

ROLE OF PELVIC MOBILITY EXERCISES ALONG WITH ELECTROTHERAPY MODALITIES IN MANAGEMENT OF PRIMARY DYSMENORRHEA: AN EXPERIMENTAL STUDY

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DOI: <https://doi.org/10.63299/ijopt.070197>

ABSTRACT

Background: Primary dysmenorrhea, characterized by painful menstrual cramps without any underlying pathology, is a prevalent condition that disrupts daily activities and reduces quality of life. Non-pharmacological interventions, such as exercise and electrotherapy are gaining recognition as effective strategies for symptom management.

Aim: To evaluate the effectiveness of the pelvic mobility exercises combined with electrotherapy modalities in reducing pain intensity, improving pelvic muscle flexibility and enhancing overall functional well-being among women with primary dysmenorrhea.

Methods: This study involved 30 participants diagnosed with primary dysmenorrhea. Each participants underwent a combined therapy program that included pelvic mobility exercises aimed at improving pelvic flexibility and muscle balance, along with transcutaneous electrical nerve stimulation (TENS) applied to the lower abdomen for pain modulation. The intervention was conducted frequency between 60-150Hz over a period of 15 minutes duration. Pain intensity was measured using Visual Analog Scale (VAS). Statistical analysis was performed to determine the significance of changes in pain score

Results: The combined therapy resulted in a significant reduction in VAS scores ($P<0.005$), indicating marked pain relief after the intervention. Participants reported improved comfort and a noticeable decrease in the severity and duration of menstrual cramps during the treatment period. The therapy was well-tolerated, with no reported adverse effects.

Conclusion: The combination of pelvic mobility exercises and electrotherapy modalities provides a highly effective, non-invasive strategy for managing pain associated with primary dysmenorrhea. The approach offers a practical, well-tolerated alternative to pharmacological options, significantly improving pain outcomes and enhancing menstrual health. Further research is recommended to explore long-term effects and optimize protocols.

Keywords: Primary dysmenorrhea, TENS, pain, electrotherapy, pelvic mobility exercises.

INTRODUCTION:

