

A Review of Dysmenorrhea and the Effectiveness of Varying Methods of Menstrual Relief

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ABSTRACT

Dysmenorrhea refers to the painful cramps experienced during menstrual cycles typically observed in younger females of the reproductive age, often felt as a pain in the lower abdomen and that pain possibly radiating to the lower back and legs. The painful cramping sensation is considered to be brought by excess of prostaglandins and hormones that instruct the uterus to contract during menstruation. Several remedies exist including over-the-counter medications and supplements, herbal concoctions, novel therapies, and lifestyle changes. There exists both research into such relief methods and their effectiveness as well as a need for research and conversation into the effects of primary and secondary dysmenorrhea on daily life and their causes.

Keywords: Dysmenorrhea; Menstrual Pain; Menstrual Relief; Gynecology; Uterine Health; Menstruation; Endometriosis; Menstrual Cramps; Reproductive Health

Abbreviations: SD: Somatic Dysfunction; MEDI-Q: Menstrual Distress Questionnaire; ALSPAC: Avon Longitudinal Study of Parents and Children; COX: Cyclooxygenase; NSAIDs: Nonsteroidal Anti-Inflammatory Drugs; CAM: Complementary and Alternative Medicines; PEMF: Pulsed Electromagnetic Fields

Background

A significant portion of those who experience menstruation also experience dysmenorrhea from the onset of menarche. The pain associated with the contraction of the uterus as it sheds its lining in the absence of other pelvic abnormalities or morbidities is defined as primary dysmenorrhea and can last from a few days prior to the start of the menstrual period to a few days into the period, typically declining in severity with age and through the progression of the period. Primary dysmenorrhea is believed to be caused by an excess release of prostaglandins, the lipids responsible for the constriction of blood vessels and contraction of uterine muscles, while secondary dysmenorrhea is associated with a separate anomaly in the pelvis and can be caused by a number of sources [1]. In the case of a 32-year-old female presenting at an osteopathic medical center with dysmenorrhea, gynecologic exam findings were normal, but findings from an

osteopathic structural examination suggested Somatic Dysfunction (SD) in the pelvis and sacrum, disrupting the autonomic nervous system's balance, as Matsushita et al. claim to be the source of her secondary dysmenorrhea [1].

Existing Research and Understanding

Different types of studies have been conducted over the years to further understand some aspects of dysmenorrheal pain, whether that is causes, effects on certain populations or various pain management methods. There has been research done to gauge the severity of dysmenorrhea, as it can be so debilitating causing absence from work or school [2,3]. Some studies have aimed to create a quantitative scale for measuring menstrual cramp symptoms such as the Menstrual Distress Questionnaire (MEDI-Q) which was developed to quantify and track changes in menstruating women's physical health, comfort, and

psychosocial changes [4]. Similarly, a study conducted by Bann et al. had subjects use a Menstrual Cycle Diary to record incidence, duration, and intensity of cramps, as well as behavioral changes as a way to find a connection between ovulation and experience of menstrual cramps [5]. There are also a number of factors that can influence the way dysmenorrhea presents itself in the individual. There have been multiple studies with the objective of finding an association between age of menarche and increased severity of cramps or effect on sleep, yet little correlation was found [6,7]. When complaints of dysmenorrhea are not remediated by hormonal therapies nor non-steroidal anti-inflammatory drugs, then a diagnosis of secondary dysmenorrhea is typically investigated and commonly found to be caused by endometriosis [8]. While not the only cause of secondary dysmenorrhea, endometriosis is the most common.

There are challenges posed, though, with the understanding of endometriosis and dysmenorrhea, namely in timely diagnosis. With primary dysmenorrhea considered as common and thus often disregarded, many sufferers of endometriosis are delayed in seeking a diagnosis without the knowledge of secondary dysmenorrhea [9,10]. From onset of symptoms, the time to an endometriosis diagnosis can exceed 4 years, chiefly in adolescents [11]. This delay on diagnosis can have detrimental effects on patients with endometriosis, including but not limited to disease progression, fertility issues, and decreased trust in healthcare professionals [12]. It has been found that the time between onset of symptoms and diagnosis is trending downward, possibly explained by increased awareness and patient and physician education in symptomatology [11]. Researchers have also studied to understand if menstrual dysfunction or dysmenorrhea had a relationship with presence of existing health conditions outside of those affecting the reproductive system. It was found that individuals with Rett syndrome, a neurodevelopmental disorder that primarily affects females, frequently report seizures with 60-80% of patients reporting epilepsy [13]. Menstruation was studied in female subjects with Rett syndrome and duration of menstrual period and cycle. Age of first menstruation were found to be common with those of females of typical development and those with other neurodevelopmental disorders, but a subset of 22.1% of the female subjects with Rett syndrome reported catamenial seizures, seizures occurring and intensifying during the menstrual cycle [14].

