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## Dysmenorrhea and perceived stress in the adolescent girls: Potential role of relaxation techniques

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### Abstract

The most common gynecologic issue affecting women, particularly teenage girls, is dysmenorrhea, which is characterized by painful menstruation. Dysmenorrhea can cause varying degrees of pain and discomfort, from minor inconvenience to serious restrictions on daily activities. Additionally, a lower quality of life is connected to it. It is estimated that 15% of female adolescents have significant discomfort, which has a negative effect on their quality of life. The adolescent girls spoke of various symptoms, such as sleep issues, low quality of life, anxiety, losing their appetite, migraines, and affects on general health status, in addition to painful menstruation. Numerous complementary therapies, such as oil massage, pelvic floor exercises, and relaxation methods, may help to alleviate the discomfort. Essential oils, which are aromatics made from extracted plants, are used in aromatherapy to enhance one's physical, emotional, and spiritual well-being. It appears that research has shown that exercising can reduce menstrual cramps. Pelvic floor exercises strengthen pelvic floor muscles by tightening and relaxing them. These exercises are crucial to pelvic floor muscle recovery. Relaxation methods enhance daily life, strengthen the immune system, and lessen depression. Additionally, they are effective in reducing tension and anxiety. Therefore, it is thought that they contribute to people's psychological well-being. Relaxation therapy is one non-pharmacological therapeutic option that may minimize menstrual discomfort. This review study led us to conclude that regular use of the Jacobson relaxation technique, pelvic floor exercises, and oil massage may help to reduce the pain caused by dysmenorrhea.

**Keywords:** Dysmenorrhea, oil massage, pelvic floor exercise, Jacobson relaxation technique

### 1. Introduction

Adolescence is a life stage that occurs between childhood and adulthood and is marked by a change from total dependency to relative independence as well as physical, endocrinal, emotional, and cerebral growth. It has been acknowledged that a girl's adolescence is a unique stage of her lifecycle that calls for particular and special attention.

Menstruation pain, or dysmenorrhea, is the most prevalent issue that affects girls and young women. Primary and secondary dysmenorrhea are two different forms of dysmenorrhea. Primary dysmenorrhea is described by spasmodic pain that lasts for one to three days and is frequently accompanied by lower back discomfort, radiating to the thighs, nausea, vomiting, diarrhea, giddiness, syncope, and fainting without any underlying medical conditions. Inflammatory disease of the pelvis, endometriosis, and uterine fibroid are a few examples of pelvic abnormalities that can cause painful menstruation or secondary dysmenorrhea. Each month, a lot of females experience dysmenorrhea [1, 2]. The majority of teenage girls experience dysmenorrhea. Prostaglandin hormones, which force the uterus to contract during menstruation and reduce blood flow to the uterus, are thought to be the primary cause of primary dysmenorrhea. An endometrial cell releases the prostaglandins that trigger menstruation during endometrial sloughing. Prostaglandins promote ischemia and myometrial contractions. Prostaglandin levels in a menstrual fluid are higher in girls with dysmenorrhea, and they are at their maximum the first two days of menstruation [3].

Yoga, acupressure, acupuncture, massage therapy, aromatherapy, and muscle relaxation therapy are just a few of the non-pharmacological options that are available to help with menstrual discomfort. Understanding this nonpharmacological technique better will be made possible by this review.

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## 2. Dysmenorrhea

The term for menstruation pain is dysmenorrhea. More than half of women who menstruate endure one to two days of agony each month. The discomfort is typically not severe. But for other women, the pain is so bad that it prevents them from engaging in their regular activities for a few days each month<sup>[4]</sup>.

Dysmenorrhea, which is characterized by painful menstruation, is the most frequent gynecologic condition affecting women, particularly adolescent girls. Primary dysmenorrhea, which doesn't have a known cause and happens in the absence of pelvic pathology, is connected to a regular ovulatory cycle during menstruation. The inflammation is mediated by elevated amounts of prostaglandins and leukotrienes, which cause contraction of the uterus and painful cramping. 1Dysmenorrhea can affect anywhere between 16% and 90% of women, with adolescent females reporting greater rates. In addition, it is predicted that 84.2% of Indians and 85% of Americans experience dysmenorrhea<sup>[2, 5]</sup>.

