

## STRUCTURED EXERCISE PROTOCOL IN INDIVIDUALS WITH RHYTHM DISORDERS OF MENSTRUATION: SINGLE GROUP STUDY

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### ABSTRACT

**Objective:** To evaluate the efficacy of a physiotherapy program for relieving symptoms among rhythmic disorders of menstruation in women using MEDI-Q and VAS.

To evaluate impact of physiotherapy programme on quality of life of women with menstrual disorders using EQ-5D.

**Study design:** Experimental Study

**Methods:** Sample size for this study was n=60 as it was calculated using G\*Power 3.1 (Universitat Dusseldorf, Germany). A single group experimental study was conducted among 60 females with age between 18-30 years. The students were screened on the basis of inclusion and exclusion criteria in order to assess menstrual pain, symptoms and quality of life using VAS, MEDI-Q and EQ-5D questionnaire.

**Results:** Results revealed significantly reduction in the menstrual pain and symptoms after the intervention. The physiotherapy intervention was beneficial in reduction of pain and symptoms of rhythm disorders of menstruation.

**Conclusion:** The results showed that physiotherapy intervention has highly significant reducing the pain intensity and the symptoms and increase in quality of life in subjects with rhythm disorders of menstruation.

**Keywords:** Rhythm disorders, menstruation, pain, physiotherapy, core strengthening, stretching, kegels exercise, VAS, MEDI-Q, EQ-5D.

### INTRODUCTION

Once a month, women of childbearing age experience the natural physiological phenomena known as menstruation, which signifies the proper functioning of their reproductive system.(1)

Through intricate hormonal feedback loops and a highly coordinated hypothalamic-pituitary- ovarian [HPO] axis, the normal menstrual cycle results in the development of dominant follicles, ovulation, and in the absence of fertilization, the regular shedding of the endometrial lining.(2)

Menstruation is also called menarche, which first appears. It usually begins around puberty, with a median age of 12. Menstrual cycles end at the menopause, which typically begins at age 51. (3)

## Rhythm disorders of Menstrual Cycle

A typical menstrual cycle might occur from 21 to 35 days and last between two and seven days. 14–25% of women experience irregular menstrual cycles which might include periods that are heavier or lighter than normal, longer than 35 days or shorter than 21 days, or other issues, such as abdominal cramps. In addition bleeding or spotting in between periods. Menstrual cycle length varying more than 7-9 days, and/or not having periods for 3-6 months are menstrual irregularities.(4)

## Risk factors for Menstrual Irregularities.(5)

- Menarche age
- Moderate-to-intense physical activity
- Obesity
- Poor nutritional health

## Menstrual disorders risk factors also includes:

- Mental problems
- Work-related stress
- Psychosocial stress in addition to physical issues
- Immaturity of the HPA axis.

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Rhythm disorders of Menstruation includes: Dysmenorrhea is the pathophysiology of dysmenorrhea indicates that it is a menstrual disorder marked by the occurrence of painful cramps during the menstrual cycle that originate in the uterus.(6) Oligomenorrhea is a woman who experiences irregular and inconsistent menstrual blood flow, such as a menstrual cycle lasting more than 35 days or only having 4 to 9 cycles per year.(7) Amenorrhoea is the lack of menstruation or an irregular halt to it is known as amenorrhoea.(8) Menorrhagia is the complaint of severe cyclical menstrual flow in multiple consecutive cycles.(9) Polymenorrhea is a condition when the menstrual period is shorter than 21 days.(10) Metrorrhagia is a frequent gynaecological illness that describes prolonged bleeding in women during non-menstrual periods or vaginal bleeding.(11)The term "metrorrhagia" should only be used to describe irregular hemorrhages that occur during menstruation. It refers to the loss of blood from the uterus in between periods.(12) Hypomenorrhea is the menstruation that lasted fewer than two days was considered hypomenorrhea.(13)