Primary dysmenorrhea is a gynaecological condition, characterized by painful menstrual cramps without any underlying cause. It typically begins in adolescence and affects numerous women during their reproductive years. The pain usually occurs just before or at the start of menstruation, often lasting 1 to 3 days, or more than 3 days and can range from mild discomfort to severe, debilitating pain [1]. The primary cause of primary dysmenorrhea is believed to be the overproduction of prostaglandins which are hormone-like substance that stimulate the uterine contractions. During menstruation, these contractions help shed the uterine lining, but excessive prostaglandin production can lead to stronger and more painful contractions, reducing blood flow to the uterus and causing pain [2]. The main aetiology of primary dysmenorrhea involves a complex of hormones, biochemicals, and physiological responses. Here are the key factors that contribute to primary dysmenorrhea. Prostaglandins play a central role in primary dysmenorrhea. During menstruation, they are released to help the uterus contract and expel its lining. However, when produced in excess, prostaglandins can cause overly strong contractions, leading to pain and discomfort [3]. The contractions can also reduce blood flow to the uterus, contributing to hypoxia (reduced oxygen supply), further intensifying the pain. High levels of prostaglandins lead to intense and frequent uterine contractions. These contractions are similar to labour contractions but generally less intense [4]. However, in some cases, they can be so severe that they cause significant pain and discomfort in the lower abdomen, back, or thighs [5]. Prostaglandins can also cause vasoconstriction (narrowing of blood vessels), which reduces blood flow to the uterus. This reduced blood flow contributes to uterine ischemia and hypoxia, worsening the pain associated with menstrual cramps [6]. Primary dysmenorrhea can be influenced by a person's sensitivity to pain. Higher sensitivity or altered pain perception might contribute to the severity of menstrual cramps. Some studies suggest that women with primary dysmenorrhea might have lower levels of endorphins, which are the body's natural painkillers. Fluctuations in hormone levels, particularly oestrogen and progesterone, play a role in regulating the menstrual cycle and can influence the production of prostaglandins [7]. Changes in these hormones can lead to variations in pain intensity and duration. Factors like stress, diet, lack of exercise, and smoking can influence the severity of primary dysmenorrhea. Emotional stress can increase pain perception, while lifestyle factors might affect hormonal balance and prostaglandin production [8]. Symptoms of primary dysmenorrhea typically revolve around menstrual pain and discomfort, often occurring in conjunction with menstruation. Here are some common symptoms: Abdominal Cramping- This is the hallmark symptom. The pain is typically felt in the lower abdomen or pelvis, with a squeezing or throbbing sensation. Back Pain- Some women experience lower back pain along with abdominal cramps. Thigh Pain- Pain may radiate to the inner thigh or hips. Nausea and Vomiting increased levels of prostaglandins can affect the gastrointestinal tract, causing nausea or vomiting and diarrhoea. Similarly, the increase in prostaglandins can lead to digestive disturbances, like diarrhoea. Headache or Dizziness though less common, these symptoms may accompany menstrual cramps [9]. These symptoms generally start a day or two before menstruation and peak within the 24 hours, lasting about two to three days. They tend to improve with age, and many women find that their symptoms lessen after childbirth or by their late twenties. If the pain is severe or persists, it might be a sign of a different underlying condition, known as "secondary dysmenorrhea", which may require further medical evaluation [10]. Although the pathophysiology of dysmenorrhea has not been fully elucidated, current evidence suggests that the pathogenesis of dysmenorrhea is due to the increased secretion of prostaglandin F_{2α} (PGF_{2α}) and prostaglandin E₂ (PGE₂) in the uterus during endometrial sloughing [11]. These prostaglandins are involved in increasing myometrial contractions and vasoconstriction, leading to uterine ischemia and production of anaerobic metabolites. This results in the hypersensitization of pain fibres, and ultimately pelvic pain [12].

MATERIALS AND METHODOLOGY:

Study design: This study describes the methods used to assess the effectiveness of pelvic mobility exercises combined with electrotherapy modalities like transcutaneous electrical nerve stimulation in improving pelvic floor muscle strength in individuals with primary dysmenorrhea.

Study population and sample size:

The study was conducted at NRI College of Physiotherapy. The sample population consisted of college-going students with complaints of lower back pain, lower abdominal, thighs pains. A total 30 participants

were selected, and the study duration was 12 months. The materials used in the study included a transcutaneous electrical nerve stimulation[TENS], couch, and data collection sheets.

Selection of participants:

Inclusion criteria: The inclusion criteria included participants aged between 18 to 25 years, having a regular menstrual period{ occurring at intervals of 21-35days, lasting 3-8 days, and having menstrual pain severity is atleast 4 according to visual analogue scale[VAS]}

Exclusion criteria: The exclusion criteria for the study excluded individuals who did not have regular menstrual cycles, defined as those not occurring at intervals of 21–35 days or lasting less or more than 3–8 days. Participants were also excluded if their menstrual pain severity was less than 4 according to the Visual Pain Scale{VAS} or if they scored below 60 on the Menstruation Symptom Scale. In addition, women who were using hormonal contraception or intrauterine devices, those who had a history of pregnancy, and individuals with systemic or chronic diseases were excluded. Participants with any previous gynecological disorders or surgical operations, those who used analgesics within six hours before or during the study period, and individuals with psychiatric problems were also not included in the study.

Methods:

Transcutaneous Electrical Nerve Stimulation (TENS) is a therapeutic electrotherapy technique used for pain management. It delivers mild electrical impulses through surface electrodes placed on the skin over the painful area. These impulses stimulate sensory nerves, which help to block pain transmission at the spinal cord level according to the Gate Control Theory of Pain. TENS may also promote the release of endogenous opioids such as endorphins, leading to longer-term pain relief. It is widely used in physiotherapy for conditions like primary dysmenorrhea musculoskeletal pain, joint pain, postoperative discomfort.

