

Effect of Progressive Muscle Relaxation Technique on Pain Intensity and Fatigue Associated with Primary Dysmenorrhea among Female Adolescents

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Abstract:

One alternate treatment for lessening the severity of pain and exhaustion is progressive muscle relaxation (PMR). Depending on whether pathology is present or absent, dysmenorrhea can be classified as primary or secondary. **The aim of the study aimed** assess the effect of progressive muscle relaxation technique on pain intensity and fatigue associated with primary dysmenorrhea among female adolescents. **Design:** A quasi-experimental research design was utilized to achieve the aim of this study. **Setting:** The study was conducted in two governmental secondary schools in Port Said City. **Subjects:** A purposive sample consisting of 150 female adolescents was recruited using a multi-stage sample technique in this study. **Three tools used for data collection** are: A self-administered questionnaire, a modified Behavioral Pain Scale, a fatigue evaluation scale, and a dysmenorrheal duration assessment sheet. **Results:** There were no statistically significant differences observed in any of the demographic variables between the study and control groups. The current study's findings showed that, in terms of pain intensity following intervention, statistically significant differences were found between the study and control groups. a statistically significant post-intervention decrease in the study group's fatigue scores as compared to the control group ($p < 0.0001$). **Conclusion:** Adolescent females with primary dysmenorrhea reported less pain and fatigue after using the progressive muscle relaxation approach. **Recommendations:** progressive muscle relaxation is a systematic approach to lessen pain intensity and fatigue in female adolescents with primary dysmenorrhea, it should be utilized as a non-pharmacological treatment.

Keywords: Fatigue, Pain intensity, Progressive muscle relaxation, Female adolescents with primary dysmenorrhea

Introduction

Dysmenorrhea, a painful menstrual cycle that hinders teenage girls from engaging in their regular daily activities and lowers their productivity and quality of life, can also damage their academic performance (Kas et al., 2020). The words dysmenorrhea, which means difficult, unpleasant, or abnormal, meno, which means month, and rhea, which means flow, are taken from the Greek. Encountered 87.5% of cases in Egypt, it is among the most prevalent gynecological ailments (Barati. et al., 2021).

Dysmenorrhea is typically split into two groups: primary and secondary. In the absence of any pelvic organs, primary dysmenorrhea is a painful menstrual cycle (Hashemi et al., 2022). The first day of menstruation marks the start of primary dysmenorrhea (PD), which peaks within 24 hours. It starts out bleeding lightly and gets better as the flow gets more established. The suprapubic region is often the site of pain, it extends to the thighs' outer and inner surfaces. (Momma et al., 2022).

Depending on whether there is a pathology present or not, dysmenorrhea is classified as primary or secondary. Only ovulatory cycles are affected by primary

dysmenorrhea, which has no underlying pathology or organic cause and normally appears between 6 and 12 months after menarche. Adolescent girls are less likely to experience secondary dysmenorrhea, which is typically caused by pelvic disease (Patel et al., 2017). Although dysmenorrhea frequently occurs as a side effect of several reproductive illnesses, it is also regarded by most females as the main sickness. Even though primary dysmenorrhea has a fair prognosis and is somewhat common in young women, it is nonetheless linked to poor quality of life (Bernardi et al., 2017).

Prostaglandin levels are increased in primary dysmenorrhea, which causes pain and possible side effects. These prostaglandins induce the uterine muscles to contract, which hurts and reduces blood flow and oxygen to the uterus. Females with primary dysmenorrhea had particularly high levels of prostaglandin F₂ during the first two days of menstruation (Kaur, et al., 2015).

Fatigue is a common problem among adolescent females with dysmenorrhea. High degrees of emotional distress, sadness, and poor function are all strongly correlated with fatigue. There should be a proactive approach

to managing sleep and fatigue (Krathong, 2013). The definition of pain is "an unpleasant sensory or emotional experience relating to or explained in terms of dysmenorrhea (Roykulcharoen & Good, 2014).

Depending on the type, several approaches are used to manage dysmenorrhea. Primary dysmenorrhea, includes hot compresses, healthy eating, consistent exercise, adequate rest, and massage in addition to medical care. Acupuncture. However, it was intended that the pathology that was causing the pain would be removed with the secondary dysmenorrhea treatment (Kizilirmak et al., 2019). Many women include exercise as a crucial component of daily life. It benefits health by easing discomfort, lowering stress, boosting mood, and enhancing well-being (Kapooret al., 2017).

