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Mini Review

Reviewed Literature on Use of Ibuprofen and Other NSAIDs in the Management of Menstrual Cramps

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ABSTRACT

Dysmenorrhea, commonly known as menstrual cramps or painful menstruation, is one of the most prevalent gynecological conditions affecting adolescents and women of reproductive age. It is characterized by recurrent lower abdominal cramping occurring shortly before or during menstruation and may be accompanied by nausea, vomiting, diarrhea, headache, fatigue, dizziness, and back pain. Dysmenorrhea is broadly classified into primary and secondary forms. Primary dysmenorrhea occurs in the absence of identifiable pelvic pathology and is predominantly associated with excessive endometrial prostaglandin production. Increased concentrations and activity of prostaglandins, particularly prostaglandin F2α and prostaglandin E2, contribute to uterine hypercontractility, vasoconstriction, reduced uterine blood flow, and activation of pain pathways. Secondary dysmenorrhea is associated with underlying pelvic disorders such as endometriosis, adenomyosis, uterine fibroids, or pelvic inflammatory disease. Nonsteroidal anti-inflammatory drugs (NSAIDs) are considered first-line pharmacological treatment for primary dysmenorrhea because they inhibit cyclooxygenase enzymes and reduce prostaglandin synthesis. Ibuprofen, a propionic acid derivative and non-selective NSAID, is widely used because of its established analgesic efficacy, relatively rapid onset, availability, and affordability. Other NSAIDs, including naproxen, mefenamic acid, diclofenac, and ketoprofen, provide effective alternatives. Evidence from randomized trials and systematic reviews demonstrates that NSAIDs are significantly more effective than placebo for menstrual pain, although comparative evidence does not establish a single conventional NSAID as consistently superior in all patients. Early initiation of treatment and appropriate dosing can improve therapeutic effectiveness. Despite favorable short-term efficacy, NSAIDs may cause gastrointestinal, renal, cardiovascular, and hypersensitivity-related adverse effects. This review discusses the pathophysiology of dysmenorrhea and the pharmacological role of ibuprofen and other NSAIDs, including their mechanisms of action, clinical efficacy,

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dosage considerations, comparative effectiveness, safety, limitations, and management of treatment-resistant menstrual pain.

INTRODUCTION

Dysmenorrhea refers to painful menstruation and is one of the most common gynecological complaints among adolescents and women of reproductive age. Although menstruation is a normal physiological process, menstrual pain can become sufficiently severe to interfere with physical activity, education, employment, social relationships, and overall quality of life. Primary dysmenorrhea is particularly common in adolescents and young adults and represents an important cause of recurrent short-term impairment. [1-3] Dysmenorrhea is traditionally divided into primary and secondary dysmenorrhea. Primary dysmenorrhea occurs in the absence of identifiable pelvic disease and generally develops after the establishment of ovulatory menstrual cycles. Secondary dysmenorrhea results from an underlying pelvic disorder, with endometriosis being an important cause in adolescents and young adults. [1,4,5] The pathophysiology of primary dysmenorrhea is strongly associated with increased endometrial prostanoid activity during menstruation. Prostaglandins, particularly prostaglandin F2α (PGF2α) and prostaglandin E2 (PGE2), contribute to increased uterine contractility and vascular changes that promote menstrual pain. Excessive uterine activity, increased intrauterine pressure, reduced uterine blood flow, and peripheral nociceptive sensitization are important components of the pain mechanism. [6,7] Because prostaglandins play a central role in primary dysmenorrhea, inhibition of prostaglandin synthesis provides a rational pharmacological approach. NSAIDs inhibit cyclooxygenase (COX), the enzyme involved in the conversion of arachidonic acid into prostaglandin precursors. Reduction in prostaglandin production decreases uterine hypercontractility and pain. [6,8] Ibuprofen is one of the most widely used NSAIDs for menstrual pain. Other commonly used agents include naproxen, mefenamic acid, diclofenac, and ketoprofen. Current clinical guidance recommends NSAIDs as first-line pharmacological therapy for primary dysmenorrhea when there are no contraindications. [1,9]

