

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

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### Abstract:

Progressive muscle relaxation (PMR) therapy is considered one of the alternative therapies used for reducing pain intensity and fatigue. Dysmenorrhea is primary or secondary on the base of the absence or presence of pathology. **The study aimed to** 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: **Tool (I):** A self-administered questionnaire, **Tool (II):** A modified Behavioral Pain Scale, **Tool (III):** A fatigue assessment scale, and **Tool (IV):** Dysmenorrheal duration assessment sheet. **Results:** No statistically significant differences were noticed between the study and control groups concerning their all demographic characteristics. Results of the present study revealed that statistically significant differences were detected between the study and control groups regarding their pain intensity post-intervention. A significant reduction in fatigue scores in the study group as compared to the control group post-intervention ( $p=0.0001$ ). **Conclusion:** Progressive muscle relaxation technique had a positive effect on reducing pain intensity and fatigue among female adolescents with primary dysmenorrhea. **Recommendations:** Progressive muscle relaxation technique should be used as a non-pharmacological method because it is a systematic technique to reduce pain intensity and fatigue among female adolescents with primary dysmenorrhea.

**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. With an 87.5% incidence in Egypt, it is one of the most common gynecological complaints (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, which radiates to the inner and outer sides of the thighs (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 F<sub>2</sub> 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, increase one's activity level and functional capacity, and minimize the amount of analgesic medication required, reducing the treatment's negative effects (Abd El-Aziz, 2019). The use of complementary therapy as an adjuvant treatment may enhance pain control and reduce immediate postoperative discomfort. Transcutaneous nerve stimulation, the use of hot or cold compresses, exercises, positioning, massage, distraction, hypnosis, 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, according to Jacobson, "an emotional state fails to exist." Jacobson felt that such a state might lower arousal in the central nervous system and the autonomic nervous system, and the outcome could restore or promote psychological and physiological well-being. (Cooke, 2013) Progressive muscular relaxation is a non-pharmacologic technique that is straightforward, secure, affordable, accessible, self-induced by the patient, as well as simply applied. Additionally, it has recently become an essential component of nursing care because it is a systematic method for lowering stress, anxiety, sadness, pain perception, muscle tension, and contractions, as well as promoting sleep (Aziz and Elgzar, 2018).

Additionally, several studies have shown that PMR boosts the body's defenses and sensation of well-being via releasing endorphins. Additionally, it boosts energy, a sense of control, and the capacity to silence inner dialogue (Bialas et al., 2020). It also improves the performance of physical activities, causes warm or cool body parts, and enhances parasympathetic activity, which lowers the cardiac index, blood pressure, heart rate, and breathing rate. One of the methodical methods for achieving a deep state of relaxation is progressive muscle relaxation (Chandrababu, 2018).

The nurse plays a critical role in pain treatment by providing comfort measures and reassurance to alleviate pain. By offering reassurance and comforting techniques to reduce pain, the nurse plays a crucial part in pain therapy. Both pharmacological and non-pharmacological measurements are used here. Primary dysmenorrhea treatment that does not use drugs avoids the drawbacks of drug-based pain control. Pharmacological treatments include things like nonsteroidal anti-inflammatory drugs, oral contraceptives, and even surgery. Contrarily, non-pharmacological treatment options include hot baths, hot drinks, acupuncture, acupressure, massage, aromatherapy, reflexology, and physical activity (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. The normal age range of occurrence for primary dysmenorrhea is between 17 and 22 years old, making it one of the most prevalent issues among teenagers (Mole, 2017; Renuka & Jeyagowri, 2015). The prevalence of dysmenorrhea was high (66.0%) in Egypt, with 28.4% of cases being mild, 24.3% being moderate, and 13.3% being severe (Nooh, 2016).

The progressive muscle relaxation technique is one of the non-pharmacological 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:**

Primary dysmenorrhea is defined as painful menstruation that occurs in the absence of any significant pelvic pathology. It usually develops after the first one or two years of the 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:**

Multi stages samples were used in this study, Port Said contains 10 governmental secondary schools. We selected 20% from the total number of schools by stratified random sample which was about two schools. The total number of students in all secondary schools was about 750 students, we have taken 10% of students from the two schools by simple random sample (150 girls)

### **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 included the following two parts:

Part I: Demographic data of the female adolescents: It included age, academic year, and residence.

