

*Traditional Indian Medicine***Natural products: a rising star for treating primary dysmenorrhea?**Ankita Wal<sup>1\*</sup>, Pranay Wal<sup>1</sup>, Divyanshi Gupta<sup>1</sup>, Awani Kumar Rai<sup>1</sup>, Preeti Sharma<sup>1</sup>, Nem Kumar Jain<sup>2</sup><sup>1</sup>Department of Pharmacy, Pranveer Singh Institute of Technology, Uttar Pradesh 209305, India. <sup>2</sup>School of Pharmacy, ITM University Gwalior, Madhya Pradesh 475001, India.**\*Corresponding to:** Ankita Wal, Pranveer Singh Institute of Technology (Pharmacy), NH2 Bhauti Kanpur Agra Highway 209305, Uttar Pradesh, India. E-mail: shuklaankita02@gmail.com.**Author contributions**

Dr. Ankita Wal was responsible for study conception and design; Dr. Pranay Wal and Dr. Awani K Rai were responsible for data collection; Nem Kumar Jain and Preeti Sharma were responsible for analysis and interpretation of results; Divyanshi Gupta was responsible for draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

**Competing interests**

The authors declare no conflicts of interest.

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**Abbreviations**

NSAIDs, non-steroidal anti-inflammatory medicines; COX, cyclooxygenase.

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**Abstract**

In the current scenario, dysmenorrhea is a very frequent gynecological condition among women. At least one in every four women suffers from severe abdominal cramps, which are referred to as dysmenorrhea or menstrual cramps. Hence, in this review we compile the data from several reviews and research papers about dysmenorrhea, its pathogenesis, along with all treatment approaches. It was found in a survey that normally women treated these cramps with non-steroidal anti-inflammatory medicines or oral contraceptives, but lately it was found that these medications have a 20% to 25% failure rate as well as unpleasant side effects. Hereby, in this review, we concluded all the possible treatments, including pharmacological treatment, non-pharmacological treatment, and herbal treatments for dysmenorrhea. Many women are looking for alternatives to conventional treatments, such as the use of herbs, vitamins, minerals, nutritional supplements, analgesics, anti-inflammatory agents, and aromatherapy agents, which can have a significant impact when taken on a regular basis. The active constituents of these medicinal plants help the body fight cramps and pain associated with menstruation, as well as alleviate these issues in the most calming and effective way possible.

**Keywords:** dysmenorrhea; menstrual cramps; treatment of dysmenorrhea; herbal treatment for menstrual pain

**Highlights**

1. We summarise the mechanism, prevention, diagnosis, and complications of primary dysmenorrhea in this review.
2. We also summarise all of the available treatments for dysmenorrhea, including pharmacological, non-pharmacological, and herbal options.
3. Chemical constituents of herbal plants that aid in the relief of dysmenorrhea are also included, as well as their dosages.

**Medical history of objective**

NSAIDs, analgesics, and oral contraceptives are some of the pharmacological treatments available today to assist manage dysmenorrhea, but these medications also carry the risk of serious side effects. Since from ancient time, herbal remedies have been utilised to treat dysmenorrhea. According to ancient literature, menstrual cramps were treated by using a variety of herbs, including ashwagandha, Brahmi, fennel, chamomile, turmeric, ginger, green tea, methi, Tulsi, belladonna, nuts, lavender oil, squaw vine, flaxseed, green leafy vegetables like coriander and peppermint. Due to their analgesic and anti-spasmodic properties, these herbs can help to lessen the symptoms of dysmenorrhea as well as stomach pain by preventing the contractions brought on by oxytocin and prostaglandins.