Combining pharmaceutical and non-pharmacological treatments is the most effective way to control pain. Non-pharmacological approaches boost one's sense of control, lessen one's sense of weakness, raise one's degree of activity and functional ability, reduce the need for analgesic medicine, and lessen the side effects of treatment (Abd El-Aziz, 2019). The use of complementary therapies as an adjuvant treatment may enhance pain control and reduce immediate postoperative discomfort. Hot or cold compresses, exercises, positioning, massage, hypnosis, transcutaneous nerve stimulation, and relaxation are a few examples of non-pharmacologic pain management techniques (Oraon et al., 2019).

Dr. Edmund Jacobson created the progressive muscular relaxation (PMR) or Jacobson relaxation technique in 1930. It was founded on the idea that relaxing the muscles would also help to relax the mind. When the peripheral portions involved are completely relaxed, As Jacobson puts it, "an emotional state fails to exist." According to Jacobson, a situation like this could reduce autonomic and central nervous system arousal, which could lead to the restoration or enhancement of psychological and physical well-being. (Cooke, 2013) Progressive muscle relaxation is a non-pharmacologic method that is easy to use, safe, inexpensive, accessible, and self-initiated by the patient. It is also a systematic way to reduce stress, anxiety, depression, pain perception, muscle tension, and contractions, and it has recently become a vital part of nursing care (Aziz and Elgzar, 2018). It also helps to promote sleep.

Furthermore, a number of studies have demonstrated that PMR releases endorphins, which strengthen the body's defenses and sense of wellbeing. It also increases vitality, self-awareness, and the ability to quiet internal chatter (Bialas et al., 2020). Additionally, it increases the ability to undertake physical activities, warms or cools body regions, and increases parasympathetic activity, which decreases blood pressure, heart rate, heart index, and breathing rate. One of the methodical methods for achieving a deep state of relaxation is progressive muscle relaxation (Chandrababu, 2018).

To reduce pain, the nurse plays a crucial role in pain management by offering comfort measures and assurance. A key role of the nurse in pain therapy is to provide comfort and reassurance in to lessen discomfort. Here, measurements that are both pharmacological and non-pharmacological are employed. Drug-free primary dysmenorrhea treatment circumvents the disadvantages of drug-based pain management. Medications such as oral contraceptives, nonsteroidal anti-inflammatory medications, and even surgery are examples of pharmaceutical therapy. On the other hand, acupuncture, massage, acupressure, hot baths, hot liquids, aromatherapy, reflexology, and physical activity are examples of non-pharmacological treatment methods (Elverisli et al., 2022).

Significant of the study:

When there is no major pelvic disease, primary dysmenorrhea—painful menstruation—occurs. After the first two years of menarche, it typically begins to manifest. Primary dysmenorrhea typically affects people between the ages of 17 and 2, making it one of the most prevalent issues among teenagers (Mole, 2017; Renuka & Jeyagowri, 2015). Egypt has a high (66.0%) prevalence of dysmenorrhea, with 28.4% of cases being mild, 24.3% being moderate, and 13.3% being severe (Nooh, 2016).

Progressive muscle relaxation is a non-pharmacological method that management techniques that assist the body in relaxing and reducing pain and fatigue. Fatigue and pain disturbances can be intervened using either pharmacological approaches or non-pharmacological methods (Cooke, 2013). Due to its accessibility, low cost, self-induction by the patient, and lack of adverse effects, PMR is regarded as the easiest technique to learn (Krupinska and Kulmatycki, 2014).

Operational definition:

Painful menstruation that happens without any substantial pelvic disease is known as primary dysmenorrhea. It often appears one or two years following menarche (Mole, 2017).

Aim of the study

This study aims to the effect of progressive muscle relaxation techniques on pain intensity and fatigue associated with primary dysmenorrhea among female adolescents.

Research hypothesis:

H1: The application of the progressive muscle relaxation technique will reduce the pain intensity associated with primary dysmenorrhea among female adolescents.

H2: The application of the progressive muscle relaxation technique will reduce the fatigue associated with primary dysmenorrhea among female adolescents.

Design:

A quasi-experimental research design was utilized to achieve the aim of this study (two groups; control and study).

Settings:

The study was conducted on two governmental secondary schools in Port Said city, namely (Alam- Eldin and El Gorpha Eltogaria secondary schools).

Subjects:

The total sample size was 150 female adolescents selected from each grade were recruited using a multi-stage sample technique in the study, aged from 16- 18 years, single, had primary dysmenorrhea for three previous consecutive cycles with a moderate or severe degree of pain based on a modified Behavioral Pain Scale and who were willing to participate in the study.