Lastly, other studies combine a variety of complaints including heavy bleeding, spotting, irregular cycles, frequent periods and menstrual pain into a single category called "menstrual problems".(14)

## ETIOLOGY

- Prostaglandins cause narrowing of the blood vessels supplying the uterus, abnormal contractile activity of the uterus, which leads to ischemia, hypoxia of the uterus and increased sensitivity of the nerve endings. (6)
- Hormonal disorders,
- Nutritional disorders,
- Mental disorders such as stress. (7)
- Polycystic ovary syndrome,
- Hypothalamic amenorrhea,
- Ovarian failure,
- Hyperprolactinemia. (8)
- Pelvic pathology,

- Uterine causes: organic, functional,
- Systemic causes: endocrinologic disorders, hematological disorders,
- Iatrogenic causes: IUDs', use of anticoagulants.(9)

## NEED OF THE STUDY

Physiotherapy offers a safe, non-invasive and affordable treatment alternative. Enhancing emotional and mental well-being in relation to menstruation problems. The necessity of preventative and comprehensive care: physiotherapy focuses on relaxation, stress reduction, exercise and posture adjustments, all of which support overall hormonal and reproductive health. The studies on lifestyle changes based on physiotherapy can show how beneficial they are over the long run for treating rhythm issues. It increases scientific understanding of physiotherapy's therapeutic application for a range of menstrual rhythm disorders. The majority of research focuses only on dysmenorrhea. There isn't much research on how physiotherapy specific exercises affects the pain, quality of life and other menstrual rhythm issues. Numerous menstrual illnesses including dysmenorrhea, endometriosis, PCOS, and PCOD have already been the subject of validated research. Hence this study focuses on various rhythm disorders of menstruation in women and its Effect of Structured Physiotherapeutic Exercise Program.

## AIM

To study the effectiveness of structured exercises protocol on individuals with rhythm disorders of menstruation

## OBJECTIVES

To evaluate the efficacy of a physiotherapy program for relieving symptoms among rhythmic disorders of menstruation in women using MEDI-Q and VAS

To evaluate impact of physiotherapy programme on quality of life of women with menstrual disorders using EQ-5D.

## MATERIALS

### 1.Exercise equipment

- Exercise mat
- Towel Roll
- Stopwatch

### 2.Measurement tools

- Pain assessment scale (VAS scale)
- MEDI-Q Questionnaire
- EQ-5D Questionnaire

### 3.Participants

- A sample group of females having menstrual disorders , who meets the inclusion criteria for the study.

### 4.Exercise protocol

- Set number of weeks- 6 weeks with clearly defined frequency, intensity, progression of exercises, 4 days per week, 1 session per day for duration of 60 minutes.

## METHODOLOGY

1. Study type: Experimental: Single group study
2. Sample Allocation: Random Sampling
3. Type of data collection: Primary data
4. Sample size: 60 Subjects
5. Source of collection of data: Data was collected from Belgaum, Urban and Rural regions.

## Inclusion Criteria

1. Females age between 18-30 years.
2. History of menstrual abnormalities.
3. Individual diagnosed with menstrual abnormalities.
4. If menstruation interval is less than 21 days. (Considered short).(15)
5. If menstruation interval is more than 35 days. (Considered long).(15)
6. Menstruation of less than 2 days.(15)
7. The presence in participant's mother or sister is accepted as positive family history.(15)
8. Severe pain before and during menstruation.(16)
9. Participants who were receiving medications for PCOS, PCOD , medications for regulating menstrual cycles

## Exclusion criteria

1. Participants taking hormonal therapies [Birth control pills, Hormone replacement therapy ] (16)
2. History of cancer
3. Participants who had other systemic diseases and were receiving medication for same.(16)
4. Participants receiving physiotherapy currently.(17)
5. Women above 30 years of age.
6. Active pelvic infection – Pelvic Inflammatory Disease.(18)

## Intervention

The participants attended 6 weeks exercise protocol. Total 24 sessions were conducted for each of them in 6 weeks, 4 sessions per week, each sessions for 60 mins.