High-Frequency TENS, also called conventional TENS, typically operates at a frequency range of 50–150 Hz with a short pulse duration of 50–200 microseconds. The intensity is kept at a sensory level, producing a tingling sensation without visible muscle contraction. This mode primarily provides immediate pain relief during or shortly after treatment but has a short-lasting effect. It is especially useful for acute pain conditions where continuous stimulation can modulate pain signals effectively. Electrodes are usually placed around or along the dermatomes of the painful region, and treatment sessions last about 20–30 minutes. High-frequency TENS is comfortable, safe, and easy to apply, making it a popular choice in clinical physiotherapy practice.

Stretching and strengthening:

Physiotherapy management for primary dysmenorrhea focuses on reducing pain, improving pelvic and spinal flexibility, and enhancing core and pelvic stability through a combination of stretching and strengthening exercises.

Stretching Exercises

1. Cat-CamelStretch:

Performed in a hands-and-knees (quadruped) position. Arch the back upward like a cat (Camel), then slowly drop the abdomen down while lifting the head (Cat).

► *Benefit:* Increases spinal and pelvic mobility, relaxes lower back and abdominal muscles, and relieves pelvic tension during menstruation.

2. Child'sPose(Balasana):

Sit back on your heels with knees slightly apart, stretch arms forward, and rest the forehead on the mat.

► *Benefit:* Gently stretches the spine, hips, and lower back, promoting relaxation and reducing pelvic discomfort.

3. Knee-to-ChestStretch:

Lie on your back and pull one or both knees gently toward your chest while keeping the shoulders relaxed.

► *Benefit:* Relieves lower back tension, stretches the gluteal and pelvic muscles, and improves pelvic circulation.

4. Supine Spinal Twist:

Lie on your back with knees bent, then drop both knees to one side while turning your head in the opposite direction.

► **Benefit:** Stretches the lower back, spine, and abdomen, easing cramping and improving mobility.

5. Cobra

Lie on your stomach, place palms under shoulders, and gently lift the chest upward, keeping hips on the mat.

► **Benefit:** Stretches abdominal muscles, enhances blood flow to pelvic organs, and relieves uterine spasm.

6. Butterfly

Sit with soles of feet together and knees bent outward; gently press knees toward the floor.

► **Benefit:** Opens the hip and groin region, relaxes the pelvic floor, and improves circulation to the uterus.

Strengthening Exercises

1. Pelvic Tilt:

Lie on your back with knees flexed, flatten your lower back by tightening abdominal muscles, then relax.

► **Benefit:** Strengthens abdominal and pelvic muscles, promotes spinal alignment, and reduces pelvic discomfort.

2. Pelvic

Floor

Contractions (Kegels):

Contract the muscles used to stop urination midstream, hold for 5 seconds, and release.

► **Benefit:** Strengthens pelvic floor muscles, supports uterine position, and helps reduce menstrual cramps.

3. Pelvic

with

Marching:

From bridge position, alternately lift one leg slightly while keeping hips level.

► **Benefit:** Improves pelvic control, coordination, and dynamic core stability.

4. Bird

switch

Dog:

From hands-and-knees position, extend one arm forward and the opposite leg backward, hold briefly, then switch sides.

► **Benefit:** Strengthens back, glutes, and core muscles while improving balance and pelvic alignment.

6. Dead

Bug:

Lie on your back with arms up and knees bent at 90°. Slowly lower the opposite arm and leg, keeping the lowerback stable, then return to start.

► **Benefit:** Strengthens deep abdominal stabilizers and reduces pelvic strain.