When studied, a large majority of female adolescents with congenital heart disease were found to report menstrual dysfunction including heavy and irregular periods, as well as menstrual cramping [15]. NSAIDs are commonly used to alleviate pain due to dysmenorrhea and their use is known to carry an increased risk for development of heart attack and stroke, thus signaling for the need for increased research into the incidence and relief of dysmenorrhea and menstrual dysfunction in those with heart disease. There are also modifiable behavioral habits that contribute to a difference in occurrence of dysmenorrhea in menstruating females. A meta-analysis conducted found strong evidence suggesting a higher prevalence of dysmenorrhea in smoking

adults, both former and current, as compared to their non-smoking counterparts [16]. A study conducted by Elbandrawy and Elhakk affirmed that women who participated in regular exercise in an observation period experienced a decrease in pain levels associated with primary dysmenorrhea [17]. Occurrence of dysmenorrhea can also have an etiological relationship with obstetric complications. While incidence of symptoms of dysmenorrhea are typically reported less with increasing age and with pregnancy, experiencing mild to severe dysmenorrhea in young adulthood and prior to pregnancy has been found to be linked to obstetric complications including pre-term birth as well as low birth weight [18-20].

Retrograde menstruation theory proposed by JA Sampson is the oldest hypothesized explanation for the cause of endometriosis, stating that it is the result of misplaced endometrial tissue into the pelvic cavity by upward passage through the fallopian tubes during menstruation [21]. While widely accepted to be the cause of endometriosis, retrograde menstruation occurs in women who do not present with the disease. Mollazadeh et al. rely on the upholding of retrograde menstruation theory in their 2019 study examining the relationship between sexual activity during menstruation and increased risk of endometriosis. They reported finding a positive correlation between risk of endometriosis and engaging in vaginal intercourse during menstruation [22]. The study, though, relies on severe retrograde menstruation being the cause of endometriosis as it posits that sexual activity may increase retrograde menstruation. Surveys recording incidence of menorrhagia, heavy or prolonged menstrual bleeding, along with dysmenorrhea have called for further research into sociological facets of menstrual health. The Avon Longitudinal Study of Parents and Children (ALSPAC) was used to identify associations between incidence of the two symptoms and novel traits such as inflammatory markers and adverse childhood experiences, as well as socioeconomic status, highlighting a potentially understudied area of female health outcomes [23]. A community-based cross-sectional study obtained Quality of Life measurements to highlight challenges to daily life as a result of dysmenorrhea and/or menorrhagia as well as barriers to obtaining medical help for menstrual dysfunction in women of mean age 30 in Puducherry, India [24].

Overview of Existing Remedies

Pharmacologic therapies such as NSAIDs and hormonal contraceptives are used with the goal of decreasing production of prostaglandins and leukotrienes responsible for pain associated with menstrual cramping [25]. Over-the-counter Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) remain to be the most common first line of defense against menstrual pain symptoms, working by inhibiting Cyclooxygenase (COX)-1 and -2 function which suppresses prostaglandin synthesis, decreasing menstrual pain [26]. Oral contraceptives as well as hormonal contraceptives administered through other routes including the transdermal patch and the vaginal ring are often prescribed when NSAIDs fail to alleviate pain. These contraceptives work to re-

duce the endometrial lining, thereby decreasing production of prostaglandins and leukotrienes [25]. Alternative nonpharmacological relief methods including herbal remedies and behavioral changes, and acupressure and acupuncture are also used, but research proving the effectiveness of these alternative therapies is limited when compared to that of pharmacologic therapies. Still, research has been done in observing effectiveness of novel or understudied treatment methods such as balloon endometrial ablation targeted to treat heavy menstrual bleeding and eastern or osteopathic medical treatments [1,27].

Alternatives to NSAIDs and Hormonal Contraceptives

Acetaminophen

In addition to NSAIDs, acetaminophen, or paracetamol, is also commonly used as an accessible pharmaceutical therapy for menstrual cramp pain and is used especially by patients with contraindications to the use of NSAIDs [28]. Though, a meta-analysis revealed that while commonly used, acetaminophen was often inadequate in delivering pain relief when compared to NSAIDs [29].

Calcium Channel Blockers

Another type of drug that is used as a remedy for dysmenorrhea is the calcium channel blocker such as the drug nifedipine, typically prescribed for the treatment of hypertension, but it can also provide relief by inhibiting uterine contractions [30].