Each session started with stretching exercises that includes butterfly stretch, child's pose, knee hugs, cobra pose with 10 sec hold for 10 times, 3 sets of each exercise. After stretching continue with core strengthening

exercises that includes bridging + VMO, static back, cat and camel exercise with 10 sec hold for 10 times, 3 sets for each exercise. After 2 weeks progress strengthening exercises by adding crunches with 10 sec hold for 10 times, 3 sets for each exercise. The session ended with Kegel's exercise with 10 sec hold for 10 times, 3 sets.(19,20,21)

### Stretching exercises

**Butterfly stretch-** Sit on the floor with back straight, bend the knees and bring the sole of the feet together. Hold the feet with your hands and gently pull heels in towards the body as much as comfortable. Keep knees dropped to the sides, moving towards the floor. Hold the stretch for 10 seconds while breathing normally.

**Child pose stretch-** Participants was asked to kneel on the floor and sit back on the heels. Slowly bend forward, lowering the chest towards thighs, stretch arms forward on the floor with palms facing down, relax forehead on the ground. Hold the position and breathe deeply for 10 seconds (or longer if comfortable).

**Knee hugs stretch-** Participants were asked to be in supine position, than bend knees and bring them towards the chest. Wrap arms around your knees or shins and gently pull them closer. Keep head and back relaxed on the floor. Hold the position for 10 seconds while breathing normally.

**Cobra pose stretch-** Lie in prone position with face down on the floor with your legs stretched back and toes pointing, place palms on the floor under the shoulders. Press hands into the floor and slowly lift your chest upward. Keep elbows close to the body and shoulders relaxed. Lift as much as comfortable without straining lower back. Hold the pose for 10 seconds while breathing normally, than slowly return down.

### Core strengthening exercises

**Bridging plus VMO-** Participants were asked to lie flat on back on a mat, bend both knees and place feet flat on the floor, hip-width apart, keep a towel roll between both the knees. Keep arms relaxed at sides with palms facing down. Tighten abdominal and buttock muscles, squeeze the towel roll between knees and slowly lift the hips upward until body forms a straight line from shoulders to knees. Hold this position for 10 seconds and then slowly lower your hips back down to the mat in a controlled manner.

**Static back-** Lie flat in supine position on the floor or a mat, bend both knees and place feet flat on floor and place a towel roll under the back. Keep arms relaxed out to the sides, palms facing upward, push lower back on that towel roll and contract the back. Breathe slowly and deeply keeping your body completely relaxed. Hold this position for 10 seconds.

**Cat and Camel-** Participants were positioned in a quadripod position (hands under shoulders, knees under hips). Keep back straight and look down at the floor. For the cat position: slowly round the back upward toward the ceiling. Tuck chin towards chest and tighten abdominal muscles. Hold this rounded position for 5 seconds. For the camel position: slowly drop belly downward towards the floor, lift head and look slightly upward, allowing back to arch gently. Hold this arched position for 5 seconds. Continue moving smoothly between Cat and Camel for the required repetitions.

**Crunches (After 2 weeks) -** Lie prone on a flat surface, such as a mat or floor. Bend knees with feet flat on the ground, place hands behind head, with fingers interlaced. Lift shoulders off the ground, curling up towards knees. Continue curling up, keeping lower back pressed into the ground. Hold the curled position for 10 seconds.

**Kegel's exercise-** Participants were positioned in a comfortable sitting position with back supported. Asked participants to contract the muscles as use to stop the flow of urine or tighten the vagina (for women). Squeeze the pelvic floor muscles for 10 seconds. Participants should feel a pulling sensation. Hold the contraction for 10 seconds.