Different levels of pain and discomfort are brought on by dysmenorrhea, ranging from mild discomfort to severe limitations on everyday activities. It is linked to a lower quality of life as well. 15% of adolescent females are thought to experience substantial discomfort, which harms their quality of life. Lower abdomen and back discomfort was more strongly linked to school absences and decreased efficacy in adolescent girls than other menstrual-related symptoms. Although dysmenorrhea is the most common gynecological condition and the most common menstrual disorder, its full burden is not well understood<sup>[6]</sup>. According to a study conducted among Japanese women, individuals with dysmenorrhea had annual healthcare costs that are almost 2-3 times greater than those of women without the illness. The study described treatment patterns and associated costs. There is evidence connecting dysmenorrhea to a rise in cases of chronic pelvic pain syndrome<sup>[7]</sup>.

Prostaglandins F<sub>2</sub> (PGF<sub>2</sub>) and E<sub>2</sub>(PGE<sub>2</sub>) mediate myometrial contractions, pain nerve

Fibers hyper sensitization, vasoconstriction, and ultimately the pain. Women with dysmenorrhea have been found to have higher circulating levels of PGF<sub>2</sub> and PGE<sub>2</sub> than asymptomatic women do during menstruation. These prostaglandin levels are at their highest during the first 48 hours of menstruation when symptoms are at their worst. Prostaglandin release is also inversely correlated with the intensity of menstruation pain<sup>[8]</sup>.

Along with painful menstruation, the adolescent girls also reported other symptoms such as sleep difficulties, poor quality of life, anxiousness, melancholy, loss of appetite, headaches, and effects on overall health status. Dysmenorrhea has a tremendous impact on women's lives, posing a significant public health challenge<sup>[9, 10]</sup>.

## 3. Stress in dysmenorrhea: Important psychological aspect

In the past, dysmenorrhea and menstruation abnormalities

have been connected to psychological issues like depression, stress, and worry. Mental stress is one of the most typical reasons for primary dysmenorrhea in young women.

Stress impairs follicular growth by preventing the pulsatile release of follicle-stimulating hormone (FSH) and uterizing hormone (LH). Because progesterone synthesis rises in the luteinized follicle after ovulation, stress-related follicular development problems may lessen progesterone production and release. The mediator of pain, prostaglandin, may be produced more frequently when progesterone levels are reduced. On top of that, decreased progesterone titer led to increased myometrial contraction, which put more strain on the ischemic myometrium and exacerbated pain from dysmenorrhea<sup>[11]</sup>.

The proportion of women who suffer from dysmenorrhea seems to be correlated with how much stress they are under. However, it has been challenging to identify a stress level that affects their menstrual cycle normally<sup>[12]</sup>.

## 4. Non-pharmacological approach

Pelvic floor exercises, the Jacobson relaxation technique, respiratory relaxation, aromatherapy, essential oil massage, music therapy, acupuncture, yoga, and acupressure are a few examples of complementary pain remedies. The quality of life can be increased and discomfort reduced using complementary therapies.

### 4.1 Oil massage/Aromatherapy: Alternative to prevent pain

Oil massage is a part of aromatherapy. Applying essential oils to a therapeutic setting is known as aromatherapy. Utilizing fragrant essential oils derived from plants, aromatherapy aims to improve one's physical, emotional, and spiritual well-being. It is one of the non- conventional treatments for dysmenorrhea<sup>[13, 14]</sup>.

Reduced contractile activity, tension, and frequency were observed with 10 essential oils

(*Curcuma phaeocaulis*, *Leonurus japonicus*, *Ligusticum striatum*, *Curcuma longa* (tuberous roots), *Curcuma longa* (rhizomes), *Carthamus tinctorius*, *Prunus persica*, *salvia miltiorrhiza*, *siphonostegia Chinensis*, cyathula of terpene). When used as a treatment for dysmenorrhea, *Curcuma phaeocaulis* essential oil could enhance uterine relaxation by inhibiting extracellular Ca<sup>2+</sup> entrance and releasing intracellular Ca<sup>2+</sup>. As an alternate therapy for dysmenorrhea, *Curcuma phaeocaulis* essential oil could decrease uterine smooth muscle contractions<sup>[15]</sup>.