7. Clamshell

Exercise:

Lie on one side with knees bent and feet together. Lift the top knee up (like a clamshell opening) and lower slowly.

► **Benefit:** Strengthens hip abductors and gluteus medius, stabilizing the pelvis.

8. Side-Lying

Leg

Lifts:

Lie on your side with legs straight; lift the top leg upward slowly, then lower.

► **Benefit:** Strengthens hip and thigh muscles, supports pelvic alignment.

9. Plank

Hold:

Maintain a straight-body position supported on forearms and toes, engaging the core.

► **Benefit:** Builds core endurance and supports abdominal and pelvic stability.

10. Toe

Taps

(Supine):

Lie on your back with knees bent at 90°. Lower one foot to tap the floor, then return to starting position.

► **Benefit:** Strengthens lower abdominals, improves pelvic stability, and supports lumbar posture.

11. Standing

Hip

Abduction:

Stand upright with a resistance band around your thighs or ankles and move one leg sideways against

resistance.

► *Benefit:* Strengthens hip abductors, enhances pelvic balance, and reduces lower body tension.

All exercises are performed in controlled repetitions with proper breathing, progressing gradually from gentle mobility and stretching to active strengthening, while emphasizing relaxation and pelvic awareness. This integrated approach helps alleviate menstrual pain, improve pelvic function, and promote overall well-being in individuals with primary dysmenorrhea.

Statistical Analysis:

Statistical analysis was conducted through paired t test to compare the pre and post values of VAS.

Table 1

Outcome measures:

	MEAN	MEDIAN	STANDARD DEVIATION	MINIMUM	MAXIMUM	Post Value
Pre VAS	7.83	8.00	1.09	5	10	<0.001
Post VAS	4.37	4.00	0.890	2	6	<0.001

Measurements of pre and post VAS of the 30 subjects

The pre-VAS showed a mean of 7.83, a median of 8.00, a standard deviation of 1.09 with values ranging from 5 to 10 ($p <0.001$).

post- VAS showed a mean 4.37, a median 4.00, a standard deviation of 0.890 with values ranging from 2 to 6 ($p <0.001$).

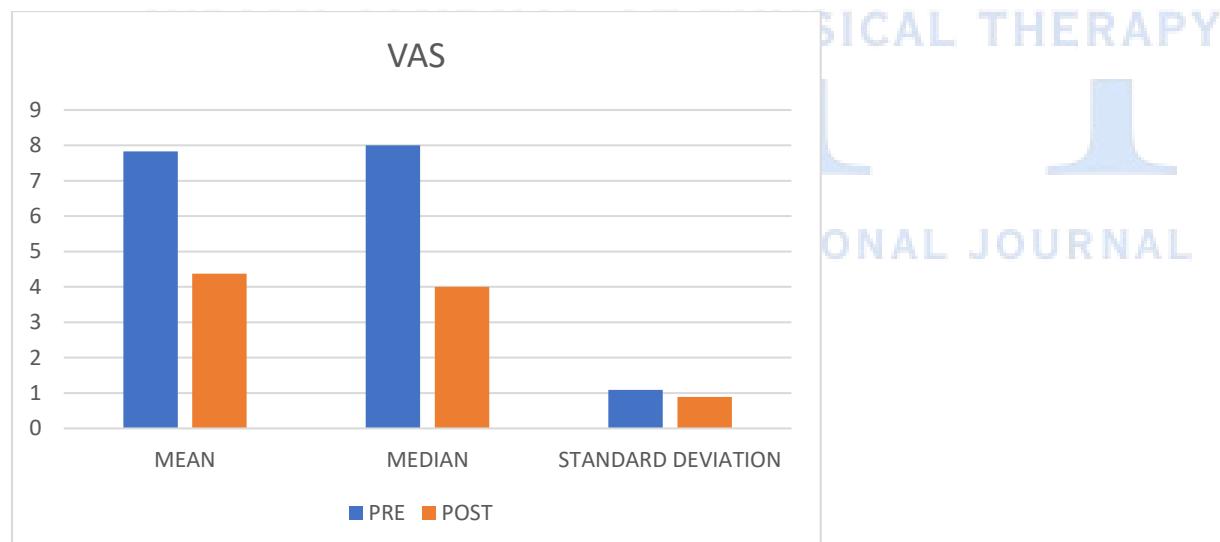
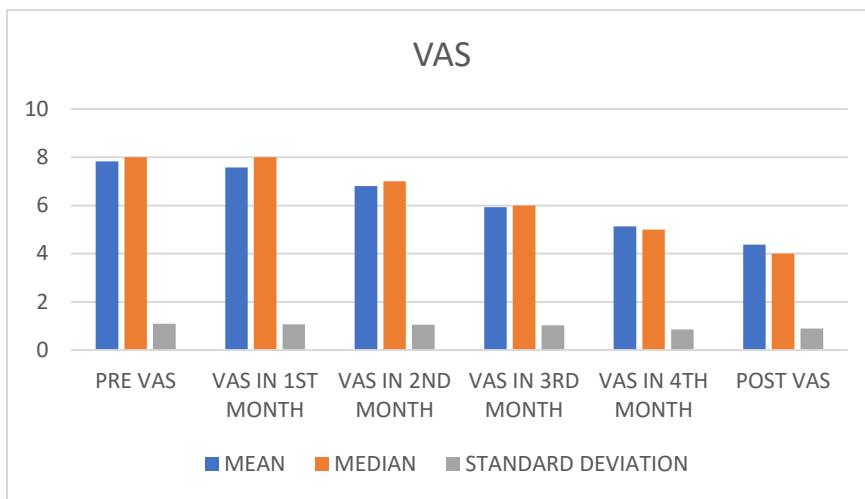