Part II: Menstrual history: It included age at menarche, rhythm, interval, and duration of menstruation, amount of menstrual bleeding by counting several saturated pads, and dysmenorrhea characteristics (onset, degree, location, associated symptoms of pain and any previous methods used to relieve dysmenorrhea).

### **Tool (II): A modified Behavioral Pain Scale:**

It was developed by Mateo and Krenzischek, (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 include relaxed, guarded, or tense posture. The options for gross motor activity are extremely restless, mildly restless, and tranquil. There are three options for facial expression: no frowning, slight frowning, and persistent frowning or grimacing. Finally, parturient verbalization ranged from typical no sound to grunts and sobbing. Each of the 12 alternatives is scored as either (0) absent or (1) present. The total scores range from 0-12. Statistically, this score was translated to the corresponding pain intensity as follows:

- (0): No behavioral responses to pain
- (< 4): Mild behavioral responses to pain

- (4-6): Moderate behavioral responses to pain
- (7-10): Severe behavioral responses to pain
- ( $\geq 11$ ): Unbearable behavioral responses to pain

#### **Tool (III): Fatigue assessment scale:**

This tool was adopted from Kleijn et al., (2011) in the English language, It was a self-created rating scale with ten items (which assess fatigue of individuals during various activities in a week in terms of physical, social, psychological, and spiritual domains and its relationship with time of the day). Scores range from 0 (no weariness) to 10 (worst possible), with a maximum total score of 100. No weariness, hardly any, light, moderate, severe, and worst. With a Cronbach's alpha of 0.81 for the overall score, the scale's reliability is regarded as good.

#### **Tool (IV): Dysmenorrheal duration assessment sheet:**

It was developed by the researchers to determine the duration of dysmenorrhea pre-intervention (baseline measurements) and eight weeks post-intervention.

#### **Validity of the Tool:**

Content validity of the tools for clarity, comprehensiveness, and appropriateness was tested by a board of five expert professors, three expert professors in the Obstetrics and Gynecological Nursing Department, and two professors from the community health nursing department.

#### **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:**

A pilot study was applied to 10% of the total (15 female adolescents). The clarity and testing of the feasibility of the research process needed for modifications were carried out based on the results of the pilot study to develop the final form of the tools. Female adolescents involved in the pilot were excluded from the current study.

#### **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 purpose of the study was explained to female adolescents. The researchers informed the participants that, the study was voluntary, they were allowed to refuse to participate and they had the right to withdraw from the study at any time, without giving any reason. Moreover, they were assured that their information would be confidential and used for research purposes only.

#### **Fieldwork:**

Based on a pre-test assessment of PMR female adolescent students' the program was prepared to improve female adolescent students' knowledge.

#### **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 received progressive muscle relaxation intervention and routine care and 75 female adolescents in the control group without progressive muscle relaxation intervention who received routine care only).

- 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, demonstration and re-demonstration, models, and the use of visual aids like pictures, handouts, posters, and a blackboard were employed (progressive muscle relaxation technique).

- The participants in the control group received routine care as an evaluation of physical health and drug administration.

## 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.
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- Port Said City's ministry of education granted authorization after receiving formal approval from the two secondary schools' administrators.
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- 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 research team split the study group into smaller groups.
- Each training session will consist of 7-8 female teenagers with primary dysmenorrhea. For a better comprehension of the training, they viewed a film that the researchers had produced about progressive muscle relaxation techniques. In front of them, the researchers then performed a demonstration of the progressive muscle relaxation approach.
- Teaching methods included group discussion, demonstration and re-demonstration, models, and pictures (progressive muscle relaxation technique).
- Pain and fatigue Intensity of the female adolescents was assessed pre-intervention
- The duration of female adolescents' dysmenorrhea was reassessed pre-intervention
- The researchers introduced themselves to the students and explained the purpose of the study; the demographic data, tool 2, and tool 3 were collected from the students without the application of the progressive muscle relaxation technique.
- In this study, the questionnaire was distributed two times; pre and post-four weeks of the intervention, and the continuation of doing exercises was followed by phone calls.
- The researchers ask students to lie down comfortably on a bed facing upward/you can also sit in a reclining chair.
- Patients were asked to lose tight clothes; remove glasses, watches, or jewelry.
- Tense and relax a specific group of muscles (palm, forearm, upper arm, shoulder, neck, eyes, forehead, scalp, eyebrow, chest, abdomen, buttock, thigh, lower leg, feet, and sole muscles) as per the instruction.
- To begin the relaxation exercise, the researchers instructed each student to inhale deeply, hold it for two seconds, and then gently exhale.
- 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 technique was to be practiced by the students three times a day, in the morning, afternoon, and night shifts.
- 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 students were then instructed by the researchers to go over each step again and practice the method three to four times until they were proficient.
- 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  
Evaluate the effect of progressive muscle relaxation technique on pain intensity and fatigue associated with primary dysmenorrhea among female adolescents