Epidemiology and Clinical Burden

Dysmenorrhea is highly prevalent, particularly among adolescents and young adults. Estimates vary considerably among studies because different populations, definitions, and methods of measuring menstrual pain are used. Nevertheless, the condition represents a substantial clinical and public-health burden. [2,10] Menstrual pain may range from mild discomfort to severe, incapacitating cramps. In addition to lower abdominal pain, affected individuals may experience lower back pain, headache, nausea, vomiting, diarrhea, dizziness, fatigue, sleep disturbances, and reduced physical functioning. [3,11] The consequences extend beyond physical symptoms. Severe dysmenorrhea may result in absence from school or university, reduced work productivity, impaired concentration, limitation of physical activity, and restriction of social activities. Consequently, dysmenorrhea can produce considerable educational, occupational, and socioeconomic effects. [2,12] Despite its high prevalence and impact, many individuals do not seek professional treatment. Menstrual pain may be normalized or regarded as an unavoidable part of menstruation. Others may self-medicate without adequate knowledge of appropriate dose, timing, or contraindications. [3,5] Improving awareness of dysmenorrhea and educating patients about appropriate treatment are therefore important components of effective management.

Types of Dysmenorrhea

1. Primary Dysmenorrhea

Primary dysmenorrhea is painful menstruation occurring without identifiable pelvic pathology. It commonly begins within a few years after menarche and is particularly prevalent among adolescents and young women. [1,3] Pain generally begins shortly before or at the onset of menstruation and is most severe during the first one or two days. It is usually described as cramping lower abdominal pain and may radiate to the lower back or thighs. Associated symptoms may include nausea, diarrhea, headache, fatigue, and dizziness. [3,5] The major biochemical feature is increased prostaglandin activity within the endometrium. Increased prostaglandin production contributes to stronger uterine contractions, vasoconstriction, reduced uterine blood flow, and pain. [6,7] Because prostaglandin-mediated mechanisms are central to primary dysmenorrhea, NSAIDs are particularly effective in this form of menstrual pain.

2. Secondary Dysmenorrhea

Secondary dysmenorrhea is menstrual pain caused by an underlying pelvic disorder. Important causes include endometriosis, adenomyosis, uterine leiomyomas, pelvic inflammatory disease, and congenital or structural abnormalities. [1,4,13] The clinical pattern may differ from primary dysmenorrhea. Pain may begin several days before menstruation, persist beyond the first few menstrual days, progressively worsen over time, or occur outside menstruation. Abnormal uterine bleeding, deep dyspareunia, infertility, or chronic pelvic pain may also occur depending on the underlying condition. [1,4] Secondary dysmenorrhea should be suspected when menstrual pain progressively worsens, begins after years of previously painless menstruation, is associated with atypical symptoms, or does not respond adequately to appropriate first-line treatment. [1,4] NSAIDs can provide symptomatic relief in secondary dysmenorrhea, but they do not treat the underlying disease. Therefore, persistent or atypical symptoms require appropriate clinical evaluation.