**Background**

Dysmenorrhea means painful menstruation or painful menstrual cramps. Dysmenorrhea causes negative influences on the everyday activities of women; sleep quality is harmed; mental problems are linked; and women's daily chores are less effective [1–3]. It is one of the primary causes of 1 to 3 days of missed school and work attendance every cycle [4–6]. Dysmenorrhea means lower abdominal ache that is intense cramping. It takes place just before and during menstruation [7]. It generally affects young women under the age of 25 and does not require any medical treatment [8–11]. According to gynecologists, it's a frequent gynecological problem. Dysmenorrhea is classified into two types: primary and secondary [12]. Menstrual discomfort lacking pelvic pathology is referred to as primary dysmenorrhea, whereas secondary dysmenorrhea is caused by specific organic diseases, including adenomyosis, pelvic inflammatory disease, and endometriosis. During menstruation, women experienced many other symptoms along with menstrual cramps, like nausea, vomiting, bloating, fatigue, diarrhea, headache, lower backache, acne, and dizziness. Due to today's changing lifestyle and hectic schedule, hormonal imbalance occurs, increasing the incidence rate of dysmenorrhea to 90%. It was especially common in teenage girls. This issue is frequently misdiagnosed and untreated. Inadequate treatment of dysmenorrhea is frequently caused by a lack of medical understanding of the disease's great incidence and significant morbidity. With over-the-counter non-steroidal anti-inflammatory medicines (NSAIDs) readily available, it's easy to think that women are appropriately treating themselves. This is, unfortunately, not always the case. Primary dysmenorrhea is the most prevalent reason for 90 percent of women's skipping work, school, the workplace, or a special occasion. Over 90% of women say that menstrual cramps make it hard for them to go about their daily lives [13].

**Epidemiology and occurrence**

Menstruation is a natural process for every woman. In young women, the composition of the body plays a crucial role in predicting hormonal changes and menstruation. Menstruation is described as "the natural phenomenon wherein vaginal bleeding occurs owing to endometrial loss in females" [14]. Humans, most primates, as well as other animals, all go through this process. This is a natural process

that has phases called proliferative, luminal, and menstrual, as well as two peaks of oestrogen secretion and one peak of progesterone secretion. Clinically, the menstrual cycle lasts 21 to 35 days, with menstrual flow lasting 4 to 6 days, although it can occasionally last two days longer, which is typical [15]. The menstruation cycle is determined from the initial day of menstruation to the prior day of menstruation. The ovarian cycle is split into two parts: the proliferative and ovulation phases. The first stage is the follicular or proliferative phase, which occurs at the start of the cycle and leads to ovulation. This stage of follicle maturation has an ovule and an entourage of follicular cells that are capable of transforming androstenedione into estradiol, which is then released. The luteal phase, also known as the secretory period, occurs between ovulation and the next menstrual cycle. The follicular cavity that left the ovule after development is transformed into a corpus luteum during this phase, and oestrogen production continues. A significant quantity of progesterone is produced throughout this process. The luteal phase is marked by a surge in luteinizing hormone and the commencement of ovulation, which can extend up to + 14 days depending on the woman [16–18]. When there is hormonal imbalance in the body, it causes many menstrual problems for women, like periodic discomfort, perimenstrual mood swings, and increased menstrual flow, as well as menstrual cramps, which is referred to as dysmenorrhea. Every woman tends to have their own menstrual pattern, the number of days spent menstruating and the amount of blood and fluid lost during menstruation. Generally, menstrual problems start during the reproductive years. One of the problems during menstruation is dysmenorrhea.

According to a recent prospective study of college students based on one-year diaries, around 70–80 percent of monitored periods were unpleasant, with the most frequent discomfort occurring on the first day of menses. Sixty percent of the women surveyed said they had experienced severe pain at least once. Absenteeism from school or work is another issue that is often overlooked. One study found that 25% of women skipped work or school for a specific monthly menstrual cycle, and 42 percent of college women reported absenteeism or loss of activity on at least one occasion. In many longitudinal studies of young women, absenteeism rates ranged from 34 to 50 percent. Previously, dysmenorrhea was associated with higher absenteeism rates was shown to be responsible for 600 million missed work hours. Menarche at a young age, long menstrual cycles, smoking, obesity, and alcohol consumption have all been associated with more severe dysmenorrhea. In another study, a cross-sectional sample of 1,147 urban teens showed that trying to lose weight was strongly linked to more painful periods.

There is conflicting data to support the widely believed idea that menstrual pain diminishes after motherhood. One longitudinal study found evidence of a decreased prevalence and severity of dysmenorrhea following pregnancy, although other studies found no such effect. These epidemiologic studies, on the whole, aid patient education efforts. The prospect of fewer painful periods may be enough to motivate some women to make healthy lifestyle choices, such as quitting smoking [19]. It affects about 60% of menstruating women, and it can range from moderate to severe [20, 21]. Some women face pain throughout their menses and some on only their first day. This completely depends on the individual body. Due to all these changes in individual women, the severity of pain also differs in individuals.

