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## **The non-pharmacological treatment of primary dysmenorrhea - efficiency and safety**

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## **Abstract**

Primary dysmenorrhea is the most common, though often underdiagnosed, gynecological disorder of women of reproductive age. The disease presents with painful abdominal cramps associated with menstrual bleeding in the absence of pelvic abnormalities. Symptoms are caused primarily by increased levels of prostaglandins produced by the endometrium, which provides hypercontraction of the uterine muscles, ischemia, and pain. Dysmenorrhea is usually treated pharmacologically with non-steroidal anti-inflammatory drugs or hormonal contraception. In particularly severe cases, surgical treatment is also possible. Nonetheless, an increasing amount of studies on non-pharmacological treatments have been published recently. Methods like Transcutaneous Electrical Nerve Stimulation (TENS), acupuncture, continuous topical heat, or exercise and yoga seem to be effective in reducing the symptoms of primary dysmenorrhea. All have an anti-inflammatory effect by lowering prostaglandin levels, but they also contribute to reducing symptoms through other mechanisms. TENS elevates the pain threshold and, together with acupuncture, causes the release of endogenous opioids. Heat, yoga, and acupuncture also lead to increased blood flow in the uterus, reducing hypoxia. Their additional advantage is the low cost and ease of self-use, except for acupuncture, depending on the patient's needs. Side effects of non-pharmacological treatments are usually mild and rarely reported.

**Keywords: primary dysmenorrhea, dysmenorrhea, TENS, acupuncture, Yoga**

## **Introduction**

Primary dysmenorrhea (PD) is a disease defined as a pain associated with the menstrual cycle which is not caused by any pelvic abnormality [1,2]. It is the most common gynecological disorder. However, in affected women, the severity of symptoms varies greatly and only a small group of patients seek medical help [1,2,3]. On account of this, its prevalence is estimated between 45 and 95% of menstruating women; 10-25% of them experience very severe symptoms [3]. A gynecologic examination is not obligatory to start treatment. The diagnosis is made on the basis of the clinical picture [2,4]. Generally, pharmacological methods like using non-steroidal anti-inflammatory drugs (NSAIDs), hormonal contraceptives (both are considered as first-line medications) tocolytic, supplementation of Vit. E, magnesium, or ginger are used to treat PD [1,4]. Surgical therapies like hysteroscopic endometrial ablation, uterosacral nerve ablation, presacral neurectomy or hysterectomy are performed very rarely [1,2]. Nevertheless, methods of non-pharmacological treatment as completely independent, or complementary therapies are also developing dynamically. These include Transcutaneous Electrical Nerve Stimulation, acupuncture, continuous topical heat, yoga [1,2,4].

## **Aim**

The review aims to present the current knowledge about non-pharmacological treatment options for primary dysmenorrhea and to discuss its effectiveness and potential side effects.

## **What is primary dysmenorrhea?**

Typically PD has an onset within 6 months to 2 years (mostly 6-12 months) after menarche, when cycles become ovulatory. Decreased progesterone level at the end of the luteal phase induces lysosome degradation and releases phospholipase A2. The enzyme synthesizes prostaglandins (PGs) through arachnoid acids by way of the cyclooxygenase pathway.

Mentioned metabolites cause vasoconstriction, myometrial contractions, ischemia, and eventually pain [2,3,5]. Usually, the patient presents typical features such as spasmodic and painful cramps in the suprapubic region which start a few hours before or during menses and last up to 72h. The pain may also radiate to the lumbar area or inner thighs and be associated with nausea, vomiting or diarrhea [1,2].

### **Transcutaneous Electrical Nerve Stimulation**

TENS is an electrophysical therapy that patients can self-administer. The device is small-sized and connects with patches applied on the painful area or thoracic spine. Therefore patients themselves adjust the intensity and duration of therapy [2,6]. TENS is hypothesized to diminish pain in several ways. Firstly it causes local vasodilation, decreases uterine muscle hypoxia, and de-escalates the severity of painful contractions. Electrical impulses also elevate a threshold for the reception of pain signals. Additionally, analgesia is induced by release of endogenous opioids (endorphin, dynorphin, enkephalin) by peripheral nerves and the spinal cord [4,6,7]. However, the 2002 Cochrane Review and its 2009 update only proved efficacy in pain relief with high-frequency TENS [8]. Correspondingly the latest overview about TENS and PD suggested the following parameters to best effect: high-frequency (50 to 120 Hz), biphasic waveform, 100 msec phase duration, and highest tolerable intensity. The intensity is crucial and should be increased during the therapy session [9]. About 30% of menstruating women benefit from using only TENS, for the rest, stimulation can also be helpful with small doses of NSAIDs [2]. Side effects are rarely reported and may include: skin redness or burn, headaches, nausea, muscle tightness [4,6,9]. Although TENS is easy to use, low-cost, and safe it is not considered to be more effective than first-line pharmacological PD treatment [1]. It can support therapy, reduce the need for painkillers or be an independent method of treatment, e.g. when hormonal contraceptives are unacceptable to the patients [2]. It is worth adding that TENS has not yet been well studied, and higher-quality scientific research is needed to improve current knowledge [6,9].