TABLE 2: Measurements of VAS every month during the experiment

VAS	MEAN	MEDIAN	STANDARD DEVIATION
PRE VAS	7.83	8	1.09
VAS IN 1 ST MONTH	7.57	8	1.07
VAS IN 2 ND MONTH	6.8	7	1.05
VAS IN 3 RD MONTH	5.93	6	1.03
VAS IN 4 TH MONTH	5.13	5	0.858
POST VAS	4.37	4	0.89



DISCUSSION: Primary Dysmenorrhea, is characterized by painful menstruation without an identifiable pelvic pathology, it is a common condition that significantly affects the quality of life for many women. The management of primary dysmenorrhea traditionally involves pharmacological intervention such as nonsteroidal anti-inflammatory drugs (NSAID'S) and hormonal treatment, but non-pharmacological approaches like physiotherapy have gained attention due to their fewer side effects and holistic benefits. It includes pelvic mobility Exercises and Electrotherapy modalities. Pelvic mobility Exercises are aimed at improving the range of motion and flexibility of the pelvic muscles, reducing tension and pain associated with primary dysmenorrhea. These exercises target muscle groups that may become stiff or contracted during menstruation, such as the pelvic floor, abdominal and lower back muscles, these exercises can alleviate the pain and discomfort experienced during menstrual periods. Mechanism of Action for pelvic mobility exercises are decreasing muscle Spasm and tension, which are often associated with menstrual cramps and enhancing the balance of stability of the pelvic muscles potentially reducing referred pain from other areas such as the lower back or thighs. Whereas, Electrotherapy modalities, particularly Transcutaneous electrical nerve stimulation (TENS), it is non-invasive treatment option for managing Primary Dysmenorrhea. Transcutaneous electrical nerve stimulation delivers mild electrical impulses through the skin to stimulate nerve fibers, which can inhibit the transmission of pain signals to the brain and enhance the release of endorphins, the body's natural pain killers. So that TENS works on the gate control theory of pain, which suggests that the Electrical impulses can block pain signals from reaching the spinal cord and brain, thereby reducing the sensation of pain. Additionally, the stimulation may increase the release of endorphins, further contributing to pain relict. When pelvic mobility exercises are combined with Electro therapy modalities like Transcutaneous electrical nerve stimulation (TENS), the two treatments can complement each other offering both immediate and long-term pain relief. Pelvic exercises address the underlying muscle tension and improve the structural support of the pelvis, while Transcutaneous electrical nerve stimulation (TENS) provides rapid relief from acute menstrual pain by interrupting pain signals and promoting endorphin release. A study by sunita sharma et al (2023) found that a combination of Transcutaneous electrical nerve stimulation (TENS) and exercise therapy resulted in greater reductions in menstrual pain compared to either intervention alone. This suggests that the Synergistic effect of both treatments can provide more comprehensive pain management for women with primary dysmenorrhea.