They did not utilize hormone therapy during the preceding six months, they did not take analgesics for pain relief during the study period, and they did not engage in any regular exercise activity. They also did not have any chronic medical diseases or pelvic pathology. The students were divided into two groups at random; the study group included 75 female adolescents who received instruction and demonstration training on how to use the progressive muscle relaxation technique, and the control group included 75 female adolescents who continued to practice their

regular routines.

Sample size:

In this study, multistage samples were used. There are ten government secondary schools in Port Said. Using a stratified random sample, we chose two schools, or 20% of the total number of schools. There were roughly 750 students enrolled in all secondary schools; we selected 150 girls, or 10% of the student body, at random from the two schools.

Four tools used for data collection are:

Tool (I): Self-administered questionnaire was developed by the researchers in Arabic language after reviewing the related literature (WorldHealth Organization, 2020; Topcu et al., 2019) .and was used to collect basic data about female adolescents. It was divided into the next two sections:

Part I: Adolescent female demographic data It covered residence, age, and academic year.

Part II: History of menstruation Age at menarche, menstrual rhythm, interval, and duration, amount of menstrual bleeding measured by counting multiple soaked pads, and dysmenorrhea characteristics (onset, degree, location, related pain symptoms, and past treatments) were all included.

Tool (II): A modified Behavioral Pain

Scale:It was developed by Mateo and Krenzischeck, (1992) in the English language. It was applied in English to measure how people behaved in response to pain. Posture, muscular function, facial expression, and verbalization are its four dimensions. The researcher asked for one of three options for each of these four primary behavioral responses. The options for posture encompass a carefree, wary, or nervous stance. There are three alternatives for gross motor activity: calm, moderately restless, and severely restless. When it comes to facial expression, there are three choices: neither frowning nor slightly frowning, nor continuous frowning or grimacing. Last but not least, parturient verbalization varied from the usual no sound to sobs and grunts. Every one of the twelve options receives a score of either (1) present or (0) absent. The entire score spans from 0 to 12. This score's statistical translation to the related pain intensity was as follows:

- (0): No actions in reaction to pain
- (< 4): Subtle behavioral reactions to discomfort
- (4-6): Moderate reactions to pain in behavior
- (7-10): Severe pain-related behavioral reactions
- (≥11): Intolerable reactions to pain in behavior

Tool (III): Fatigue assessment scale:

This tool, an English-language self-created rating scale with ten items, was taken from Kleijn et al. (2011). It measures an individual's fatigue from a week's worth of activities in the physical, social, psychological, and spiritual domains, as well as how that fatigue relates to the time of day. A total score of 100 is the highest achievable. Scores go from 0 (no fatigue) to 10 (worst possible). Absent, very little, mild, moderate, severe, and worst levels of fatigue. The scale's dependability is deemed good, with an overall score Cronbach's alpha of 0.81.

Tool (IV): Dysmenorrheal duration assessment sheet:

The purpose of the development was to ascertain the length of dysmenorrhea eight weeks post-intervention and prior to intervention (baseline measurements).

Validity of the Tool:

A panel of five expert academics, comprising two professors from the community health nursing department and three from the department of obstetrics and gynecological nursing, evaluated the content validity of the tools for appropriateness, comprehensiveness, and clarity.

Reliability of the Tool:

Reliability was done using Cronbach's alpha test, the reliability of tool (1) was 0.948, the reliability of tool (2) was 0.864, the reliability of tool (3) was 0.81, and the reliability of tool (1) was 0.935 indicating high reliability of the study tools

A pilot study:

Of the total, 10% participated in a pilot study (15 female teenagers). Based on the findings of the pilot study, the final version of the tools was developed by verifying the viability of the research process and adding clarity. The current study did not include any of the female teenagers who participated in the pilot.

Administrative and ethical considerations:

Formal administrative approval was

sought from the setting. - The study was gained for the ethical committee of the research's approval. The aim of the study was explained to female adolescents. The participants were told by the researchers that the study was optional, they could choose not to participate, and they could leave the study at any moment, for any reason. They also received assurances that the information they provided would be kept private and utilized exclusively for research.

Fieldwork:

The program was designed to increase the knowledge of female adolescent students' based on a pre-test assessment of PMR students.

Planning phase:

Data collection took place over three months, commencing in March 2022 and ending in May 2022. Two study and control groups were formed from the participants (75 female adolescents in the study group who got regular care along with a progressive muscle relaxation intervention, and 75 female adolescents in the control group who got routine care alone without a progressive muscle relaxation intervention).