### Specific objectives to

- 1- Implement a program regarding

### dysmenorrhea2- Apply a progressive muscle relaxation technique

3- Evaluate the effect of progressive muscle relaxation technique on reducing pain intensity and fatigue associated with primary dysmenorrhea among female adolescents.

**Designed manual booklet about progressive muscle relaxation:** This booklet contained illustrative colored pictures and the main points of each training session

**Title:** Progressive muscle relaxation technique

**Outlines of the booklet:**

- 1- Introduction to a progressive muscle relaxation technique
- 2- Meaning of progressive muscle relaxation technique
- 3- The technique of progressive muscle relaxation technique
- 4- Causes of progressive muscle relaxation technique
- 5- Importance of progressive muscle relaxation technique
- 6- Steps of massage technique demonstration.

### Evaluation phase:

- The intensity of pain among the female adolescents' dysmenorrhea was assessed four weeks post-intervention among the study and control groups.
- Duration of female adolescents' dysmenorrhea was reassessed four weeks post-intervention using the same pre-intervention tools in the study and control groups to evaluate the effect of progressive muscle Relaxation Technique on pain intensity and fatigue among female adolescents with primary dysmenorrhea.

### 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 ( $\chi^2$ ) 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):** Presents the demographic characteristics among the studied female students (study and control groups). It was found that the teenage of the study group was  $16.31 \pm 0.78$  years corresponding to  $16.73 \pm 0.43$  years among the control group. It was also, observed that more than half (72% and 75%, respectively) of the study and control groups had been born in urban areas with no statistically significant differences between the two groups ( $\chi^2 = 1.106$ ,  $P = 0.062$ ). Regarding

**Table (2):** depicts the menstrual history of the female students under study (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 ( $\chi^2 = 0.100$ ,  $P = 0.762$ ).

Concerning the menstrual cycle interval, **table (2)** also demonstrates that the majority of the participants in the study and control groups (96.0% and 93.0%, respectively) had an interval of 28–30 days with no statistically significant differences between the two groups ( $\chi^2 = 0.703$ ,  $P = 0.413$ ) and that the majority of the participants in the study had menstrual bleeding for an average of 6-7 days (52% and 49%, respectively). ( $\chi^2 = 0.815$ ,  $P = 0.033$ ). In addition 80% and 81%, respectively) of the study and the control, groups had moderate menstrual flow (2-3 pads/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) ( $\chi^2 = 0.517$ ,  $P = 0.768$ ). Less than two-thirds (64.0% and 66.0%, respectively) of the groups experienced discomfort in the lower abdomen, but more than half (52.0% and 51.0%, respectively) experienced pain in the lower back. Furthermore, more than half (52% and 51%, respectively) adopted non-pharmacological techniques to treat their dysmenorrhea.

**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. Female students in the study and control groups pre-intervention had clear average VAS-modified Behavioral Pain Scale scores of (9.05-1.78 and 9.93-1.45, respectively), with no statistically significant difference ( $Z=0.573$  and  $P=1.769$ ). Post-intervention, there were statistically significant differences between the study group's mean modified Behavioral Pain Scale score of 1.671.56 and the control group's mean score of 7.562.67 ( $Z=7.632$  and  $P=0.0001$ ).

**Table (5):** The pre- and post-intervention mean and standard deviation of the duration of dysmenorrhea in the study and control groups of the female students who were the subject of the study, it was clear that 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  $P= 0.227$ ). These values were ( $4.89\pm 1.27$  and  $4.36\pm 1.21$ , respectively). On the other hand, the study group's mean and standard deviation of dysmenorrheal duration significantly decreased post-intervention ( $1.78\pm 0.52$ ) compared to ( $4.03\pm 1.15$ ) among the control group with a statistically significant difference ( $Z=8.767$  and  $P=0.0001$ ).