## Outcome measure

VAS: Menstrual pain intensity was assessed using the Visual Analogue Scale (VAS), where participants rated their menstrual pain on a 0–10 numerical scale, with 0 indicating no pain and 10 indicating the worst imaginable pain. The VAS is a validated and reliable tool widely used for evaluating pain intensity in women with menstrual and pelvic pain disorders. It is simple to administer, sensitive to clinical change, and effective for monitoring treatment response.(22)

MEDI-Q questionnaires: Symptoms severity was measured using the Menstrual Distress Questionnaire (MEDI-Q), a self-administered instrument that evaluates the frequency and intensity of symptoms associated with menstrual rhythm disorders. The questionnaire covers both physical and psychological domains of menstrual health. Each item is rated on a Likert-type scale, and total scores are summed, with higher scores reflecting greater symptom severity. The MEDI-Q has demonstrated good internal consistency and construct validity in studies assessing menstrual and reproductive health.(23)

EQ-5D: Health-related quality of life, assessed using the EuroQol -5 Dimension Scale (EQ-5D). The EQ-5D is a validated, self-administered questionnaire that evaluates five health dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension includes five response levels ranging from “no problems” to “extreme problems.” Responses were converted into a single EQ-5D index value according to the standard scoring algorithm, with higher scores indicating better quality of life. Measurements were taken at baseline and post-intervention.(24)

## Data analysis

For each included study, three reviewers independently extracted the sample size using G\*Power 3.1.. Statistical analysis was done using R Studio version 4.5.1. All data was first entered into a Microsoft excel sheet followed by R Studio 4.5.1 version. Mean  $\pm$  standard deviation was used to display the mean and standard deviations of the numerical data collected from each participant. To find out the effect of intervention paired t test was used. A sample size of 60 participants was calculated and 95% was approved as the confidence interval. In all studies,  $P<0.05$  was regarded as the statistical significance level. To generate the graphs and tables Microsoft Excel is used.

## RESULTS

### Demographic Characteristics:

The research sample consist of 60 females. All participants were with menstrual disorders hence gender distribution was 100%. There were no male participants as the condition is gender specific. The participant age distribution showed the mean  $\pm$  standard deviation is  $21.25 \pm 1.75$  express that the sample was mainly made up of young adults with little variation in age. This reveals that most of the participants was near to 21 years and according to this majority of participants were probably between ages of 19.5 and 23 years. The little variation in age indicates a homogeneous age group, meaning that there was minimal difference in the ages of the participants. Overall statistics showed that the majority of participants were in their early adult years. According to the World Health Organization's (WHO) classification, the participants' average Body Mass Index (BMI) was within the normal weight range, with a mean  $\pm$  SD  $20.09 \pm 3.59$ . The moderate standard deviation shows some variation in the BMI values of the subjects. It is likely that the majority of people had BMIs between 16.5 and 23.7 kg/m<sup>2</sup> according to the distribution. This range includes participants who were on the lower end of normal BMI and a few who might be considered underweight or slightly overweight. The results show that the population is usually healthy and tends to have a normal body weight.

Table 1 and 2: Descriptive statistics of baseline characteristics of participants

Demographic data	Mean	Standard deviation
Age (Years)	21.25	1.75
BMI	20.09	3.59

Table 1

Gender	Frequency (n)	Percentage (%)
Female	60	100

Table 2

**For VAS (pain parameter)**

We used VAS score as pain parameter to study the effect of treatment. VAS scores were measured pre and post treatment. The mean  $\pm$  SD of VAS pretreatment is  $6.95 \pm 1.68$  and post treatment is  $5.15 \pm 1.53$ . There is 25.90% reduction in VAS scores after the intervention. After performing paired t test on VAS scores of pretreatment and post treatment taken from group of 60 patients, we get p value  $< 0.05$ . Mean of VAS score pretreatment is greater than mean of VAS score post treatment and conclude that the treatment significantly reduces the pain and has positive impact on patients. Table 3: Reflects pre and post treatment values.