- On Sunday and Tuesday from 9 am to 12 pm, researchers visited the aforementioned location to collect data.
- After describing the study's goal to students, their verbal agreement was obtained.
- Other facilities, including the classroom, the instructional strategies, the audiovisual materials, and the handouts, were examined and organized during this phase. The curriculum was taught in each chosen school's classrooms, which were the only venues that were open for that purpose. With the school director's approval, this agreement was made.
- Two out of every seven days, the data were gathered in the morning. Two sessions were held in total for each group. A day or session was given to each group. There were 90-minute sessions each.
- Resources and teaching techniques: It was planned out before the educational sessions were implemented. Simple teaching techniques including group discussions, lectures, brainstorming, models, progressive muscular relaxation technique demonstration and re-demonstration, and visual aids such as photos, handouts, posters, and a chalkboard were used.

- The control group participants received routine medical treatment to assess their physical well-being and medication compliance.

II- Implementation phase:

- Before beginning this study, formal administrative approval was sought from the setting. - The study was gained for the ethical committee of the research's approval.
- Port Said City's ministry of education granted authorization after receiving formal approval from the two secondary schools' administrators.
- In accordance with each school's policy, the data were gathered. The actual work began with meetings with the school administrators during the morning class period. The researcher was giving them a thorough explanation of the study's methodology.
- To gather baseline data, the researcher conducted interviews with females who had primary dysmenorrhea (pre-test). The researchers discussed the study's goals at the outset of the interview, gave them all the details (including its duration), and got their verbal assent before they could continue.
- The study group was divided into smaller groups by the research team. Seven to eighteen female teenagers with primary dysmenorrhea will participate in each training session. They watched a movie about progressive muscle relaxation techniques that the researchers had made to better understand the training. Before them, the researchers then performed a demonstration of the progressive muscle relaxation approach.
- Group discussions, models, re-demonstration, and images (progressive muscular relaxation technique) were used as teaching approaches.
- Pain and fatigue Intensity of the female adolescents was assessed pre-intervention
- The duration of female adolescents' dysmenorrhea was reassessed pre-intervention
- The students were presented to the researchers, who also discussed the goal of the study The students' demographic information, tool 2, and tool 3 responses were gathered without the use of the progressive muscle relaxation technique.

- In this study, The questionnaire was given out twice in this study: once before and once after the four weeks of the intervention. Phone calls were then made in order to continue the exercises.
- Students are asked by the researchers to either sit in a reclining chair or lie down comfortably on a bed with their backs to the light.
- Patients were instructed to take off any jewelry, watches, and tight clothing.
- As directed, tense and release a particular set of muscles, including the sole muscles, buttocks, thigh, lower leg, foot, forehead, scalp, eyes, neck, and palms, forearms, upper arms, shoulders, and chest.
- The researchers gave each student instructions on how to start the relaxation exercise: take a deep breath, hold it for two seconds, and then release it slowly.
- Repeat the exercise one more time to experience a new wave of calm sweeping over your entire body. Take a deep breath in, hold it for two seconds, and then gently exhale.
- To explain how to use the relaxation technique, the researchers were giving each student a customized handbook booklet.
- The students were expected to perform the technique in the morning, midday, and night shifts three times a day.
- The researchers requested the students to do each phase of the progressive muscle relaxation technique after they had demonstrated it to them during the relaxation implementation. The researchers then gave the students instructions to repeat each procedure three or four times until they were comfortable with the method.
- The researcher reevaluates pain and fatigue in both the intervention and control groups four weeks after the PMR intervention.
- The study team prepared the intervention in response to the needs of the students as identified by the pretest, including the theoretical component based on the pertinent literature and the PMR technique.
- The Objectives of the intervention
General objectives of the intervention
Assess the effect of the progressive muscle relaxation technique on the level of pain and fatigue related to primary dysmenorrhea in adolescent females

Specific objectives to

- 1- Implement a program regarding

dysmenorrhea2- Apply a progressive muscle relaxation technique

3-Evaluate the effect of the progressive muscle relaxation technique on the level of pain and fatigue related to primary dysmenorrhea in adolescent females

Designed manual booklet about

progressive muscle relaxation: This booklet included the key ideas from each training session along with colorful illustrations.

Title: Gradual-step muscular relaxation method

Summary of the booklet:

1. Overview of a progressive muscle relaxation.
2. Definition of the progressive muscle relaxation method.
3. The progressive muscle relaxation method
4. Reasons for using the progressive muscle relaxation method
5. The value of the progressive muscle relaxation method
6. Steps for demonstrating a massage technique.

Evaluation phase:

- Four weeks after the intervention, the study and control groups evaluated the degree of pain associated with the dysmenorrhea experienced by the female adolescents.
- The effect of progressive muscle relaxation technique on pain intensity and fatigue in female adolescents with primary dysmenorrhea was assessed four weeks after the intervention using the same pre-intervention tools used in the study and control groups.