Pathophysiology of Menstrual Cramps

The principal mechanism underlying primary dysmenorrhea involves excessive endometrial prostanoid production and activity. During the late luteal phase, withdrawal of progesterone produces biochemical changes in the endometrium. Membrane phospholipids are subsequently mobilized, leading to the release of arachidonic acid, which serves as the precursor for prostaglandin synthesis. [6,7] Arachidonic acid is metabolized through the cyclooxygenase pathway to produce prostaglandin intermediates. These subsequently generate biologically active prostaglandins, including PGF2α and PGE2. PGF2α has an important role in stimulating myometrial contraction and vasoconstriction, whereas PGE2 has effects on uterine contractility, vascular responses, and pain signalling. [6,7] The resulting uterine contractions may become more frequent, prolonged, and intense. Increased intrauterine pressure together with reduced uterine blood flow contributes to tissue ischemia and activation of pain-sensitive pathways. [6] Prostaglandins may also influence gastrointestinal and systemic functions, helping explain associated symptoms such as nausea, vomiting, diarrhea, headache, and fatigue. [3,7] Although prostaglandins are central to the pathophysiology, dysmenorrhea is not explained by a single pathway. Other inflammatory mediators, eicosanoids, leukotrienes, vascular factors, and peripheral and central pain-processing mechanisms may also contribute. [7,14]

Role of Prostaglandins in Dysmenorrhea

The prostaglandin theory remains one of the major explanations for primary dysmenorrhea. Women with dysmenorrhea may have increased menstrual prostaglandin activity, and pharmacological suppression of prostaglandin synthesis is associated with reduction in uterine activity and pain. [6,7] PGF2α is particularly important because it promotes myometrial contraction and uterine vasoconstriction. Excessive uterine activity can increase intrauterine pressure and compromise local blood flow. [6] Evidence from clinical studies supports the relationship between prostaglandins and menstrual pain. Ibuprofen has been shown to reduce menstrual prostaglandin concentrations together with improvement in dysmenorrhea. [15,16]

In a randomized crossover study, ibuprofen substantially reduced menstrual-fluid PGF2α and PGE concentrations and significantly reduced menstrual pain. [16] The effectiveness of prostaglandin synthesis inhibitors therefore provides pharmacological support for the prostaglandin-mediated mechanism of primary dysmenorrhea.

However, current understanding indicates that dysmenorrhea involves several biological pathways. Leukotrienes and other inflammatory mediators may also contribute to symptoms, which may partly explain incomplete response to conventional NSAID treatment in some individuals. [7,14]

Nonsteroidal Anti-Inflammatory Drugs

NSAIDs are a group of analgesic, anti-inflammatory, and antipyretic drugs that inhibit cyclooxygenase enzymes and consequently reduce prostaglandin synthesis.

Common NSAIDs used in dysmenorrhea include:

- Ibuprofen
- Naproxen
- Mefenamic acid
- Diclofenac
- Ketoprofen

NSAIDs are recommended as first-line pharmacological treatment for primary dysmenorrhea because they directly interfere with an important biochemical mechanism responsible for menstrual pain. [1,8,9]

A Cochrane review of 80 randomized controlled trials involving 5,820 women found that NSAIDs were significantly more effective than placebo for pain relief. However, the review found insufficient evidence to establish a consistently superior individual NSAID with respect to efficacy or safety. NSAIDs were also associated with somewhat greater adverse effects than placebo, particularly gastrointestinal and neurological adverse effects. [8]

Thus, drug selection should be individualized rather than based on the assumption that one conventional NSAID is universally superior.

Cyclooxygenase and Mechanism of NSAID Action

Cyclooxygenase is a key enzyme involved in the conversion of arachidonic acid into prostaglandin precursors.

Two major isoforms are commonly described.

COX-1

COX-1 is constitutively expressed in many tissues and contributes to physiological prostaglandin production. These prostaglandins participate in gastric mucosal protection, renal function, and platelet physiology.

COX-2

COX-2 is strongly induced in many inflammatory states and contributes to prostaglandin production associated with pain and inflammation. However,

COX-2 also has physiological functions in selected tissues.

Traditional NSAIDs inhibit both COX-1 and COX-2 to varying degrees.