**Pathogenesis**

The pathogenesis of primary dysmenorrhea is not clearly understood, but it is assumed that dysmenorrhea is caused by tissue ischemia resulting from increased intrauterine pressure, vessel contraction, and decreased uterine blood flow or due to the action of uterine prostaglandins. The cyclooxygenase (COX) pathway produces prostaglandins, which have been derived from arachidonic acid and play a major role in the mechanism of dysmenorrhea [22–24]. Nitric oxide, vasopressin, calcium, inflammation, and oxidative stress are all implicated in the pathway [25]. Prostaglandins are the main cause of

menstrual pain. Under the influence of progesterone, which is generated in the ovary during the secretory phase of the cycle, these are created in the endometrium. The endometrium breaks it down during menstruation, causing prostaglandins to be secreted and dispersed into the myometrium. They elicit twitching myometrial movements in the myometrium, resulting in crampy menstrual discomfort. It was found that pain intensity during the first two days of menstruation is high as well as symptoms are at their peak.

#### Clinical presentation and diagnosis

According to a report, the level of pain varies from woman to woman. Some women have slight discomfort, while others experience moderate to severe discomfort [26].

Within three years following menarche, primary dysmenorrhea commonly appears in adolescents. It's not uncommon for symptoms to appear within the first six months of menarche. Intense, periodic pain spasms affect affected women, which are frequently confined to the abdominal region. The pain may radiate to the lower back or the back of the legs. Nausea, vomiting, diarrhoea, tiredness, fever headache, or lightheadedness are all frequent systemic symptoms. Pain usually starts within hours of the start of menstruation and peaks during the first day or two of the cycle, when the flow is at its highest.

#### Methods to ease dysmenorrhea intensity

##### Water intake

Keeping your body hydrated during menstruation will ease bloating. In a study, it was found that drinking lots of fluid during menstruation or during primary dysmenorrhea like drinking plain water, flavoured mineral water, mint or lemon water, ginger clove tea, etc., is proven to provide relief from menstrual cramps [27]. It was advised that women drink a minimum of 2.5 liters of water per day and a maximum of 4 liters of water per day during menstruation.

##### Food intake

A healthy person's diet is always important. Similarly, during primary dysmenorrhea, eating a good diet of foods that contain good fats may help in the management and reduction of pain. In a study, it was found that when women are having their menses, they crave sweets and their appetites are increased. In this condition, they are advised to avoid junk food, fatty foods, or high sugar foods. Several doctors recommend foods to women like walnuts, tomatoes, cherries, squash, fish oil, high omega fatty acid foods or some dietary and nutraceutical supplements. Dietary supplements are often more helpful for pain alleviation than placebos or no therapy. According to various studies conducted on herbal medicine, it was obvious that herbal and nutritional treatments had comparable efficacy to standard treatments like analgesics and had a lower degree of side impact. According to the study conducted in New Zealand, it was reported that it was more successful than a placebo in relieving pain, and the need for further medication was reduced. When compared to placebo or no therapy, supplements, vitamins, and omega-3 fatty acids were beneficial in lowering discomfort. Dietary supplements like magnesium, vitamins, calcium, and omega fatty acids play a vital role in the management of dysmenorrhea [28]. Women should take proper carbohydrates and vitamins for management of primary dysmenorrhea. Table 1 shows various dietary supplements that have a role in the management of primary dysmenorrhea [29–36].

##### Heat method

This is the oldest method used since very ancient times to reduce the pain or swelling. This method was found to be very effective in relieving abdominal pain as well as other menstrual discomfort. Heat therapy is one of the traditional methods used for relieving pain during menstruation, and it may be used to relieve menstrual discomfort in many ways, such as heating bags, clothes, or glass bottles. During topical thermal therapies, temperatures ranging from 40–45 °C are utilised to treat the treatment area to a depth of about 1

centimeter, and for deeper heat, temperatures ranging from 2–5 cm are performed. It has been noticed that the application of heat during menstruation relieves discomfort caused by muscular spasms by reducing muscle spasms and relaxing the lower body. This therapy also allows for a decrease in discomfort due to nerve damage. It causes an increase in local blood and body fluid retention, as well as the use of pelvic blood circulation. It reduces congestion and puffiness, which aids in pain relief. Heat therapy has no major side effects. However, it might induce heat burn, which goes away within a few days without medication [37].

#### Extracorporeal shock wave therapy

Radial extracorporeal shock wave treatment is a procedure that uses a series of acoustic pulses with a high peak pressure, quick rate, short duration, and low energy density [38]. This procedure is fully safe, cost-effective, and non-invasive for pain relief, especially for lower back pain. This technique is used to treat a wide range of persistent soft tissue pain. It promotes cellular proliferation while reducing prostaglandin synthesis [39, 40].