Statistical analysis:

Statistical analysis and data entry was carried out with SPSS for Windows, version 20. For qualitative and quantitative variables, respectively, frequencies and percentages as well as means and standard deviations were used in the data presented. The t-test was applied to compare the two means. The proportions between qualitative measures were compared using the Chi-square (χ^2) test of significance. The strength of the correlation between two sets of variables was evaluated using Pearson's correlation test. The level of statistical significance was considered at P-value <0.05 .

Results:

Table (1): outlines the demographic traits of the studied female students (both study and control groups). The study group's teenage age was determined to be 16.31 ± 0.78 years, while the control group's teenage age was discovered to be 16.73 ± 0.43 years. Additionally, it was noted that the majority of the study and control groups (72% and 75%, respectively) were born in cities, and there were no statistically significant differences between the two ($\chi^2 = 1.106$, $P = 0.062$).

Table (2): illustrates the female students' menstrual history (both in the study and control groups). Fewer than three quarters (75% and 79%, respectively) of them were reported to have menarche between the ages of 11 and 13, with no significant differences between the two groups ($\chi^2 = 0.39$, $P = 0.837$), and the majority (93% and 96%, respectively) were reported to have regular menstruation ($\chi^2 = 0.100$, $P = 0.762$).

In relation to the menstrual cycle interval, table (2) also shows that most study participants (96.0% and 93.0%, respectively) experienced an interval of 28–30 days, with no statistically significant differences between the two groups ($\chi^2 = 0.703$, $P = 0.413$). Additionally, most study participants (52% and 49%, respectively) experienced menstrual bleeding for an average of 6-7 days. ($P = 0.033$, $\chi^2 = 0.815$). Furthermore, menstrual flow was moderate in 80% of the study group and 81% of the control group, using two to three pads each day.

Table (3): Shows signs of dysmenorrhea in the students under study (study and control groups). There were no statistically significant differences between the study and control groups when it came to the claim that dysmenorrhea started at the start of menstruation and persisted for 48 hours (80% and 83%, respectively) ($\chi^2 = 0.517$, $P = 0.768$). Of the groups, less than two-thirds (64.0% and 66.0%, respectively) reported lower abdominal pain, while more than half (52.0% and 51.0%, respectively) reported lower back pain. Furthermore, to manage their dysmenorrhea, over half (52% and 51%, respectively) used non-pharmacological methods.

Table(4): depicts the pre-and post-intervention mean scores for pain dysmenorrheal severity among the researched female students in the study and control groups using the modified Behavioral Pain

Scale. Pre-intervention average VAS-modified Behavioral Pain Scale scores for female students in the study and control groups were clearly 9.05-1.78 and 9.93-1.45, respectively, with no statistically significant difference ($Z=0.573$ and $P=1.769$). After the intervention, the study group's mean modified Behavioral Pain Scale score varied statistically significantly from 1.671.56 and the control group's mean score of 7.562.67 ($Z=7.632$ and $P=0.0001$).

Table (5): There was no statistically significant difference between the study and control groups' pre-intervention means and standard deviations for the duration of dysmenorrhea ($Z= 0.203$ and $P= 0.227$), according to the pre- and post-intervention means and standard deviations of the duration of dysmenorrhea in the female students who were the study's subject. The respective results were 4.89 ± 1.27 and 4.36 ± 1.21 . Conversely, there was a statistically significant difference ($Z=8.767$ and $P=0.0001$) in the study group's mean and standard deviation of dysmenorrheal duration before and after the intervention (1.78 ± 0.52) and (4.03 ± 1.15) among the control group.

Table 6 showed that neither group's pre-intervention levels of weariness had decreased statistically significantly. Additionally, a statistically significant reduction in weariness was observed in the study group following the intervention ($p0.0001$).

Table (1): The study and control groups' percentage distribution of female students with respect to their demographic characteristics

Variables	Students(n=150)				x 2	P
	Studygroup (n=75)		Control group (n=75)			
	N	%	N	%		
•Age(years):					1.983	0.058
16-17	50	67	53	71		
17-18	25	33	22	29		
Mean±SD	16.31±0.78		16.73±0.43			
•Residence:					1.106	0.062
Rural	54	72.0	56	75.0		
Urban	21	28.0	19	25.0		
Academic year:					1.273	0.204
First	44	59.0	41	55.0		
Second	20	27.0	24	32.0		
Third	11	14.0	10	13.0		
Mean±SD	26.73±3.47		25.68±4.24			

*Significant (P<0.05)

Table (2): Menstrual history percentage distribution among the female students in the study and control groups