Mechanism in Dysmenorrhea

NSAIDs exert their therapeutic effect in dysmenorrhea by inhibiting cyclooxygenase (COX) enzymes, thereby reducing the synthesis of prostaglandins, particularly $PGF_2\alpha$ and PGE_2. The resulting decrease in prostaglandin activity reduces uterine hypercontractility and vasoconstriction, which subsequently decreases nociceptive stimulation and menstrual pain. This mechanism explains the clinical effectiveness of NSAIDs in primary dysmenorrhea. [6,8]

Ibuprofen in the Management of Menstrual Cramps

Pharmacological Profile

Ibuprofen is a non-selective NSAID belonging to the propionic acid derivative class. It possesses analgesic, anti-inflammatory, and antipyretic properties. Its analgesic action is primarily related to inhibition of COX enzymes and reduction of prostaglandin synthesis. Ibuprofen has been extensively investigated in dysmenorrhea. Its relatively rapid onset and established efficacy make it suitable for short-term treatment of acute menstrual pain. [17,18]

Clinical Effectiveness

Clinical trials have demonstrated significant analgesic efficacy of ibuprofen in primary dysmenorrhea. In a double-blind crossover study, ibuprofen provided significantly greater pain relief than aspirin and placebo. [17] Another controlled study demonstrated that ibuprofen was associated with substantial relief of severe primary dysmenorrhea and a marked reduction in menstrual prostaglandin release. [15] In a randomized crossover study comparing ibuprofen, acetaminophen, and placebo, both active drugs improved pain compared with placebo, while ibuprofen produced greater suppression of menstrual-fluid PGF2α. [19]

These findings provide both clinical and pharmacological evidence supporting ibuprofen as an effective treatment for primary dysmenorrhea.

Timing of Ibuprofen Administration

The timing of NSAID administration is important for successful treatment. NSAIDs are generally most effective when started at the onset of menstrual pain or bleeding rather than after pain has become severe. In individuals with predictable cycles, administration shortly before the expected onset of menstruation may also be considered. [1,5,18] Early administration aims to inhibit prostaglandin synthesis before substantial prostaglandin-mediated uterine hypercontractility and pain have developed. Regular administration during the first one to three days, when symptoms are commonly most severe, may be preferable to waiting until pain becomes intense. [1,5]

Dosage and Administration of Ibuprofen

The appropriate ibuprofen dose depends on age, formulation, clinical circumstances, and whether the medication is being used under professional supervision or as an over-the-counter product. Clinical trials have commonly evaluated doses such as 200–400 mg per dose, while some older therapeutic studies used higher doses. [17,18,20] For routine use, patients should follow the dose and maximum daily amount stated on the specific product label or prescribed by a healthcare professional.

General principles include:

- Start treatment at the onset of pain or menstrual bleeding.

- Consider starting shortly before menstruation when cycles are predictable.
- Use the lowest effective dose.
- Follow the recommended dosing interval.
- Restrict treatment to the period of greatest need.
- Avoid exceeding the recommended daily dose.
- Take with food if gastrointestinal discomfort occurs.

Higher doses should not automatically be considered more appropriate because adverse effects may increase with dose and duration.

Naproxen in Dysmenorrhea

Naproxen is a propionic acid derivative NSAID with analgesic and anti-inflammatory properties. Its relatively longer duration of action compared with ibuprofen can permit less frequent dosing, which may be convenient for some patients. Clinical evidence supports naproxen as an effective treatment for primary dysmenorrhea. In a pooled analysis of five studies involving 443 women, naproxen demonstrated significant analgesic efficacy compared with placebo and acetaminophen; some comparisons also favored naproxen over the ibuprofen dose used in those trials. [21] However, broader systematic-review evidence does not establish naproxen as universally superior to all other NSAIDs. [8] Therefore, naproxen is an appropriate alternative when ibuprofen is ineffective, poorly tolerated, or inconvenient.