#### Chinese herbal footbaths

Traditional Chinese medicine is one of the growing interests of patients and has been utilised in China in the treatment of various diseases for over 3,000 years. This therapy is also useful for patients with dysmenorrhea. In this therapy, a patient's feet and legs should be soaked in a hot botanical solution for about half an hour. It is a holistic method that includes reflective effects, thermal impacts, and pharmaceutical effects of herbal remedies [41, 42]. These herbal compositions regulate prostaglandin synthesis as well as block calcium channels and Cox activity. They enhance nitric oxide and its synthetase expression, reducing several hormone levels [42–45]. Traditional footbaths are used to promote skin permeability and improve vascular permeability in order to facilitate the absorption of traditional herbal formulations and their active ingredients.

#### Physical exercise

Physical exercise reduces the frequency and severity of premenstrual syndrome and primary dysmenorrhea. It has been seen in many women that moderate physical exercise may help with relieving pain. Generally, stretching exercise claims a high rate of symptom relief [46]. In 2015, investigational research was conducted on seventy females with primary dysmenorrhea in Mashhad University of Medical Sciences dorms, within which aerobic exercise was conducted on the study participants for eight weeks, three times a week, for 30 minutes each time. The impact of primary dysmenorrhea did not show any significant changes in the control group at four weeks just after the intervention ( $P = 0.423$ ), but at the end of eight weeks after the study, the intervention group showed outstanding changes compared to the control group ( $P = 0.041$ ), indicating that aerobic exercise could be used to cure primary dysmenorrhea [47].

#### Treatments for dysmenorrhea

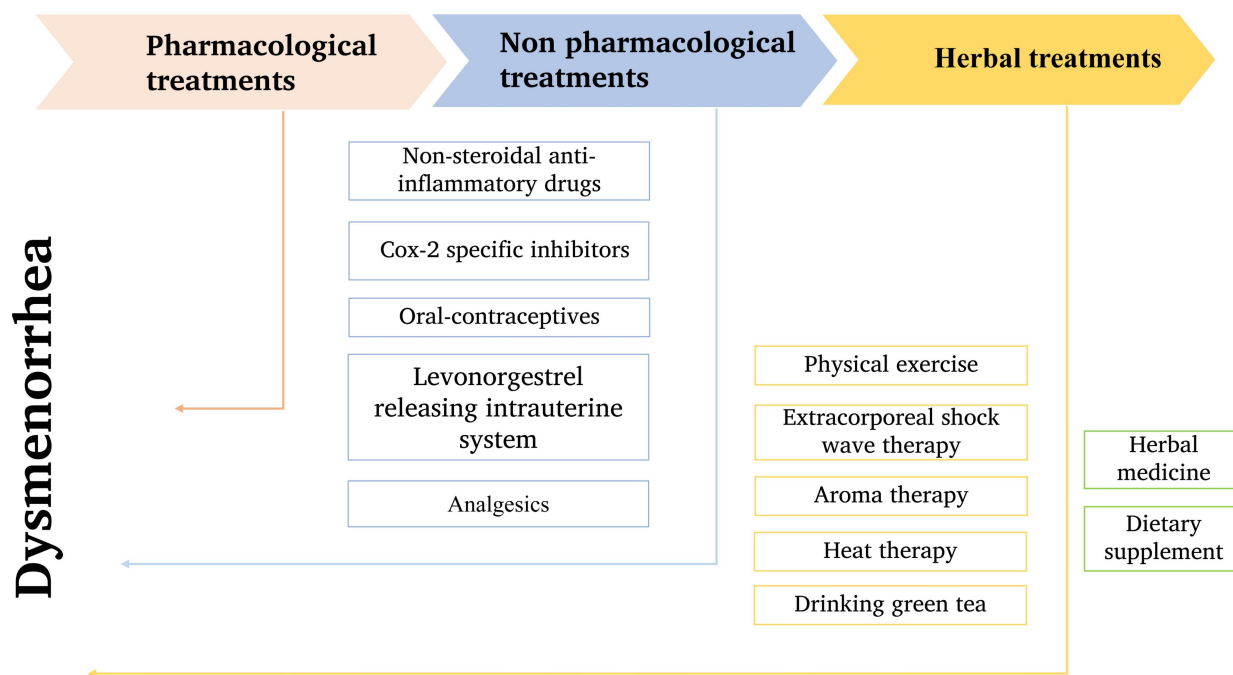
Generally, young women prefer self-care for managing the pain. This may include some physical exercise, over the counter analgesic medication (pharmacological), herbal medicine (non-pharmacological), heat therapy, or psychological strategies. Physical exercise like stretching or resting and taking analgesic medications like Ibuprofen and paracetamol helps in reducing pain [48–53]. Most women use herbal medicines or traditional remedies to manage their pain; they do not like to use analgesic education [54, 55]. Possible treatment for dysmenorrhea is shown in Figure 1.