Variables	Students(n=150)				x 2	P
	Study group (n=75)		Control group (n=75)			
	N	%	N	%		
• Ageofmenarche(years):					0.39	0.837
9-<11	4	5.0	3	4.0		
11-<13	56	75.0	59	79.0		
13-<15	9	12.0	8	11.0		
15-17	6	8.0	5	6.0		
• The rhythm of menstruation:					0.100	0.762
Regular	70	93.0	72	96.0		
Irregular	5	7.0	3	4.0		
Interval of the menstrual cycle(days):					0.703	0.413
<28	3	4.0	5	7.0		
28-30	72	96.0	70	93.0		
Duration of menstrual blood flow(days):					0.815	0.033
2-3	9	12.0	10	13.0		
4-5	25	33.0	23	31.0		
6-7	39	52.0	37	49.0		
8-10	2	3.0	4	5.0		
• Amount of menstrual blood (No. of pads /day):					0.128	0.049
Slight(One)	10	13.0	8	11.0		
Moderate(2-3)	60	80.0	61	81.0		

Excessive(≥ 4)	5	7.0	6	8.0		
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*Significant($P < 0.05$) χ^2 :Chi-square test

Table (3): The study and control groups' percentage distribution of female students with dysmenorrheal characteristics

Variables	Students(n=150)				x 2	P
	Studygroup (n=75)		Control group (n=75)			
	N	%	N	%		
▪ The onset of dysmenorrhea:						
-Before the menstrual period	15	20.0	13	16.0	0.517	0.768
-With the onset of menstruation& continuefor48 hours	60	80.0	62	83.0		
#•Location of dysmenorrhea:						
- Lower abdomen	32	85.0	36	48.0	0.139	0.709
- Lower back	39	52.0	38	51.0	3.367	0.067
- Lower limbs	18	24.0	17	23.0	1.008	0.315
- Perineal area	16	21.0	18	24.0	2.559	0.278
- Knee	8	7.0	6	8.0	0.326	0.568
#•Associated symptoms with dysmenorrhea:						
-Fatigue &tiredness	70	93.0	69	92.0	0.901	0.343
-Drowsiness	50	71.0	39	52.0	1.714	0.190
-Vomiting and nausea	55	73.0	60	80.0	0.034	0.853
-Diarrhea	39	52.0	38	51.0	0.035	0.852
-Constipation	37	49.0	33	44.0	0.045	0.831
-Headache	35	47.0	37	49.0	0.036	0.849
-Restlessness	34	45.0	40	53.0	1.645	0.200
#• Earlier techniques for treating dysmenorrhea:						
-Pharmacological	11	15.0	10	13.0	0.137	0.703
-Non-Pharmacological	39	52.0	38	51.0	0.569	0.436
-Both	25	33.0	27	36.0	0.312	0.556

*Significant ($P < 0.05$)

χ^2 :Chi-square test #:More than one answer was chosen

Table (4):Pre- and post-intervention mean score on the modified Behavioral Pain Scale for pain dysmenorrheal severity among the female students in the study and control groups.

Pain dysmenorrhea severity	Students(n=150)		Value	P
	Studygroup (n=75)	Control group (n=75)		
•Pre-intervention:				
Mean \pm SD	9.05 \pm 1.78	9.93 \pm 1.45	0.573	1.769
•Post-intervention:				
Mean \pm SD	1.67 \pm 1.56	7.56 \pm 2.67	7.632	0.0001*
χ^2 value	41.563	2.863		
P	0.0001*	0.265		

*Significant($P < 0.05$)

χ^2 valueofFriedmantest ZvalueofMann-Whitney test

Table (5): The study examined the mean and standard deviation of dysmenorrheal duration in female students in both the study and control groups, both before and after the intervention.

Dysmenorrheal Duration	Students(n=150)		Zvalue	P
	Study group (n=75)	Control group(n=75)		
•Pre-intervention: Mean±SD	4.89±1.27	4.36±1.21	0.203	0.227
•Post-intervention: Mean±SD	1.78±0.52	4.03±1.15	8.767	0.0001*
x ² value	33.623	6.192		
P	0.0001*	0.412		

*Significant(P<0.05)

x²valueofFriedmantest

Z valueofMann-Whitneytest

Table (6): Comparison of fatigue scores among the studied female students in the study and control groups pre and post-intervention

Items	Group	Pre-intervention	Post-intervention
Fatigue scores	Study group (75)	26.89±4.02	14.23±2.34
	Control group (75)	27.79±4.67	23.77±2.23
P- value	Study group (75)	0.125	0.0001*
	Control group (75)	0.069	0.043

*Significance at 0.0001 levels

Discussion:

One of the most common and serious health problems, especially for adolescent girls, is primary dysmenorrhea. It diminishes the quality of life, interferes with daily tasks, and negatively impacts one's physical and mental health. A variety of efficient therapies, such as relaxation techniques, are a part of non-pharmacologic pain management. These interventions are intended to lessen anxiety and the severity of pain following surgery, and as a result, to lower the risk of postoperative problems (Saeed,2018).