From **table 6**, it was observed that no statistically significant decrease was found in fatigue levels from pre-intervention among both groups. Moreover, in the study group, a statistically significant decrease was noticed in fatigue post-intervention ( $p0.0001$ ).

Table (1): Percentage distribution of the studied female students (study and control groups) regarding their demographic characteristics

| Variables             | Students(n=150)   |      |                      |      | x 2   | P     |
|-----------------------|-------------------|------|----------------------|------|-------|-------|
|                       | Studygroup (n=75) |      | Control group (n=75) |      |       |       |
|                       | N                 | %    | N                    | %    |       |       |
| <b>Age(years):</b>    |                   |      |                      |      | 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           |      |       |       |
| <b>Residence:</b>     |                   |      |                      |      | 1.106 | 0.062 |
| Rural                 | 54                | 72.0 | 56                   | 75.0 |       |       |
| Urban                 | 21                | 28.0 | 19                   | 25.0 |       |       |
| <b>Academic year:</b> |                   |      |                      |      | 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&lt;0.05)

Table (2): Percent distribution among the studied female students in the study and control groups regarding their menstrual history

| Variables  | Students(n=150)    |      |                      |      | x 2   | P     |
|--|--------------------|------|----------------------|------|-------|-------|
|  | Study group (n=75) |      | Control group (n=75) |      |       |       |
|  | N                  | %    | N                    | %    |       |       |
| <b>Age of menarche(years):</b>                     |                    |      |                      |      | 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  |       |       |
| <b>The rhythm of menstruation:</b>                 |                    |      |                      |      | 0.100 | 0.762 |
| Regular  | 70                 | 93.0 | 72                   | 96.0 |       |       |
| Irregular  | 5                  | 7.0  | 3                    | 4.0  |       |       |
| <b>Interval of the menstrual cycle(days):</b>      |                    |      |                      |      | 0.703 | 0.413 |
| <28  | 3                  | 4.0  | 5                    | 7.0  |       |       |
| 28-30  | 72                 | 96.0 | 70                   | 93.0 |       |       |
| <b>Duration of menstrual blood flow(days):</b>     |                    |      |                      |      | 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  |       |       |
| <b>Amount of menstrual blood(No. of pads/day):</b> |                    |      |                      |      | 0.128 | 0.049 |
| Slight(One)  | 10                 | 13.0 | 8                    | 11.0 |       |       |
| Moderate(2-3)                                      | 60                 | 80.0 | 61                   | 81.0 |       |       |



|                       |   |     |   |     |  |  |
|-----------------------|---|-----|---|-----|--|--|
| Excessive( $\geq 4$ ) | 5 | 7.0 | 6 | 8.0 |  |  |
|-----------------------|---|-----|---|-----|--|--|

\*Significant ( $P < 0.05$ )       $\chi^2$ : Chi-square test

**Table (3): Percent distribution among the studied female students in the study and control groups regarding their dysmenorrheal characteristics**

| Variables   | Students (n=150)   |      |                      |      | x <sup>2</sup> | P     |
|---|--------------------|------|----------------------|------|----------------|-------|
|   | Study group (n=75) |      | Control group (n=75) |      |                |       |
|   | N                  | %    | N                    | %    |                |       |
| <b>▪ The onset of dysmenorrhea:</b>                     |                    |      |                      |      |                |       |
| -Before the menstrual period                            | 15                 | 20.0 | 13                   | 16.0 | 0.517          | 0.768 |
| -With the onset of menstruation & continue for 48 hours | 60                 | 80.0 | 62                   | 83.0 |                |       |
| <b># Location of dysmenorrhea:</b>                      |                    |      |                      |      |                |       |
| -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 |
| <b># Associated symptoms with dysmenorrhea:</b>         |                    |      |                      |      |                |       |
| -Fatigue & tiredness                                    | 70                 | 93.0 | 69                   | 92.0 | 0.901          | 0.343 |
| -Drowsiness   | 50                 | 71.0 | 39                   | 52.0 | 1.714          | 0.190 |
| -Nausea & vomiting                                      | 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 |
| <b># Previous methods used to relieve dysmenorrhea:</b> |                    |      |                      |      |                |       |
| -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 ( $P < 0.05$ )       $\chi^2$ : Chi-square test # : More than one answer was chosen