Mefenamic Acid

Mefenamic acid belongs to the fenamate group of NSAIDs and has been used extensively for dysmenorrhea. Its principal mechanism involves inhibition of cyclooxygenase-mediated prostaglandin synthesis. Reduction of prostaglandin activity decreases uterine contractility and menstrual pain. [8] Mefenamic acid may also reduce menstrual blood loss in some individuals because prostaglandins contribute to endometrial vascular regulation and menstrual hemostasis. Comparative evidence indicates that mefenamic acid is effective for primary dysmenorrhea, although evidence is insufficient to establish it as universally superior to other conventional NSAIDs. [8,22] Gastrointestinal adverse effects such as dyspepsia, nausea, abdominal discomfort, and diarrhea may occur.

Diclofenac

Diclofenac is another potent NSAID used for the treatment of pain, including dysmenorrhea. It inhibits cyclooxygenase and reduces prostaglandin production. Comparative clinical evidence supports the effectiveness of diclofenac in primary dysmenorrhea. [23] Network meta-analysis has also demonstrated significant efficacy of diclofenac for menstrual pain. However, differences between NSAIDs should be interpreted cautiously because many comparisons are indirect or based on relatively small trials. [22] Although effective, diclofenac should be selected with consideration of individual gastrointestinal, renal, and cardiovascular risk factors.

Comparative Efficacy of NSAIDs

An important clinical question is whether one NSAID is more effective than all others. Evidence indicates that ibuprofen, naproxen, mefenamic acid, diclofenac, ketoprofen, and other NSAIDs can effectively reduce primary dysmenorrhea. [8,22] The Cochrane review of NSAIDs found clear evidence of superiority over placebo but insufficient evidence to establish one individual NSAID as consistently superior in both efficacy and safety. [8]

A network meta-analysis involving 72 randomized controlled trials and 5,723 participants found

efficacy for several NSAIDs, although rankings varied according to the outcome and analytical method. [22]

Therefore, the choice of NSAID should depend on:

- Individual treatment response.
- Previous experience with NSAIDs.
- Tolerability.
- Dosing convenience.
- Cost and availability.
- Contraindications and risk factors.
- Patient preference.

If one NSAID provides inadequate relief despite appropriate timing and dosing, another NSAID may be considered. Two NSAIDs should not routinely be taken together because doing so increases exposure to adverse effects without a clear therapeutic advantage.

NSAIDs Compared with Paracetamol

Paracetamol is a commonly used analgesic but differs from conventional NSAIDs in its peripheral anti-inflammatory effects. Evidence from systematic reviews indicates that NSAIDs are effective for primary dysmenorrhea and may provide greater pain relief than paracetamol. [8] A randomized crossover study directly comparing ibuprofen and acetaminophen demonstrated that both were superior to placebo, while ibuprofen produced greater suppression of menstrual-fluid PGF2α. [19] The greater efficacy of NSAIDs is pharmacologically plausible because they directly inhibit COX-mediated prostaglandin production, which is a major contributor to primary dysmenorrhea. Paracetamol may nevertheless be considered when NSAIDs are contraindicated or not tolerated.

Additional Benefits of NSAIDs

Pain relief is the principal therapeutic objective of NSAIDs in dysmenorrhea. However, inhibition of prostaglandin synthesis may provide additional benefits.

1. Reduction in Menstrual Blood Loss

NSAIDs may reduce menstrual blood loss in some individuals with dysmenorrhea and heavy menstrual bleeding. Their effects on prostaglandin pathways can influence endometrial vascular function and menstrual hemostasis.

However, persistent or excessive menstrual bleeding should be clinically evaluated rather than managed solely through self-medication.