After simple and quick training, one can obtain progressive muscle relaxation, an efficient technique that reduces pain severity and tiredness. One of the best complementary therapies is Jacobson's progressive muscle relaxation technique, which is easy to learn, affordable, and doesn't require any specific equipment. It is thought to be one of the most successful complementary therapies, is non-pharmacological, and is incredibly easy to learn (Alwan et al., 2018). Therefore, the purpose of the current study was to evaluate how PMRT affected the level of pain and tiredness associated with primary dysmenorrhea in female adolescents.

The current study's findings showed that there were no statistically significant changes found.

between the study and control groups concerning their all demographic characteristics. From the researchers' point of view, this means that the study sample was homogenous.

According to the current study, the average age of the student group was 16.31±0.78 years, whereas the control group's mean age was 16.73±0.43 years. These results are consistent with those of Charan et al. (2019), who examined adolescents' knowledge of and distress about primary dysmenorrhea in Amritsar. They found that the average age of the students was 16.84 2.044 years, with a range of 16 to 20 years. These findings concur with those of Kumar et al. (2016), who investigated the prevalence of dysmenorrhea in higher secondary school females in Manipur. They discovered that students' ages ranged from 15 to 19 years old; with the mean age of students being 16 was 16.78±0.90.

According to the current study, more than three-fifths of the studied students were enrolled for the academic year in which they were being studied. The experts speculate that this could be explained by students spending more time in their early academic years attending classes related to monthly curriculum evaluation.

Less than 75 percent of both groups had menarche

between the ages of 11 and 13, according to the study's findings regarding menstrual history. This outcome is comparable to **Sima R et al's (2022)** determining that the menarche age was 12.39 ± 1.33 on average. Most study participants—both in the study and control groups—also had normal menstrual cycles that lasted between 28 and 30 days. This conclusion was in line with that of **Abo-Hatab T. (2017)**, who observed that most students experienced regular menstruation with an average 28–30-day interval. Furthermore, **HashemSh et al. (2018)** demonstrated that most nursing students polled experienced regular menstruation, with over half reporting an interval of more than two weeks. These findings aligned with the results of the current study, which found that the majority of respondents experienced an interval of $>27-35$ days.

This result is consistent with the findings of **Charan et al. (2019)**, who found that the average age at menarche is 12.37 ± 0.71 . Furthermore, these results were corroborated by **Aboushady & El-El-said (2016)**, who examined the effects of menstrual care and at-home stretching exercises on primary dysmenorrhea and premenstrual symptoms in adolescent females in Egypt. They discovered that 18.5 years old, or 12.5 ± 2.08 , was the average age at menarche.

Furthermore, the menstrual bleeding lasted anywhere between 6-7 days for exactly half of the students who participated in the study. This finding agrees with **Akbas E (2019)**, who showed that the average menstrual cycle lasted 6.1 ± 0.087 days. Additionally, just around two thirds of the study and control groups had moderate menstrual flow, according to the current study (two to three pads per day). This result aligns with the findings of **Moghadam (2019)**, who reported that less than two-thirds of the assessed medical students experienced menstrual cycles lasting a moderate duration.

The majority of the female study participants reported using sanitary towels in the range of 2-3 each day, according to the current study, which also examined the types of towels used during menstruation and the number of pads changed daily. This may be related to the influence of television, which increased their knowledge of the availability and usage of sanitary pads. Contrary to the results of a cross-sectional study conducted in 2017 by **Hakim et al.** on Indian girls' knowledge, attitudes, and actions surrounding the menstrual cycle and related issues, more than two-fifths of students utilized sanitary pads exclusively.

According to the results of the current study, the majority of the students in both groups who were evaluated had dysmenorrhea, which began 48 hours after the onset of the menstrual cycle. The results of **Abo-Hatab (2017) and Hashem et al. (2018)**, who found that almost two-thirds of the students in both groups reported pain that started at the onset of menstruation and lasted for the

first 48 hours, are consistent with this conclusion. Prostaglandins are released in response to the shedding of the endometrial lining, reaching their peak within 48 hours, according to literature evaluations, which further corroborated this finding.