#### Pharmacological treatments

There are various pharmacological treatments available for pain like NSAIDs, analgesics, specific-COX-2 inhibitors, and oral contraceptives, but they are not specifically for the treatment of dysmenorrhea. These medications work through different mechanisms and result in relief of pain.

**Table 1 Various dietary supplements, with descriptions, that aid in the alleviation of dysmenorrhea**

No.	Dietary supplement	Description	Refs
1	Magnesium	It was found in a random controlled trial study that magnesium treatment reduced the amount of prostaglandin during mensuration while in placebo probability is less than 0.05. Magnesium inhibits biosynthesis of prostaglandin and it also aids in muscle calm. Similarly, one trial is performed in which after four months of daily therapy, there was no significant change between the two groups and found probability equals to 0.07.	[29–31]
2	Vitamin B6	It has a significant impact on metabolism. It is also used to treat fatigue, muscle cramps and to reduce pain. One of the large trials (n = 556) is conducted between vitamin B6 and placebo which follows two months of daily therapy, there was a substantial change (14.74, 95 percent confidence interval 10.07, 21.58).	[32]
3	Vitamin E	It contains anti-inflammatory and analgesic effects. It has been used in the reduction of pain during rheumatoid arthritis that is why it was supposed to be used for dysmenorrhea. There is one research comparing the synergistic effect of one group given vitamin E and ibuprofen combination and other group given only ibuprofen during menstruation and it showed there is no significant difference in pain alleviation after one month of therapy.	[33, 34]
4	Omega-3 fatty acids	High levels of omega-3 fatty acids have been linked to milder menstruation symptoms. Research on omega-3 fatty acid (fish oil) against placebo (number of females are 42) found that the placebo groups were substantially different after two months of therapy and had probability equals to 0.004. It also causes side effects such as nausea, vomiting, and headache.	[35, 36]



**Figure 1 Possible treatment for dysmenorrhea pharmacological treatment and non-pharmacological treatment. Cox-2, cyclooxygenase-2.**

**NSAIDs and analgesics**

These NSAIDs are often the first therapy for menstrual cramps. It reduces COX activity and, as a result of its inhibitory impact on COX-1, causes a number of physiological problems. Acid reflux, headaches, and sleepiness are common adverse effects of NSAIDs [56–58]. These medications act by preventing prostaglandin synthesis and inhibiting the COX enzyme, which are the main reasons for prostaglandin generation. Analgesic drugs like aspirin, paracetamol, and ibuprofen are also used to relieve pain during mensuration, but there is no clear clinical data regarding this [59, 60]. These drugs can help with pain relief in the short to medium term, but they can also trigger adverse effects such as skin sensitivity and other issues [61].

**Specific COX-2 inhibitors**

In one of the trials [62, 63], rofecoxib, celecoxib and valdecoxib were shown to be beneficial in the treatment of primary dysmenorrhea in one of the trials [62]. In one of the trials, 120–130 women (18–44 years old) with primary dysmenorrhea were given a reasonable amount of Placebo and rofecoxib every 24 hours as needed, for a maximum of three days. According to the findings of this study, rofecoxib has a greater analgesic effect than placebo ( $P > 0.006$ ). A further trial of 96 women (18–35 years) with primary dysmenorrhea found that after the initial dosage, the outcomes were superior to placebo and comparable to naproxen sodium [64]. But because of the higher risk of side effects, a number of countries have banned the use of these drugs [65, 66].

**Oral-contraceptives**

According to an obstetrics and gynecology study, in 497 women,

small oestrogen and moderate oestrogen paired oral contraceptives results were compared to placebo, and they experienced pain relief. A sensitivity analysis revealed that therapy had a significant advantage when applied to several women (95 percent confidence interval 1.76, 5.07). Some studies that documented undesirable symptoms such as dizziness, pain, and excess weight and while other some studies observed no signs of an effect [67, 68]. Many adverse effects of oral contraceptives include morning sickness, puking, headaches, chest tenderness, and weight changes; progesterone side effects include skin problems, water retention, excessive hair growth, and distress; as well as potentially severe health problems of oestrogen include venous thrombosis and arterial diseases such as heart risk of developing chronic diseases. If a woman is still at risk of developing this illness, she should stop using oral contraceptives [69].