2. Reduction of Associated Symptoms

Reduction in prostaglandin activity may improve some associated symptoms such as headache, nausea, diarrhea, and generalized discomfort. [3,6]

3. Improvement in Daily Function

Reduction in menstrual pain may allow individuals to maintain normal school, work, physical, and social activities. The functional benefits of effective dysmenorrhea treatment are particularly important in adolescents and young adults. [2,5]

Adverse Effects of NSAIDs

Although NSAIDs are generally well tolerated during short-term use, adverse effects can occur. The risk depends on the particular drug, dose, duration of treatment, patient characteristics, and concomitant medications. [8,24]

1. Gastrointestinal Effects

Common gastrointestinal effects include:

- Dyspepsia
- Heartburn
- Nausea
- Abdominal discomfort
- Gastric irritation

More serious complications include peptic ulceration and gastrointestinal bleeding. [24]

2. Renal Effects

Renal prostaglandins contribute to maintenance of renal blood flow under certain physiological conditions. NSAID-mediated inhibition of prostaglandin synthesis can therefore impair renal function in susceptible individuals. [24] Patients with renal disease, dehydration, heart failure, or reduced renal perfusion require particular caution.

3. Cardiovascular Effects

NSAIDs may increase cardiovascular risk, particularly with prolonged use or in individuals with pre-existing cardiovascular disease. [24] Because dysmenorrhea usually requires only short-term treatment, use of the lowest effective dose for the shortest appropriate duration is an important safety principle.

4. Hypersensitivity Reactions

Some individuals may develop NSAID hypersensitivity reactions, including urticaria, angioedema, bronchospasm, or other allergic manifestations. Patients with a history of serious NSAID hypersensitivity should avoid the responsible drug and seek professional advice regarding alternative therapy.

Contraindications and Precautions

NSAIDs should be avoided or used cautiously in individuals with:

- Active or previous serious peptic ulcer disease.
- Previous NSAID-associated gastrointestinal bleeding.
- Significant renal impairment.
- Significant cardiovascular disease.
- NSAID hypersensitivity.
- Certain bleeding disorders.
- Concomitant medications that substantially increase bleeding risk.
- Pregnancy, particularly later pregnancy.

Patients with asthma should also be assessed for previous NSAID-induced bronchospasm or other hypersensitivity reactions. Patients with diagnosed bleeding disorders require particular caution because NSAIDs can interfere with platelet function and may increase bleeding risk. [24,25] Individual risk assessment is therefore important before repeated or prolonged NSAID use.

NSAIDs and Menstrual Blood Loss

NSAIDs may have a useful additional role in individuals who experience both dysmenorrhea and heavy menstrual bleeding. Prostaglandins participate in regulation of endometrial vascular tone and hemostasis. Inhibition of prostaglandin synthesis may therefore reduce menstrual blood loss in some patients. This potential benefit can be clinically useful when pain and heavy bleeding occur together. However, unexplained heavy menstrual bleeding should not be managed solely through self-medication. Persistent heavy bleeding requires evaluation for structural, endocrine, hematological, or other underlying causes. In adolescents with suspected bleeding disorders, NSAID use requires particular consideration. [25]

Hormonal Therapy in Dysmenorrhea

Hormonal therapies provide an alternative or adjunctive pharmacological approach. Combined hormonal contraceptives and progestin-containing methods can suppress ovulation and reduce endometrial proliferation. This may decrease prostaglandin production and subsequently reduce menstrual pain. [1,26]

Hormonal therapy may be particularly useful for individuals who:

- Require contraception.

- Have inadequate response to NSAIDs.
- Prefer hormonal treatment.
- Have recurrent or severe dysmenorrhea.

A Cochrane review supports the use of combined oral contraceptives as a treatment option for primary dysmenorrhea, although treatment choice should be individualized. [26] In adolescents and young adults with persistent symptoms despite adequate NSAID therapy, hormonal therapy may be considered, particularly when secondary dysmenorrhea has been appropriately assessed. [5]

Non-Pharmacological Management

Non-pharmacological measures can complement NSAID treatment.

1. Heat Therapy

Application of local heat to the lower abdomen is a simple and inexpensive approach that may reduce menstrual pain. Heat may promote muscle relaxation, increase local circulation, and modify pain perception. [1,3]

2. Exercise

Regular physical activity may reduce dysmenorrhea severity in some individuals. A Cochrane review evaluated exercise as a non-pharmacological intervention and found evidence suggesting a potential reduction in menstrual pain, although certainty varied across outcomes and studies. [27] Exercise should therefore be considered a useful adjunct rather than a guaranteed replacement for pharmacological therapy in moderate-to-severe dysmenorrhea.