Pre VAS mean $\pm$ SD	Post VAS mean $\pm$ SD	Standard variation	t value	P value
$6.95 \pm 1.68$	$5.15 \pm 1.53$	13.87	13.87	$<0.05$

Table 3 Comparison of pain (VAS) pre and post treatment

**For MEDI-Q (number of symptoms)**

We used MEDI-Q as a parameter for number of symptoms to study effect of treatment. MEDI-Q values were measured pretreatment and post treatment. The mean  $\pm$  SD of MEDI-Q pretreatment is  $2.73 \pm 1.26$  and post treatment is  $1.61 \pm 1.18$ . There is 40.85% reduction in MEDI-Q scores after the intervention. After performing paired t test on number of symptoms pre treatment and post treatment taken from group of 60 patients, we get p value  $< 0.05$ . Mean of number of symptoms before treatment is greater than mean of number of symptoms after treatment and concluded that the treatment significantly reduces number of symptoms and has positive impact on patients. Table 4 reflects pre and post treatment values.

Pre MEDI-Q mean $\pm$ SD	Post MEDI-Q mean $\pm$ SD	t value	p value
2.73 $\pm$ 1.26	1.61 $\pm$ 1.18	12.98	<0.05

Table 4 Comparison of number of symptoms (MEDI-Q) pre and post treatment

**For EQ-5D (Quality of life)**

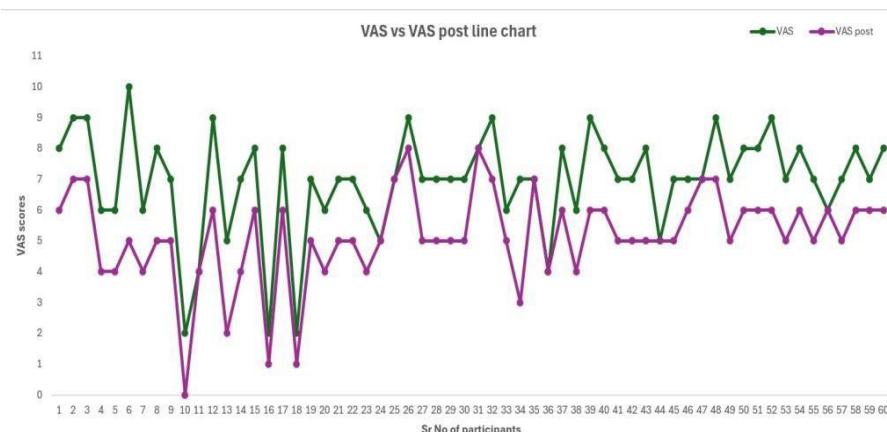
We used EQ-5D 3 level (3L) values as parameter to study effect of treatment on quality of life of the participants. EQ-5D values were measured before and after the treatment. The values ranges from 11111 to 33333, where 33333 denotes most painful, uncomfortable and unhealthy lifestyle whereas 11111 denotes most painless, comfortable and healthy lifestyle. “UK” standards were considered to calculate index scores of each EQ-5D 3L observation. Value of index score ranges from -1 to 1 where -1 denotes worst lifestyle and 1 denotes the best lifestyle. The mean  $\pm$  SD of EQ-5D before therapy was  $0.49 \pm 0.36$  and after therapy was  $0.78 \pm 0.12$ . There is 53.28% reduction in EQ-5D scores after the intervention. After performing paired t test on index scores of before and after treatment taken from group of 60 patients, we get p value < 0.05. Mean of index scores before treatment is less than mean of index scores after treatment. and concluded that the treatment significantly improves patient's lifestyle and experience and has positive impact on patients. Table 5 reflects before and after intervention values.

Pre EQ-5D mean $\pm$ SD	Post EQ-5D mean $\pm$ SD	t value	p value
$0.49 \pm 0.36$	$0.78 \pm 0.12$	-7.12	<0.05

Table 5 Comparison of quality of life (EQ-5D) pre and post treatment.