### Herbal treatment for dysmenorrhea

Herbal products are useful in the treatment of menstrual pain and associated symptoms. Several herbal plants have antispasmodic, anti-inflammatory, and nutritional effects, and they work in a variety of ways. Herbs that are used to treat dysmenorrhea work by preventing the formation of prostaglandins. The methods of action of many plants are not completely known. Different herbs used in the treatment of dysmenorrhea act by inhibiting prostaglandin synthesis or reducing muscle spasms and inflammation (Figure 2). Active constituents of plants that help in the treatment of dysmenorrhea are shown in Figure 3 and Table 2 lists many herbs and their active constituents that have a function in the treatment of dysmenorrhea [70–83].

#### Nutritive herbs

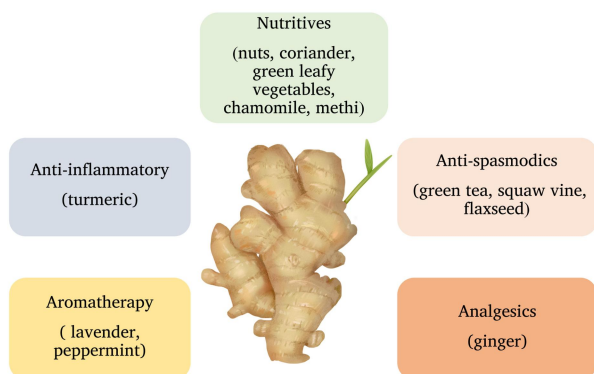
These nutritious herbs aid in the relief of menstrual pain. They work by suppressing inflammatory cytokines and absorbing and eliminating prostaglandins, which are hormone-like substances that induce menstrual cramps. They also aid in the relief of premenstrual syndrome symptoms and the reduction of premenstrual tension [84, 85].

#### Anti-spasmodic herbal treatments

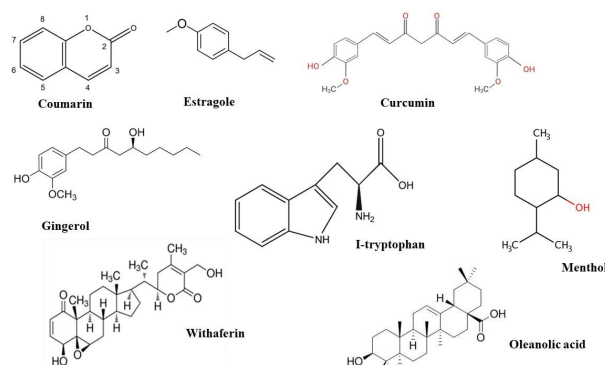
These medications work by lowering prostaglandin synthesis, which leads to muscular spasm relaxation and also alters hormone levels. Some anti-spasmodic plants include black haw, cramp bark, flaxseed, squaw vine, green tea, and others that include tannins, glycosides, lignans, alkaloids, and bitter glycosides as active ingredients [86, 87].

#### Anti-inflammatory herbal treatment

These medications are mostly used to treat painful and delayed



**Figure 2** Herbs used for treatment in menstrual pain combining herbs into five categories to address various issues such as discomfort, spasm, and inflammation, all of which contribute to the cramps that occur at this period



**Figure 3** Active constituents of plants that are having role in the treatment of primary dysmenorrhea

menstruation. It alleviates pain, inflammation, and tension. Turmeric, ginger, Cumin, and Jatamansi are some of the herbs used to relieve cramp discomfort. These plants contain terpenoids, essential oils, alkaloids, vitamin C, and amino acids as active ingredients, which are responsible for their anti-inflammatory activity.

#### Aromatherapy

Aromatherapy is a safe and effective natural cure for premenstrual syndrome. Herbs such as lavender oil, clary sage oil, peppermint oil, cypress oil, and others work by lowering prostaglandin levels and improving circulation. Due to the presence of rich, fragrant components in them, they also provide relief from uncomfortable cramps. Aromatherapy is the most commonly used complementary treatment in nursing, and it entails using essential oils extracted from fragrant plants to address physical problems and enhance the overall standard of living. Essential oils can be used in a number of ways, including massage, because they can get into the skin [88, 89].