3. TENS and Other Approaches

Transcutaneous electrical nerve stimulation (TENS) and other complementary approaches have also been investigated as adjunctive interventions. These approaches may be useful when combined with pharmacological treatment or when patients prefer non-drug options.

Dysmenorrhea in Adolescents

Dysmenorrhea frequently begins during adolescence and can interfere substantially with school attendance, academic performance, physical activity, and social functioning. [3,5] NSAIDs are generally recommended as first-line treatment for adolescents with primary dysmenorrhea when there are no contraindications. [1,5] Early treatment is particularly important because adolescents may delay medication until pain becomes severe. Education regarding appropriate dose, timing, and adherence can therefore improve treatment outcomes. Severe menstrual pain should not automatically be considered a normal feature of adolescence. If symptoms progressively worsen or fail to respond to appropriate treatment, secondary causes such as endometriosis should be considered. [4,5]

NSAID-Resistant Dysmenorrhea

Although NSAIDs are effective for many individuals with primary dysmenorrhea, some patients experience incomplete relief.

Possible reasons include:

- Delayed treatment initiation.
- Inadequate dose or duration.
- Poor adherence.
- Individual variation in drug response.
- Severe disease.
- Multiple inflammatory or pain-processing mechanisms.
- Secondary dysmenorrhea.

Dysmenorrhea involves more than prostaglandin production alone, and leukotrienes and other inflammatory pathways may also contribute to symptoms. [7,14] When an NSAID appears ineffective, the clinician should first confirm

appropriate timing, dose, adherence, and duration. A different NSAID may then be considered where appropriate. Persistent treatment failure should prompt assessment for secondary causes rather than repeated escalation of self-medication.

Recognition of Secondary Dysmenorrhea

Certain features should prompt investigation for secondary dysmenorrhea.
These include:

- Progressive worsening of menstrual pain.
- Pain beginning after years of previously painless menstruation.
- Pain beginning well before menstruation or persisting beyond the menstrual period.
- Abnormal uterine bleeding.
- Deep dyspareunia.
- Chronic pelvic pain.
- Infertility.
- Inadequate response to appropriate NSAID therapy.

Endometriosis is particularly important because it may present with severe dysmenorrhea in adolescents and young women. [4,5] Current clinical guidance emphasizes appropriate evaluation when symptoms are atypical, progressively worsening, or inadequately controlled with first-line treatment. [1]

Patient Counselling and Rational NSAID Use

Patient education is an important component of successful dysmenorrhea management.
Patients should be advised to:

- Begin NSAID treatment early in the course of menstrual pain.
- Follow the recommended dose and dosing interval.
- Avoid combining two NSAIDs.
- Avoid exceeding the recommended daily dose.
- Use the drug only for the required duration.
- Take the medication with food if gastrointestinal discomfort occurs.
- Inform healthcare professionals about other medications.
- Seek medical attention for gastrointestinal bleeding or severe hypersensitivity symptoms.
- Seek evaluation if menstrual pain becomes progressively worse.
- Maintain a menstrual and symptom record when recurrent pain is difficult to manage.

Appropriate counselling can improve adherence and reduce unnecessary NSAID exposure.

Advantages of Ibuprofen

Ibuprofen has several characteristics that make it useful for menstrual cramps:

1. Established analgesic efficacy.
2. Relatively rapid onset of action.
3. Inhibition of prostaglandin synthesis.
4. Suitability for short-term treatment.
5. Wide availability.
6. Relatively low cost.
7. Extensive clinical experience.
8. Availability in several formulations.