Graphical representations of data:

Graph 1: Demonstrates that there is a difference between pre and post readings of VAS



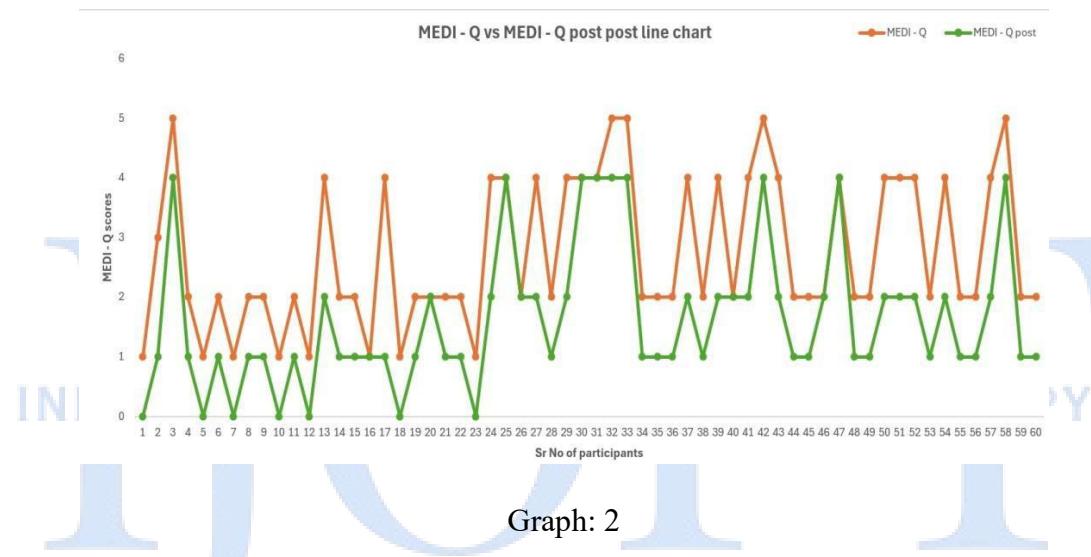
Graph: 1

This graph is a line chart comparing VAS scores before and after an intervention across 60 participants. X-axis represents the serial number of participants 1 to 60. Y-axis represents the VAS score 0 to 10 scale. Green line (VAS pre) indicates the VAS scores of participants before intervention. Purple line (VAS post) indicates the VAS scores of participants after intervention.

Pre-intervention (green line) scores mostly range between 6–10 showing the higher pain levels Post-intervention (purple line) scores shift downward, clustering more around 4–6, with some dropping as low as 0–2.

For most participants, the purple line (VAS post) is lower than the green line (VAS pre), showing that pain levels decreased after intervention. A few participants have little or no difference, while some even show higher post scores, but the general pattern suggests improvement.

Graph 2: Demonstrate that there was difference between pre and post readings of MEDI-Q



Graph: 2

This chart is a line graph comparing MEDI-Q scores before and after intervention for 60 participants. X-axis represents the serial number of participants (1–60). Y-axis represents MEDI-Q scores (ranging from 0–5). Orange line represents participants scores before intervention. Green line represents participants scores after intervention.

Many participant started with score between 2–5 in pre intervention. In post-intervention many shifted down towards 0–2 (green line). This indicates that post-intervention scores were generally reduced, reflecting improvement.

This graph shows that most participants had lower MEDI-Q scores after the intervention, which suggests an improvement in their condition. While the majority benefited, a few participants still showed minimal or no improvement.

Graph 3: Demonstrate that there was difference between pre and post readings of EQ-5D



Graph: 3

This chart is a line graph comparing index scores before and after intervention for 60 participants. X-axis represents serial number of participants (1–60). Y-axis represents index scores ranging approximately from –0.4 to 1.2. Red line represents index scores before intervention. Blue line represents index scores after intervention.