LIMITATIONS OF THE STUDY: This study focused on individuals with regular menstrual cycles, a practical choice to facilitate the organization of exercise programs and follow-up assessments. Exclusion of women with irregular menstrual cycles. Inclusive age limit is within 18-25 years.

FUTURE RECOMMENDTIONS:

The study was a short-term study; it is therefore necessary to do a long-term study to make the results more beneficial. Sample studied was small and the study reduces the generalization, therefore study with a large population is recommended. Age limit (younger and adult 18-25, exclusion of women with irregular cycle). Should requires more follow-ups or multiple visits.

CONCLUSION: The integration of pelvic mobility exercises with electrotherapy modalities, such as Transcutaneous Electrical Nerve Stimulation (TENS), represents a promising approach for managing primary dysmenorrhea. Pelvic mobility exercises enhance flexibility, improve blood flow, and alleviate muscle tension in the pelvic region, effectively reducing cramping and discomfort associated with menstruation. Electrotherapy complements these benefits by modulating pain perception through mechanisms such as endorphin release and inhibition of pain signal transmission. Evidence from various studies indicates that this combination leads to a significant reduction in pain intensity, as measured by the Visual Analog Scale (VAS), over the course of treatment. Patients often report not only immediate relief but also improved overall menstrual health and a decreased need for pharmacological intervention and it enhances the quality of life for individuals suffering from primary dysmenorrhea, providing an effective alternative to conventional pain management strategies. This holistic approach underscores the importance of considering physical therapy modalities in the comprehensive treatment of menstrual pain, promoting better health outcomes for women. The combination of pelvic mobility exercises and electrotherapy modalities represents a valuable strategy for the effective management of primary dysmenorrhea. This integrated approach not only addresses pain relief but also promotes overall well-being and empowers individuals to take an active role in their menstrual health management.

Acknowledge: Any success takes place with the combined efforts of numerous people and cannot be achieved alone. First and foremost, I humbly express my heartfelt gratitude to the Almighty God, whose presence has been the guiding force behind my academic endeavour's. This research marks the conclusion of my BPT (Bachelors of physiotherapy) journey and the start of new and inspiring challenges ahead. It gives me great pleasure to humbly place on record my profound sense of gratitude, indebtedness and heartfelt thanks to Prof. Dr. B. RAJESH, Ph.D. MPT[SPORTS], Principal and chief Physiotherapist NRI College of physiotherapy & General hospital, for his initiative, benevolence and constant encouragement, in doing this research. With respectful regards and indebtedness, I profess my deep sense of gratitude and sincere thanks to Dr. SANJUKTA SARDESAI, PhD, MPT (Neurosciences), Associate Professor, for her warm affection, caring nature and contributing her valuable time and expertise ideas which enabled me to overcome several stumbling blocks during the period of my investigations and also in doing this research. The authors support. The author wishes to express the gratitude to the principal and staff of physiotherapy department, family and friends for their valuable support throughout the entire work.

Source of funding: None

Conflict of interest: The author declares no conflict of interest

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ISSN: 2321-5690