**Table (4): Mean score of pain dysmenorrheal severity among the studied female students in the study and control groups according to modified Behavioral Pain Scale pre and post-intervention.**

| Pain dysmenorrhea severity  | Students (n=150)   |                      | Value | P       |
|-----------------------------|--------------------|----------------------|-------|---------|
|                             | Study group (n=75) | Control group (n=75) |       |         |
| <b>▪ Pre-intervention:</b>  |                    |                      |       |         |
| Mean $\pm$ SD               | 9.05 $\pm$ 1.78    | 9.93 $\pm$ 1.45      | 0.573 | 1.769   |
| <b>▪ Post-intervention:</b> |                    |                      |       |         |
| Mean $\pm$ SD               | 1.67 $\pm$ 1.56    | 7.56 $\pm$ 2.67      | 7.632 | 0.0001* |
| x <sup>2</sup> value        | 41.563             | 2.863                |       |         |
| P                           | 0.0001*            | 0.265                |       |         |

\*Significant ( $P < 0.05$ )      x<sup>2</sup> value of Friedman test      Z value of Mann-Whitney test

**Table (5): Mean and standard deviation of dysmenorrheal duration among the studied female students in the study and control groups pre and post-intervention**

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

\*Significant(P&lt;0.05)

x<sup>2</sup>valueofFriedmantest

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:**

Primary dysmenorrhea is one of the most widespread and significant health issues, particularly in adolescent females. It interferes with everyday activities, harms physical and emotional well-being, and lowers the quality of life. 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. Jacobson's progressive muscle relaxation technique is one of the greatest complementary therapies that may be quickly learned, inexpensive, and do not require specialized equipment. It is non-pharmacological, very simple to learn, and is regarded as one of the most effective complementary therapies (Alwan et al., 2018). The current study, therefore, sought to assess the impact of PMRT on the degree of pain and exhaustion related to primary dysmenorrhea in female adolescents.

Results of the current study indicated that no statistically significant differences were noticed

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.

The present study showed that the mean age group of students was 16.31±0.78 years corresponding to 16.73±0.43 years among the control group, These findings are in line 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.

The current study revealed that over three-fifths of the studied students were enrolled in their first year of study concerning academic year. According to the experts, this may be explained by the first academic years being more dedicated to attending classes relevant to educational curriculum evaluation each month.

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)** finding that the average age of menarche was  $12.39 \pm 1.33$ . The majority of the participants in the study (both the study and control groups) also experienced regular menstruation with an interval of 28 to 30 days. This result agreed with that of **Abo-Hatab T. (2017)**, who noted that the majority of the students had regular menstruation with an average interval of 28–30 days. Additionally, **HashemSh et al. (2018)** showed that the majority of the nursing students surveyed had regular menstruation and that more than half of them had an interval of more than two weeks, which was in line with the findings of the current study of  $>27-35$  days.

This finding is in accordance with **Charan, et al., (2019)** who reported that the mean age of menarche is  $12.37 \pm 0.87$ . Additionally, **Aboushady & El-El-said (2016)** on the impact of at-home stretching exercises and menstrual care on primary dysmenorrhea and premenstrual symptoms among adolescent girls in Egypt validated these findings. They found that the mean age of menarche was 18.5 years old  $12.5 \pm 2.08$ .

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  $6.1 \pm 0.87$  days. Additionally, the current study found that only about two-thirds of both the study and control groups experienced moderate menstrual flow (two to three pads per day). This finding is consistent with **Moghadam, (2019)**, who stated that fewer than two-thirds of the medical students who were evaluated had menstrual cycles that lasted for a moderate amount of time.

Concerning the number of pads changed each day and the different types of towels used during menstruation, the current study showed that the majority of the female study participants reported using sanitary towels in the range of 2-3 each day. This could be linked to television's effect, which raised their awareness of sanitary pad availability and use. According to these findings, more than two-fifths of students solely used sanitary pads, which is contrary to the findings of **Hakim et al., (2017)** cross-sectional study on the knowledge, attitude, and behaviors of girls in India regarding the menstrual cycle and associated difficulties.

