12325-020-01564-y>
5. Munro, M. G., Critchley, H. O. D., Fraser, I. S., & FIGO Menstrual Disorders Committee. (2018). The two FIGO systems for normal and abnormal uterine bleeding symptoms and classification of causes of abnormal uterine bleeding in the reproductive years: 2018 revisions. *International Journal of Gynecology & Obstetrics*, 143(3), 393–408. <https://doi.org/10.1002/ijgo.12666>
6. Jain, V., Munro, M. G., & Critchley, H. O. D. (2023). Contemporary evaluation of women and girls with abnormal uterine bleeding: FIGO systems 1 and 2. *International Journal of Gynecology & Obstetrics*, 162(Suppl. 2), 29–42. <https://doi.org/10.1002/ijgo.14946>
7. Bryant-Smith, A. C., Lethaby, A., Farquhar, C., & Hickey, M. (2018). Antifibrinolytics for heavy menstrual bleeding. *Cochrane Database of Systematic Reviews*, 2018(4), CD000249. <https://doi.org/10.1002/14651858.CD000249.pub2>

8. Jain, V., Chodankar, R. R., Maybin, J. A., & Critchley, H. O. D. (2022). Uterine bleeding: How understanding endometrial physiology underpins menstrual health. *Nature Reviews Endocrinology*, 18(5), 290–308. <https://doi.org/10.1038/s41574-021-00629-4>
9. Critchley, H. O. D., Maybin, J. A., Armstrong, G. M., & Williams, A. R. W. (2020). Physiology of the endometrium and regulation of menstruation. *Physiological Reviews*, 100(3), 1149–1179. <https://doi.org/10.1152/physrev.00031.2019>
10. Maybin, J. A., Murray, A. A., Saunders, P. T. K., Hirani, N., Carmeliet, P., & Critchley, H. O. D. (2018). Hypoxia and hypoxia inducible factor-1 α are required for normal endometrial repair during menstruation. *Nature Communications*, 9(1), 295. <https://doi.org/10.1038/s41467-017-02375-6>
11. Maybin, J. A., & Critchley, H. O. (2016). Medical management of heavy menstrual bleeding. *Women's Health*, 12(1), 27–34. <https://doi.org/10.2217/whe.15.100>
12. Maybin, J. A., Boswell, L., Young, V. J., Duncan, W. C., & Critchley, H. O. D. (2017). Reduced transforming growth factor- β activity in the endometrium of women with heavy menstrual bleeding. *The Journal of Clinical Endocrinology & Metabolism*, 102(4), 1299–1308. <https://doi.org/10.1210/jc.2016-3437>
13. Cai, J., Ribkoff, J., Olson, S., et al. (2020). The many roles of tranexamic acid: An overview of the clinical indications for TXA in medical and surgical patients. *European Journal of Haematology*, 104(2), 79–87. <https://doi.org/10.1111/ejh.13348>
14. Hrometz, S. L. (2012). Oral modified-release tranexamic acid for heavy menstrual bleeding. *The Annals of Pharmacotherapy*, 46(7–8), 1047–1053. <https://doi.org/10.1345/aph.1R025>
15. Freeman, E. W., Lukes, A., VanDrie, D., Mabey, R. G., Gersten, J., & Adomako, T. L. (2011). A dose-response study of a novel, oral tranexamic formulation for heavy menstrual bleeding. *American Journal of Obstetrics and Gynecology*, 205(4), 319.e1–319.e7. <https://doi.org/10.1016/j.ajog.2011.05.015>
16. Leminen, H., & Hurskainen, R. (2012). Tranexamic acid for the treatment of heavy menstrual bleeding: Efficacy and safety. *International Journal of Women's Health*, 4, 413–421. <https://doi.org/10.2147/IJWH.S13840>
17. Lukes, A. S., Moore, K. A., Muse, K. N., et al. (2010). Tranexamic acid treatment for heavy menstrual bleeding: A randomized controlled trial. *Obstetrics & Gynecology*, 116(4), 865–875. <https://doi.org/10.1097/AOG.0b013e3181f20177>
18. James, A. H. (2016). Heavy menstrual bleeding: Work-up and management. *Hematology American Society of Hematology Education Program*, 2016(1), 236–242. <https://doi.org/10.1182/asheducation-2016.1.236>
19. Samuelson Bannow, B. (2020). Management of heavy menstrual bleeding on anticoagulation. *Hematology American Society of Hematology Education Program*, 2020(1), 533–537. <https://doi.org/10.1182/hematology.2020000138>
20. Relke, N., Chornenki, N. L. J., & Sholzberg, M. (2021). Tranexamic acid evidence and controversies: An illustrated review. *Research and Practice in Thrombosis and Haemostasis*, 5(5), e12546. <https://doi.org/10.1002/rth2.12546>
21. Meaidi, A., Mørch, L., Torp-Pedersen, C., & Lidegaard, O. (2021). Oral tranexamic acid and thrombosis risk in women. *EClinicalMedicine*, 35, 100882. <https://doi.org/10.1016/j.eclinm.2021.100882>
22. Lim, M. Y., Olson, L., Rajpurkar, M. A., & Weyand, A. C. (2021). Concomitant use of combined hormonal contraceptives and antifibrinolytic agents for the management of heavy menstrual bleeding: A practice pattern survey. *Thrombosis Research*, 204, 95–100. <https://doi.org/10.1016/j.thromres.2021.06.006>
23. Lukes, A. S., Baker, J., Eder, S., & Adomako, T. L. (2012). Daily menstrual blood loss and quality of life in women with heavy menstrual bleeding. *Women's Health*, 8(5), 503–511. <https://doi.org/10.2217/whe.12.36>
24. Bofill Rodriguez, M., Lethaby, A., & Farquhar, C. (2019). Non-steroidal anti-inflammatory drugs for heavy menstrual bleeding. *Cochrane Database of Systematic Reviews*, 2019(9), CD000400. <https://doi.org/10.1002/14651858.CD000400.pub4>
25. Bofill Rodriguez, M., Lethaby, A., Low, C., & Cameron, I. T. (2019). Cyclical progestogens for heavy menstrual bleeding. *Cochrane Database of Systematic Reviews*, 2019(8), CD001016. <https://doi.org/10.1002/14651858.CD001016.pub3>
26. Bofill Rodriguez, M., Lethaby, A., & Jordan, V. (2020). Progestogen-releasing intrauterine systems for heavy menstrual bleeding. *Cochrane Database of Systematic Reviews*, 2020(6), CD002126. <https://doi.org/10.1002/14651858.CD002126.pub4>
27. Chen, S., Liu, J., Peng, S., & Zheng, Y. (2022). LNG-IUS vs. medical treatments for women with heavy menstrual bleeding: A systematic review and meta-analysis. *Frontiers in Medicine*, 9, 948709. <https://doi.org/10.3389/fmed.2022.948709>