A massage that uses essential oils and soft strokes to stimulate the skin is called an aromatherapy massage. An appropriate absorption rate for aromatherapy massage on bodily organs results in a calming effect. This happens as a result of improved oxygen circulation, which might lessen the degree of pain. Menstrual pain can be eased by inhaling or applying aromatherapy. Combining aromatherapy with a massage reduces the length of the pain<sup>[16]</sup>.

**Table 1:** Studies related to the effect of oil massage on dysmenorrhea

Sr. No	Research design And sample	Interventions provided	Research measurement tools	Research result	Author (year)
1	40 women who suffer from primary dysmenorrhea	Aromatherapy Rosemary Aroma and lavender and Progressive relaxation training	VAS	Aromatherapy and progressive relaxation techniques both work well to lessen menstruation pain.	Hanfy <i>et al.</i> (2020) [17]
2	One group pre-post-test Design Quasi-experimental study. 38 female students with primary dysmenorrhea	Aromatherapy with lavender 2-4 drops in the lower belly and a 10-minute massage done once a day for three days	Questionnaire	Lavender aromatherapy could reduce menstrual pain	Pramita <i>et al.</i> (2020) 18
3	Randomized pretest-posttest design. 84 students with primary dysmenorrhea	Ginger, geranium, lavender, clary sage, and aromatherapy massage Effleurage massage with lavender aromatherapy at minutes 5, 10, 15, 25, and 30. performed for 3 minutes.	NRS	Giving aromatherapy with effleurage massage combined with ginger, geranium, clary sage, and lavender proved more successful in relieving dysmenorrhea pain than lavender aromatherapy alone.	Pujiati <i>et al.</i> (2019) [19]
4	Pre-experimental Design with Time series design 40 students Who experience Menstrual pain	Effleurage massage with two drops of lavender essential oil and one milliliter of olive oil was carried out for ten minutes before and after the test with a six-hour gap	NRS	Menstrual pain relief with effleurage massage and lavender aromatherapy	Purwati (2018) [20]
5	Pre-experimental design with time series design 42 students with primary dysmenorrhea	Effleurage massage with lavender essential oil therapy 4 observations over 6 hours.	VAS	The intensity of dysmenorrhoea pain was successfully decreased by administering lavender essential oil therapy together with effleurage massage.	Ari Adiputri <i>et al.</i> (2018) [21]
6	Randomized clinical trial 60 Students with primary dysmenorrhea	Lavender essential oil massage 2.5ml of almond oil and 2 drops 2.5ml of placebo almond oil for massaging performed above the pubis for 15 minutes twice daily for two menstrual cycles.	VAS	Pain from dysmenorrhea was effectively diminished by a massage using lavender	Beiravand <i>et al.</i> (2015) [22]
				Aromatherapy.	

(VAS: visual analog scale, NRS: Numerical Rating Scale)

The limbic system is activated by aromatherapy, stimulating the hypothalamus to generate endorphins that lessen pain. Some molecules of essential oils can interact with hormones or enzymes in the blood to reduce pain. Aromatherapy administered via inhalation helps lessen the discomfort of dysmenorrhea, and it is a safe treatment because there are no side effects observed in research patients. According to one study, aromatherapy administered via inhalation for five minutes while using three to five drops of the treatment will lessen pain and menstruation pain [23].

Lavender's linalyl acetate and linalol content have a calming effect that might lessen anxiety. One recent study found that respondents frequently reported menstrual pain on the first to the third day of their periods. Other risk factors for dysmenorrhea include excess body weight linked to fatty tissue in the reproductive organs that inhibits blood flow and experiencing stress as a result of stress. It is what sets off the overproduction of the uterine contraction-related chemicals estrogen and adrenaline. Primary dysmenorrhea symptoms can be improved by reducing stress by administering essential oils [24].

Spice essential oil in the first two days of menstruation can be adequately relieved by 5 drops and 250 mg of ginger capsules every 6 hours, however, ginger essential oil is more easily tolerated than ginger capsules. [25] In a prior report, it was found that combining effleurage massage with the aromatherapy blends of lavender, ginger, clary sage, and

geranium reduced the pain associated with dysmenorrhea more effectively than using lavender aromatherapy alone [19].