Pre-intervention (red line) shows a lot of fluctuation, with some participants having very low or even negative index scores (e.g., participant 3, 31, 37, 49). Most participants range between 0.2 –0.8. Post-intervention (blue line) scores are much more stable, clustering between 0.7 – 1.0 for most participants. Few dips are seen (participants 33 and 37 around 0.5–0.6), but still higher than their pre-scores.

The blue line is consistently higher than the red line for nearly all participants. This indicates that index scores improved after the intervention. Hence this chart clearly shows that the post- intervention index scores are higher and more consistent than pre-intervention scores. Before treatment scores were scattered, unstable and in some cases negative than the scores improved to a higher, more uniform level, suggesting a strong positive effect of the intervention.

## DISCUSSION

The findings from multiple studies indicate that exercise therapy is an effective non- pharmacological intervention for managing primary dysmenorrhea. The systematic review by Paloma Carroquino-García, José Jesús Jiménez-Rejano et al.(2019) and the study by Salvi Shah et al.(2016) demonstrated that physical exercise particularly stretching, aerobic, and yoga training significantly reduced menstrual pain and improves quality of life compared to control group. In the trial by Salvi Shah et al.(2016) participants performed abdominal, pelvic and groin stretching for eight weeks showed a significant reduction in pain with VAS scores decreasing from 6.3 to 4.6 and VMSS from 2 to 1, confirming the effectiveness of structured stretching exercises. Similarly, Carroquino-García et al.(2019) reported moderate-quality evidence that therapeutic exercise decreases both menstrual pain intensity and duration across randomized controlled trials. The mechanisms underlying these improvements include enhanced pelvic blood flow, reduced uterine ischemia, muscle relaxation, and endorphin release, which collectively counter prostaglandin-induced uterine contractions. Despite methodological variations among studies, the overall evidence quality was rated moderate, and all findings consistently support exercise as a safe, low-cost, and sustainable management strategy. Supporting these findings, the study by Bárbara Valente de Oliveira, Sebastiana da Costa Figueiredo et al. (2022) demonstrated that electrotherapy, particularly Aussie and TENS currents, is another effective approach for reducing menstrual pain in women with primary dysmenorrhea. Their results showed a significant reduction in pain across all groups treated with electrical stimulation compared to placebo, with the Aussie current producing longer-lasting analgesic effects and slight improvement in sleep quality. These outcomes highlighted that both therapeutic exercise and electrostimulation can provide safe alternatives to pharmacological pain management, minimizing drug dependence.

The present study evaluated the effect of a structured physiotherapy exercise protocol, including stretching, strengthening, and pelvic floor muscle training on females with rhythm disorders of menstruation. The results demonstrated a significant reduction in menstrual pain and symptom severity and an improvement in quality of life after six weeks of intervention. These findings indicate that physiotherapy-based exercise may be an effective non-pharmacological approach to managing menstrual irregularities. The mechanism by which exercise influences menstrual health is not completely understood but it is proposed that regular physical activity improves blood flow, reduces pelvic muscle tension and enhances hormonal balance through hypothalamic–pituitary–ovarian regulation. Improved core and pelvic muscle strength may also promote better posture and reduce pain associated with uterine contractions. The improvement in quality of life observed through EQ-5D scores related to both physical and psychological benefits of exercise including reduced stress, improved energy levels, and better emotional well- being. These outcomes align with previous research emphasizing the role of physiotherapy in women's reproductive health.

However, this study had certain limitations. As it was a single-group design without a control group, external factors such as lifestyle changes or natural hormonal variations cannot be completely ruled out. Additionally,

the study included a relatively homogeneous sample of young females, which may limit the generalizability of results to other age groups. Despite these limitations, no adverse effects were reported, and participant adherence remained satisfactory throughout the intervention period.

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