Herbals/Botanicals

Largely due to differences in socioeconomic and cultural backgrounds, menstrual pain is managed differently among groups of female patients. Complementary and Alternative Medicines (CAM) are widely used, especially in rural areas, yet are widely inadequately studied [3]. In a cross-sectional study of high school-aged girls in Western Ghana, 79.3% reported having used a form of CAM including herbal products and other alternative practices to alleviate dysmenorrhea and of them 90% perceived relief [3]. A meta-analysis published in 2021 compared studies that investigated the effectiveness of Rosa damascene (Damask rose) in treating menstrual-related pain and symptoms and found that there was little evidence to support claims that inhaled and oral administration of Damask rose could significantly reduce menstrual-related pain and anxiety, but it could be effective in reducing secondary menstrual symptoms such as headache, fatigue, and bloating [31]. In another study, rosemary capsules were found to be just as effective in decreasing menstrual bleeding and treating moderate primary dysmenorrhea as mefenamic acid capsules, another NSAID [32]. The use of moxibustion, a thermal therapy practice of Chinese medicine, to treat primary dysmenorrhea has been investigated, with findings suggesting that the practice is effective in decreasing perceived menstrual pain after three cycles and a 3-month treatment period within a 9-month period, chiefly more effective in the observed group treated pre-menstrual cycle as compared to during the menstrual period [33]. Effectiveness of similar

acupressure and acupuncture therapies was also shown through the improvement of menstrual pain and associated symptoms [34,35].

Lifestyle

Physical exercise has been cited as a non-pharmaceutical method of reducing symptoms of primary dysmenorrhea. When aerobic exercise regimens were compared to isometric and core-stability exercise regimens, both were found to be effective in reducing menstrual pain compared to a sedentary pattern, yet aerobic exercise was found to be superior to both [17,36]. In a study conducted to assess association of water intake with occurrence of menstrual distress in those suffering with dysmenorrhea, female students of reproductive age between 18-30 were identified as regularly drinking less than 1600 mL daily and assigned to a control group and an experimental water intake group where a 2000 mL water intake regimen was adhered to; findings suggest significant evidence for association of water intake with reducing duration of menstrual period, number of pain relievers taken and needed, and intensity of menstrual pain [37].

Other Alternative Treatments

Ibuprofen, like other NSAIDs, can inhibit the synthesis of prostaglandins to treat primary dysmenorrhea [38]. However, also like other NSAIDs it carries the risk of gastrointestinal side effects along with other possible adverse reactions [39]. Due to its analgesic benefits yet potential for side effects when consumed orally, researchers were prompted to develop a gel form of ibuprofen that could be administered trans dermally through the abdomen for uptake into the uterus, which was confirmed successful in female rats, signaling for possible promise in a transdermal analgesic for human treatment of dysmenorrhea [40]. Endometrial ablation is an existing procedure for the treatment of heavy menstrual bleeding, but a modification has been proposed using a modified Foley's catheter to perform thermal balloon ablation with the purpose of optimizing costs for treatment in settings with fewer resources [27]. Among the 12 subjects who underwent the procedure, nine reported a significant perceived decrease in menstrual bleeding [27]. The study is limited, though, with a small sample size of only 12 and lack of ability to set and monitor temperature and pressure during the procedure. It is likely that further controlled testing and research is necessary for the wider implementation of this procedure. For three consecutive cycles, two experimental groups of subjects diagnosed with primary dysmenorrhea received one of two treatments: Pulsed Electromagnetic Fields (PEMF) on the pelvis for 20 minutes a day, 3 times per cycle or 50 mg diclofenac tablets near onset of menstrual pain [41]. The results suggest a significant improvement in pain and associated symptoms of dysmenorrhea in the group that received electromagnetic stimulation [41].

Challenges and Limitations

Due to the nature of many of the studies dealing with a measure of perception of pain, there exists the challenge of quantifying data by relying on metrics that may vary from subject to subject and could

leave room for self-report bias. Though, many of the studies are able to gather quantitative data through levels of progesterone in patients' blood, as well as number of pain relievers taken. Often other measured values rely on patients placing themselves on a scale of severity, or using indexes to assess how symptoms of dysmenorrhea affect or challenge daily life, such as the aforementioned World Health Organization's Quality of Life index used to collect sociodemographic information and find a correlation between dysmenorrhea and quality of life outcomes in women in Puducherry, India [24].

Conclusion

Due to cultural norms and implications, dysmenorrhea is often seen as something that those who menstruate must grin and bear, rather than a condition that can be debilitating so much so to cause frequent absenteeism from work and school for individuals around the world. The scientific community, though, has continued to attempt to identify alternatives to existing menstrual relief methods and improve existing treatments for menstrual distress, especially in recent years. There does exist a gap, though, in academic knowledge of efficacy of herbal and other alternative interventions for menstrual pain that are in use in many parts of the world, which calls for further study and research to expand accessibility to menstrual relief to more communities.

Conflict of Interest

The authors declare nonfinancial or otherwise.

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