According to the results of the current study, the majority of the students in both groups who were evaluated had dysmenorrhea, which started with the start of menstruation and lasted for 48 hours. This finding is consistent with those of **Abo-**

**Hatab, (2017) and Hashem et al. (2018)**, who indicated that about two-thirds of the students in both groups reported experiencing pain that began at the start of menstruation and persisted for the first 48 hours. 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.

Less than two-thirds of the study and control groups reported having discomfort in their lower abdomen, however, more than half of them reported having pain in their lower back, according to the current study. These results were in line with those of **Mohamed and Hafez (2017) and Hashem et al. (2018)**, who discovered that the researched students experienced pain in the lower back before moving on to the lower abdomen. Furthermore, the results of the current investigation showed that more than half of the study and control groups relied on non-pharmacological treatments to alleviate their dysmenorrhea.

According to the results of the current investigation, there was no discernible change in pre-intervention behavioral response scores between the study and control groups for any behavioral response items. 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, according to the mean score of pain dysmenorrheal severity among the studied female students in the study and control groups. This is supported by the favorable effects of gradual muscular relaxation on pain reduction in the female pupils under investigation.

Furthermore, the findings are consistent with a study by **Paula et al. (2012)** entitled "The Use of the Progressive Muscle Relaxation Technique for Pain Relief in Gynecology and Obstetrics," which found that PMR significantly reduced pain perception in the study group.

According to the current study, there was a statistically significant difference in the levels of pain across the intervention groups following exercise in pre- and late-post-tests. This outcome may be accounted for by the uterus's increased blood flow and metabolism during exercise, which may be useful in reducing dysmenorrheal symptoms. Stress is known to increase sympathetic activity, which can worsen uterine contractions and make periods more painful. Exercise may lower this sympathetic activity and relieve stress by releasing endorphins, 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. The results of this study agreed with those of Gopagar M and Devi P (2020), Cahyanto E et al (2021), and Purba R et al (2021), who looked into the effects of exercise on primary dysmenorrhea and found that these exercises greatly reduced the severity of the condition. These findings support those of Khare& Jain (2015), who investigated the impact of various exercise techniques on primary dysmenorrhea in higher secondary school girls in India. They found that after exercise intervention, there was a greater reduction in pain between the case and control groups in terms of pain intensity.

Our study showed a substantial reduction in the mean and standard deviation of dysmenorrheal duration among the study group compared to the control group post-intervention. This discovery corroborated the findings of **Salehi F et al (2012)**, who discovered that exercises could shorten the duration of primary dysmenorrhea.

**Rezvani et al. (2013)**'s findings are supported by those of **Karami E and Ghasemi B (2014)**, who investigated the effects of aquatic exercises, kegal& stretching exercises, pelvic rocking exercises, and plan-based exercises, and found that exercise significantly reduced the duration of primary dysmenorrhea. According to the researcher, these results can be because exercise can release endorphins, increasing one's pain tolerance. Exercise can also improve blood flow to the uterus, alleviating ischemia and ultimately shortening the length of discomfort by increasing circulation.

The current study's findings showed a significant reduction in fatigue scores in the study group after the intervention when compared to the control group; these results are consistent with those of **Dehkordi& Rastar (2016)**, who examined the impact of progressive muscle relaxation on social performance and quality of life in older adults, and **Akgun & Dayapoglu (2015)**, who examined the impact of progressive relaxation exercises on fatigue and sleep quality in patients with schizophrenia. 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 study revealed that there was a statistically significant difference between mean scores at  $p < 0.05$  level in the study group regarding pain and fatigue levels.

### **Recommendations**

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

- The progressive muscle relaxation technique should be used as a non-pharmacological method because it is a systematic technique to reduce pain intensity and fatigue among female adolescents with primary dysmenorrhea.
- Improve female students' awareness about the effect of progressive muscle relaxation techniques by incorporating this topic into curriculums to relieve pain and fatigue of dysmenorrhea through mass media.
- **Further studies about**
- The effect of different progressive muscle relaxation techniques on pain and fatigue among female students to minimize physical problems.
- Replication of this study on a large group.
- Comparing the effect of progressive muscle relaxation techniques with other methods such as listening to music or imagination.

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