#### Clary sage oil

As previously said, clary sage oil aids in the natural balance of hormones, which can assist in alleviating symptoms. Applying a few drops of oil to the bottom of the abdominal area and then applying a heating pad for 5–10 minutes is quite beneficial. In addition, cypress oil promotes circulation and helps relieve cramps when used in conjunction with clary sage. It is a boon to females since its infusion is used to cure uterine and other uterine issues, as well as menstrual cycles, stress, and abdominal contractions [90].

#### Lavender oil

Lavender oil lowers toxicity and allergies and increases blood circulation during the menstrual cycle by increasing an adrenocorticotrophic hormone [91]. The oil of lavender can be used to treat primary dysmenorrhea [92].

#### Complication and risk factors

Dysmenorrhea can be caused by a number of reasons, including age, early puberty, excessive menstrual flow, irregular menstrual bleeding, family history, smoking, and hormonal imbalance. All of these factors play a role in the development of dysmenorrhea. Dysmenorrhea should be treated if it is not, since it can cause pain that interferes with education, work, and social activities, as well as infertility owing to endometriosis and ectopic pregnancy pelvic inflammatory disease.

#### Diagnosis and prevention

The diagnosis is made based on the patient’s medical history of menstrual pain, which includes a pelvic examination that includes a visual and physical examination of the reproductive organs; a



**Table 2 Medicative plants used to treat primary dysmenorrhea, as well as the dosage to be taken during menstruation**

No.	Plant name	Biological source	Active constituent	Description	Dosages	Refs
1.	<i>Matricaria chamomilla</i> L. (chamomile)	Asteraceae	Sesquiterpenes, flavonoids, coumarins, polyacetylenes	This plant has a various medicinal property that is why it is also known as doctor plant. It was found that chamomile tea help in the treatment of dysmenorrhea. It has a role in mainly treating symptoms like bloating, acne, menstrual cramps, back pain, arthritis, anxiety etc.	Chamomilla (comes in homeopathy medicine), recommended doses are not clear yet.	[70, 71]
2.	<i>Foeniculum vulgare</i> (fennel)	Apiaceae	Essential oils, estragole	Fennel was found effective in the treatment of dysmenorrhea, especially fennel extract. Fennel helps in uterine contraction and prevent prostaglandins synthesis. This herb contains anti-inflammatory, analgesic, and antispasmodic properties and has been utilised in Iranian traditional medicine for generations.	Recommended in tincture form. Initial dose: 1 teaspoon of crushed fennel seed dissolved in one glass of boiling water.	[72]
3.	<i>Curcuma longa</i> L. (Turmeric)	Zingiberaceae	Curcumin	Turmeric is used to cure arthritis, lower cholesterol, and heal wounds and it is used as an alternative medicine for inflammation, cut, pain, healing wounds and for many diseases. Turmeric's curcumin inhibits the formation of prostaglandins, nuclear factor (tumor necrosis factor), and Cyclooxygenase, which reduce inflammation.	1 teaspoon turmeric mis with one glass of hot water. Initial dose: once a day or 1 gm turmeric powder once a day. Maximum dose: thrice a day.	[73, 74]
4.	<i>Zingiber officinale</i> (ginger)	Zingiberaceae	Gingerol	It has high anti-inflammatory and oxidative properties as well as help in ease of dysmenorrhea symptoms like nausea, morning sickness and headache.	Initial dose: 200–250 mg (3–4 dosage per day)	[75, 76]
5.	<i>Thea sinensis</i> L. (green tea)	Theaceae	Catechins	Cyclooxygenase-2 activity is inhibited by green tea catechin. It was assumed that it decreases prostaglandin levels and provides relieve from the severity of dysmenorrhea but there is no clinical evidence on it yet. A large population-based study is conducted and it was found that green tea consumption was linked to a reduced frequency of dysmenorrhea. Tea intake was linked to a decreased occurrence of dysmenorrhea, for mild dysmenorrhea 95% confidence interval 0.50 to 0.93, and for moderate-to-severe dysmenorrhea 95% confidence interval 0.50 to 0.93.	Initial dose: drinking 3–5 cup in a day.	[77]
6.	Fenugreek (methi)	Leguminaceae	Trigonelline, lysine, L-tryptophan	It has role in the reduction of dysmenorrhea symptoms as well as the abdominal cramps.	Initial dose: one teaspoon methi with hot water in morning empty stomach.	[78, 79]

**Table 2 Medicative plants used to treat primary dysmenorrhea, as well as the dosage to be taken during menstruation (continued)**