#### 4.2 Pelvic floor exercise: Next step toward relaxation

Exercise has been reported to reduce ischemia and promote vasodilation, both of which are known to reduce menstruation discomfort. Because it aids in the release of beta-endorphins, which are internal opioids similar to morphine produced by humans, exercise relieves cramps. It results in analgesia (pain alleviation) and aids in the burning of prostaglandin molecules that are created during menstruation and speed up muscular contractions. Which exercise is most effective at reducing menstruation pain. aerobic exercise raises our heart rate and includes activities like running, brisk walking, playing team sports, playing tennis, swimming, etc. The most crucial aspect is that you should perform it for 30 minutes at a time, at least three times every week [26]. The pelvic floor becomes more powerful when performing kegel exercises, which entail repeatedly tightening and relaxing the pelvic floor muscles. Kegel's exercises are regarded as a crucial part of pelvic floor muscle rehabilitation. Studies also demonstrate that strengthening the pelvic floor muscles has a major positive impact on women's quality of life, which in turn enhances their capacity for physical, mental, and social functioning [27].

**Table 2:** Studies related to the effect of pelvic floor exercise on dysmenorrhea

Sr. No	Research design And sample	Interventions provided	Research measurement tools	Research result	Author (year)
1	An experimental study with	Exercises to strengthen	McGILL pain	According to the study's findings, group A	Sandhiya M.
	60 subjects	the pelvic floor muscles	questionnaire	significantly improves the quality of life for	<i>et al</i> (2021) <sup>[28]</sup>
		are provided to group A, and a different series		Females with primary dysmenorrhea.	
		of stretching exercises are given to group B.			
2	Quantitative approach with a quasi-experimental research design. 40 samples in which the pretest was conducted before intervention and the post-test conducted after an intervention.	Pelvic rocking exercise	VAS	Pelvic Rocking Exercise is a physical exercise that can be used to reduce dysmenorrhoea by strengthening the abdominal muscles and smoothing the blood circulation.	Beautily V and Khatoun L. (2021) <sup>[29]</sup>
3	a pre-post assessment in a quasi-experimental study design. There were 100 students included study.	Pelvic rocking exercises	VAS	Adolescent girls with moderate to severe primary dysmenorrhea who performed pelvic rocking exercises saw improvements in their pain scores, pain duration, menstrual flow length, and a number of analgesic tablet intakes during the first and second menstrual cycles following an intervention.	Mohamed HA, Hafez AM. (2017) <sup>[30]</sup>
4	A 4-week study of 33 subjects. The subjects were divided into three groups: sling exercise group, stretching group, and control group.	Sling equipment was used for the sling exercise program, and hotpacks were used to apply thermotherapy to members of the control	Menstrual Distress Questionnaire (MDQ), VAS	Exercises using a sling and stretches help with dysmenorrhea, uncomfortable menstruation, and pelvic alignment. These exercises can serve as the basis for a variety of interventions aimed at preventing or treating dysmenorrhea.	Kim S. <i>et al</i> (2017) <sup>[31]</sup>
		group. No equipment was used for the stretching exercises.			
5	Using a simple random sample procedure, 60 adolescent girls with dysmenorrhoea were chosen for the one-group pre-test and post-test design.	Girls were given the pelvic rocking exercise for a month, and data were gathered utilizing a structured interview schedule.	VAS	To prevent adolescent females from developing dysmenorrhea and to enhance their quality of life, comprehensive school education initiatives and the establishment of curricula regarding pelvic rocking activities are required.	Rathi Devi, S (2011) <sup>[32]</sup>

Pelvic Floor Muscle Training (PFMT) has been shown in numerous studies to enhance pelvic floor muscle function when done often. This element, along with the increased functionality, is thought to help the primary dysmenorrhea-affected women's quality of life. Because the pain associated with primary dysmenorrhea worsens during menstruation as a result of stress and hormonal changes, it is important to find out whether PFM exercises minimize pain during the menstrual cycle in nulliparous women as well as their effects on the women's quality of life<sup>[28-32]</sup>.