Clinical trials have consistently demonstrated its effectiveness in primary dysmenorrhea, while systematic reviews support NSAIDs as a class of effective treatments. [8,15,17,19] However, these advantages do not mean that ibuprofen is universally superior to every other NSAID. Individual response, tolerability, and patient-specific risk factors remain important determinants of drug selection.

Limitations of NSAID Therapy

Despite their established efficacy, NSAIDs have several limitations. First, they do not provide complete relief for every patient. Second, delayed administration may reduce their effectiveness. Third, adverse effects may occur, particularly with

excessive doses or prolonged use. [8,24] NSAIDs also provide primarily symptomatic treatment. In secondary dysmenorrhea, the underlying disease must be identified and managed. Another limitation is inappropriate self-medication. Easy availability of NSAIDs may encourage patients to exceed recommended doses, use multiple NSAIDs simultaneously, or continue treatment without evaluating persistent symptoms. Therefore, patient education and appropriate clinical assessment are important components of rational NSAID therapy.

Current Evidence and Future Perspectives

The traditional understanding of dysmenorrhea has focused strongly on prostaglandins. Although this mechanism remains central, current evidence indicates that menstrual pain is multifactorial. Inflammatory mediators, leukotrienes, uterine contractility, vascular changes, peripheral sensitization, and central pain-processing mechanisms may all contribute to symptom severity. [7,14] The identification of patients who are unlikely to respond adequately to conventional NSAIDs could eventually support more individualized treatment. Another important area is early recognition of secondary dysmenorrhea, particularly endometriosis. Delayed recognition can result in prolonged symptoms and reduced quality of life. [4,5] Research into biomarkers, menstrual-fluid mediators, and individual differences in pain processing may eventually improve prediction of treatment response. Digital menstrual-health technologies may also assist patients in recording menstrual timing, pain severity, medication use, and treatment response. Such information can improve communication between patients and healthcare professionals. Future pharmacological research may therefore move beyond conventional COX inhibition toward therapies targeting additional inflammatory, vascular, and pain-processing pathways.

CONCLUSION

Dysmenorrhea is a common and clinically important condition that can significantly impair quality of life, education, occupational functioning, and social activities. Primary dysmenorrhea is strongly associated with increased endometrial prostaglandin activity, particularly involving PGF2α and PGE2, which contribute to uterine hypercontractility, vasoconstriction, reduced uterine blood flow, and pain. [6,7] NSAIDs remain the principal first-line pharmacological treatment because they inhibit cyclooxygenase enzymes and reduce prostaglandin synthesis. Ibuprofen is an important NSAID for menstrual pain because of its established efficacy, relatively rapid onset, availability, and affordability. Naproxen, mefenamic acid, diclofenac, ketoprofen, and other NSAIDs provide effective alternatives. [1,8] Clinical evidence demonstrates that NSAIDs are significantly more effective than placebo for primary dysmenorrhea. However, comparative evidence does not consistently establish one conventional NSAID as universally superior. Therefore, selection should be based on individual response, tolerability, dosing convenience, cost, contraindications, and patient preference. [8,22] Early initiation of treatment is important, and NSAIDs should generally be started at the onset of menstrual pain or bleeding, or shortly before menstruation in individuals with predictable cycles. The lowest effective dose should be used for the shortest appropriate duration. [1,5] Although short-term NSAID treatment is generally well tolerated, gastrointestinal, renal, cardiovascular, and hypersensitivity-related adverse effects should be considered. Appropriate patient counselling is therefore essential. [8,24] Finally, menstrual pain that is severe, progressive, atypical, or resistant to appropriate NSAID treatment should not simply be managed through

repeated self-medication. Secondary causes, particularly endometriosis, should be considered and investigated when clinically indicated. [1,4,5] Overall, ibuprofen and other NSAIDs remain important, evidence-based treatments for primary dysmenorrhea. Their greatest clinical benefit is achieved through appropriate drug selection, early administration, rational dosing, patient education, and timely investigation of persistent or atypical symptoms.

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