No.	Plant name	Biological source	Active constituent	Description	Dosages	Refs
7.	<i>Mentha piperita</i> L. (peppermint)	Labiatae	Menthol	Peppermint oil's antispasmodic characteristics make it a better alternative for menstruation pain, and it's also used to treat irritable bowel syndrome. By suppressing contractions generated by oxytocin and prostaglandins, even this product's essential oil has analgesic properties for the uterus. This product relieves dysmenorrhea by allowing blood to be discharged in a shorter period of time.	Mentha piperita capsules once a day during menstruation's.	[80]
8.	<i>Withania somnifera</i> (Ashwagandha)	Solanaceae	Withaferin, withanolides	Reduces menstrual discomfort by reducing pain and swelling.	Initial dose: 180–220 mg per day.	[81]
9.	<i>Ocimum tenuiflorum</i> (Tulsi)	Lamiaceae	Oleanolic acid, eugenol	Helps in reducing menstrual cramping, bloating, nausea and headache.	Used in making herbal tea on the daily basis.	[82]
10.	<i>Atropa belladonna</i> L. (belladonna)	Solanaceae	1% alkaloid, L-hyoscyamine	Smooth muscle relaxation is caused by blocking muscarinic receptors. Scopolamine is a stronger antispasmodic than atropine. Atropine is a well-known anticholinergic chemical found in this plant. Atropine's antagonistic activity on muscarinic receptors causes relaxation in the gastrointestinal tract muscle, which relieves spasm and prevents diarrhoea.	–	[83]

–, not mentioned.

laboratory examination that includes blood tests and a urine test to rule out other symptoms; and an ultrasound to look for abnormalities in the lower abdomen for secondary causes. A thorough medical history and physical examination are typically enough to diagnose primary dysmenorrhea. The history indicates usual menstrual cramps, and the physical examination is perfectly normal. The diagnosis is made based on the patient's medical history of menstrual pain, which includes a pelvic examination that includes a visual and physical examination of the reproductive organs; a laboratory examination that includes blood tests and a urine test to rule out other symptoms; and an ultrasound to look for abnormalities in the lower abdomen for secondary causes [93].

It can be avoided by exercising regularly, drinking plenty of fluids, and eating a healthy diet. Risk factors, complications, prevention, and diagnosis are summarised in Table 3. Based on data collected from multiple research papers and meta-analyses, it can be estimated that around 80% of women experience discomfort during menstruation, which can range from mild to severe. Pain can be managed if they are taking medication. It was shown that almost 80% of women are taking medicine for the treatment of primary dysmenorrhea, which might be synthetic or herbal in nature. The degree of pain varies from woman to woman; some women have severe pain, while others have minor pain; it all depends on their hormonal balance in the body. Some women may experience abdominal pain, back pain, limb pain, or discomfort in more than one location.

### Conclusion

From the above review of menstrual cramps, the intensity of pain in individual women is different due to internal and external factors.

**Table 3 Risk factors and prevention of primary dysmenorrhea**

Risk factors	Complication	Prevention	Diagnosis
Age.	If untreated, it may lead-	Exercise regularly.	Diagnosis can be done by knowing medical history of menstrual pain.
Early puberty.	Pain which interferes with school, work and social activities.	Avoid excessive intake of salts.	Diagnosis can be done by knowing medical history of menstrual pain.
Heavy bleeding during menses.	Infertility due to endometriosis.	Maintain healthy diets.	Pelvic examination.
Irregular menstrual bleeding.	Ectopic pregnancy-pelvic inflammatory disease can scar the fallopian tube.	Get adequate rest.	Laboratory examination.
Family history.		Drink plenty of fluids.	Ultrasound.

Dysmenorrhea is a common problem in young women. Menstruation pain can be treated by pharmacological and non-pharmacological methods. Pharmacological treatments like the use of analgesics, NSAIDs, and COX inhibitors have more adverse effects, whereas non-pharmacological treatments like green tea consumption, physical exercise, and herbal medicine have fewer or no side effects. The purpose of this study is to assess the effectiveness of various medications and herbal medicines on the severity of menstrual pain. The use of pharmacological treatments like analgesics and NSAIDs is less efficient in relieving pain; only about 50% of young women say they get adequate pain relief from them. It may be concluded that

herbal medicine is becoming a more common means of treating pain, either alone or in conjunction with established treatments. Herbs are high in phytoconstituents, which assist the body in reducing pain and spasms. They are also chemical-free, non-addictive, and non-toxic. There is little evidence that herbal remedies are effective in the treatment of pain.

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