According to the current study, less than two-thirds of the study and control groups felt lower abdominal discomfort, but more than half of them reported lower back pain. These findings were consistent with those of **Hashem et al. (2018) and Mohamed and Hafez (2017)**, who found that the studied students first had lower back discomfort before going on to lower abdomen pain. Moreover, the present study's findings demonstrated that over 50% of the research and control groups relied on non-pharmacological interventions to address dysmenorrhea.

According to the results of the current investigation, findings indicate that there was no appreciable difference in the study and control groups' pre-intervention behavioral response scores for any of the behavioral response questions. This may be connected, in the researchers' opinion, to the similarity between the two groups in that neither group has undergone the PMR approach.

The study group's mean score on the modified Behavioral Pain Scale considerably decreased after the intervention, based on the average pain dysmenorrheal severity score of the female students under investigation in both the study and control groups. The beneficial benefits of progressive muscle relaxation on pain reduction in the study's female participants provide evidence for this.

Additionally, the results align with a research study conducted by **Paula et al. (2012)** titled "The Use of the Progressive Muscle Relaxation Technique for Pain Relief in Gynecology and Obstetrics," which discovered that the study group's pain perception was greatly reduced by PMR.

The current study found that after exercise, there was a statistically significant difference in pain levels between the intervention groups in the pre- and late-post-tests. The uterus's enhanced blood flow and metabolism during exercise may be responsible for this result, which may help to lessen the symptoms of dysmenorrhea. It is well known that stress raises sympathetic activity, which exacerbates menstrual discomfort and uterine contractions. By generating endorphins, exercise can reduce this sympathetic activity and reduce stress, brain chemicals that

increase the threshold for pain, so minimizing symptoms **Kaur et al., (2015)**.

According to Chang E et al (2018), exercise taping helps reduce dysmenorrhea pain in female university students. This study's findings corroborated those of **Gopagar M and Devi P (2020)**, **Cahyanto E et al (2021)**, and **Purba R et al (2021)** studies, which examined the impact of exercise on primary dysmenorrhea and discovered that these activities significantly lessened the condition's severity. These results corroborate those of **Khare & Jain (2015)**, who examined how different exercise regimens affected primary dysmenorrhea in Indian higher secondary school females. They discovered that following the exercise intervention, the case and control groups experienced a higher degree of pain reduction in terms of intensity.

The results of our investigation shown a significant drop in the study group's post-intervention mean and standard deviation of dysmenorrheal duration when compared to the control group. This finding supported the research done in **2012 by Salehi F et al.**, who found that exercise could reduce the length of time that primary dysmenorrhea lasts.

The results of **Karami E and Ghasemi B (2014)**, who examined the effects of aquatic exercises, kegal& stretching exercises, pelvic rocking exercises, and plan-based exercises, corroborate those of **Rezvani et al. (2013)**. They discovered that exercise significantly shortened the duration of primary dysmenorrhea. The researcher speculates that these outcomes might be caused by endorphins released during exercise, which raise pain thresholds. Additionally, exercise can increase circulation, which will reduce ischemia and minimize the duration of discomfort by improving blood flow to the uterus.

The results of this study demonstrated a significant decrease in the study group's fatigue scores following the intervention when compared to the control group; these findings are in line with those of **Dehkordi & Rastar (2016)**, who looked at the effects of progressive muscle relaxation on older adults' social performance and quality of life, and **Akgun & Dayapoglu (2015)**, who looked at the effects of progressive relaxation exercises on patients with schizophrenia's fatigue and sleep quality. The objectives and premise of the current study were validated by these findings. This can be a sign of how crucial it is to use the gradual muscle relaxation technique.

Conclusion:

Based on the results of the present study, it can be concluded that the Progressive muscle relaxation technique had a positive effect on reducing pain intensity and fatigue among female adolescents

with primary dysmenorrhea. The results of the study showed that there was a statistically significant difference in the study group's mean scores for levels of pain and fatigue at the $p < 0.05$ level.

Recommendations

Based on the results of the present study, the following recommendations are suggested:

- The progressive muscle relaxation technique is a systematic approach to lessen pain intensity and exhaustion in female adolescents with primary dysmenorrhea, it should be employed as a non-pharmacological treatment.
- Increase female students' knowledge of the benefits of progressive muscle relaxation techniques by including a lesson on how to use the media to alleviate the pain and fatigue associated with dysmenorrhea.
- **Further studies about**
- The impact of several progressive muscle relaxation techniques on female students' pain and fatigue in order to reduce physical issues.
- A large-group replication of this study.
- Evaluating the benefits of progressive muscle relaxation techniques against those of alternative approaches, such music or visualization.

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