### **Acupuncture**

Acupuncture is a therapy that stimulates the nervous system by the insertion of thin needles into specific anatomic locations [2,10]. It relieves the pain by releasing endogenous opioids and serotonin, and also increases uterine blood flow from the ovarian sympathetic nerve

reflex [2,4,10]. Moreover, punctures may have anti-inflammatory effects by diminishing the level of PGs and inflammatory cytokines (e.g.,  $TNF\alpha$ , IL-1, IL-2, IL-18, COX-2, NF- $\kappa$ B, NK cell activity, and MCs) [11]. As mentioned, that stops hypoxia, ischemia, and cramps of the uterus. Certain points on the auricle, calf, medial malleolus, and tibia have been found to be beneficial in the treatment of PD [2]. It is challenging to determine acupuncture effectiveness due to methodological deficiencies in many scientific reviews. The 2016 Cochrane review found that there is still no convincing evidence for relieving menstrual symptoms [12]. However, a recent meta-analysis shows that acupuncture can remarkably reduce pain and may be an effective option for PD, but the level of certainty was moderate [13]. Reported adverse outcomes like little bleeding, hematoma, bruises, dizziness or fainting are mild and harmless. Serious side effects were not observed [10,13]. To summarize, acupuncture could potentially be an effective and safe method of treatment for PD, but more thorough clinical research and better quality of evidence are needed to prove it [1,2,10]. For now it may be recommended for women not interested in pharmacological treatment [1,4].

### **Continuous topical heat**

Heat applied on the suprapubic region may reduce symptoms of PD [4, 14,15]. Its positive effect is caused by increased blood circulation in the pelvis. Therapy improves oxygenation of the uterine muscles, reducing its tension and supplementary flow diminishes the retention of blood and body fluids, preventing uterine swelling. Additionally, the level of PG gets smaller when heat is applied [2,14]. Randomized controlled trials have proven that heat therapy provides analgesia during mense. The results are comparable or even superior to ibuprofen and definitely better than acetaminophen [1]. Furthermore, the latest meta-analysis confirmed significantly reduced dysmenorrhea symptoms [14]. Nonetheless, the authors caution that additional, well-designed, high-quality studies are needed to provide strong evidence of heat therapy benefits. Adverse effects, which may include mild conjunctivitis, moderate application site reactions, first-degree burning, and itching are infrequent and all vanish within a few days [14,15]. Local heating is safe, inexpensive, easy to use, and available, and may therefore be recommended for the treatment of PD [1,2,15].

### **Exercise and yoga**

Exercises and yoga are well-known as beneficial for health and quality of life. That may also be of value to women suffering from dysmenorrhea [1,2]. Physical effort increases pelvic blood flow, releases endogenous opioids and endorphins, and reduces prostaglandin levels, consequently lowering menstrual pain [16,17,18]. Additionally, yoga by downregulation of the hypothalamic-pituitary-adrenal axis and balancing the sympathetic nervous system reduces stress and has a supplementary anti-inflammatory effect [16]. A 2010 Cochrane Review has shown that exercise and yoga may have beneficial effects in the treatment of primary dysmenorrhea, but the authors found only one low-quality RTC [18]. The current meta-analysis confirmed pain relief during menstrual bleeding and the absence of reported side effects [16]. Additionally, some small studies have proved that practicing yoga leads to a reduction in symptoms and an improvement in quality of life. In conclusion, exercise and yoga appear to be effective in the treatment of PD and should be recommended to patients, especially with the benefit of having no side effects [2]. However, evidence is still insufficient, and more high-quality studies are needed [16,18].

## **Conclusion**

Primary dysmenorrhea is the most common gynecological disorder in women of reproductive age. It is associated with pain of varying intensity during menstruation. All of the above-described treatments are probably effective in the fight against pain. Additionally, they are characterized by a rare occurrence of side effects. Recommending them as an independent or supportive treatment for NSAIDs and hormonal contraception seems justified. However, the authors stipulate that there is still a need for high-quality research on their effectiveness.

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