#### 4.3 Jacobson relaxation technique: The traditional way of relaxation

Jacobson relaxation is also known as Progressive muscle relaxation (PMR). PMR is a relaxation technique that involves repeatedly tensing and relaxing the muscles until the body is completely relaxed. Jacobson invented progressive relaxation techniques in 1929, and Bernstein and Borkovec updated them in 1973. Progressive relaxation has been proven to be a successful method for reducing muscle rigidity after extensive research. The large muscle

groups in the human body are systematically stretched and relaxed using this approach.

The PMR technique, which consists of two steps, can be used to reduce stress and cultivate awareness of tension and deep relaxation in various muscle groups. This therapy starts by tightening up specific muscle groups and focusing on how the affected body part feels when it is tense. The following step is to release the tension in the muscles, and after that is done, begin to experience how a relaxed muscle feels. By moving through the body while alternately tensing and relaxing different muscle groups in a certain order, one learns how to recognize and distinguish between the corresponding feelings of a tensed muscle and a fully relaxed one.

The use of relaxation techniques can boost immunity, lessen sadness, and improve daily living. They have also been shown to be effective in reducing anxiety and tension. They are therefore believed to enhance human psychological well-being. One non-pharmacological therapy approach that may lessen menstruation discomfort is relaxation therapy<sup>[33]</sup>.

**Table 3:** Studies related to the effect of the Jacobson relaxation techniques on dysmenorrhea

Sr. No	Research design And sample	Interventions provided	Research measurement tools	Research result	Author (year)
1	pre-experimental one-group pretest-posttest research design. 60 subjects were selected by convenient sampling technique	Muscle relaxation technique	Numericalpain assessment scale	The present study found that adolescents with dysmenorrhea experienced less pain when using the Jacobson muscles relaxation technique.	Qadir M.A, <i>et al</i> (2022) <sup>[34]</sup>
2	Review research	a deep breathing relaxation technique	Pain scale	Adolescent dysmenorrhea can be reduced with deep breathing exercises. When the approach is used for five to thirty minutes, changes can be observed.	Hidayatunnaifah F. <i>et al</i> (2022) <sup>[35]</sup>
3	Pre-experimental and one-group pretest-post-test designs were utilized. 60-sample data. Non-probability Purposive Sampling was used.	Jacobson Progressive Muscle Relaxation Exercise	Pain Scale	It was clear that Jacobson's relaxation technique had a significant positive impact on reduced dysmenorrhea among adolescent girls.	Warulkar Y. <i>Et al</i> (2020) <sup>[36]</sup>
4	Quasi-experimental non-equivalent pre-test and post-test Control group design was used. 60 samples were used.	Jacobson's relaxation technique was given for 30 minutes twice a day on the day of menstruation.	VAS	Jacobson's relaxation method proved successful in lowering the prevalence of dysmenorrhea in teenage girls.	Akilandeswari S. (2017) <sup>[37]</sup>
5	A quantitative approach using quasi-experimental pre-test post-test design with a control group. Non-probability purposive sampling chose 60 adolescent girls	For 30 days, JacobsonMuscle Relaxation Exercise was performed once a day for 15-20 minutes.	self-administered modified Stainer and Wilkins PMS diagnostic criteria	According to the study's conclusions, adolescent girls who practice Jacobson's Progressive Muscle Relaxation Exercise have lower rates of premenstrual syndrome.	Sonia V. R. (2011) <sup>[38]</sup>

Studies that used nonpharmacological treatments to treat dysmenorrhea, like massage, pelvic floor exercise, acupuncture, aromatherapy, and progressive relaxation therapy, demonstrated that these methods are deemed to be successful procedures (see Tables 1, 2, and 3). It is possible for women who suffer from dysmenorrhea to benefit from using this relaxation technique to lessen the pain they experience. It is also a way that can be applied independently by individuals, and it is a method that is simple to apply and does not cause any harm.

### 5. Conclusion

Among adolescent girls and women of childbearing age, dysmenorrhea is a fairly frequent problem. This review concluded that the Jacobson relaxation technique, pelvic floor exercise, and oil massage could help to lower the pain associated with dysmenorrhea.

### Conflict of interest

None

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### 6. Reference

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