

## Effect of Progressive Muscle Relaxation Technique on Menstrual Cramps among Adolescent students

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### Abstract

**Background:** Menstrual cramps are one of the most frequent problems that adolescents face, and it have a significant impact on females' quality of life. Progressive muscle relaxation is a useful technique to minimize menstrual cramps after short, basic training. It is one of the most effective complementary therapies because it is simple to learn, inexpensive, highly useful, and has no negative side effects. **Aim:** to evaluate the effect of progressive muscle relaxation technique on menstrual cramps among adolescent students. **Design:** A quasi-experimental research design one-group (pre/post-test) was utilized to achieve the aim of the current study. **Setting:** The study was conducted at the Faculty of Nursing - Sohag University. **Sample:** A purposive sample of 530 first-year adolescent students enrolled at the Faculty of Nursing-Sohag University was included in the study. **Tools for data collection: Tool I:** A structured interviewing questionnaire that consists of two parts; part (1) adolescent students' personal data; part (2) adolescent students' menstrual history; **Tool II:** Numeric Pain Rating Scale (NPRS). **Results:** The majority of the adolescent students had mild pain and less than one fifth of them had moderate pain while none of them had severe pain post-progressive muscle relaxation technique application. A highly statistically significant differences in the mean pain total scores among the adolescent students pre & post application. Moreover, there is highly significantly decrease in the pain total scores in the post-application as compared to pre application of progressive muscle relaxation technique. **Conclusion:** Progressive muscle relaxation technique has an impact on reducing menstrual cramps when they are practiced on a regular basis. **Recommendations:** Progressive muscle relaxation technique should be utilized as a supportive therapy to help adolescent students to alleviate menstrual cramps.

**Keywords:** Progressive muscle relaxation technique, Menstrual cramps, Adolescent students.

### Introduction

Adolescents have a transitional stage as well as cases that are quite challenging (Marlow & Redding, 2018). Menstruation is the term used to describe regular bleeding from the uterus that starts about fourteen days after ovulation and is brought on by the uterine endometrial lining's shedding. Because the egg is not fertilized by the sperm in this case, the endometrium that had grown on the uterine wall in preparation for pregnancy sheds. A healthy girl's menstruation usually lasts 3 to 7 days, and menstrual cycle typically lasts 28 to 35 days. A girl's menstrual cycle is considered abnormal if it lasts more than 40 days or less than 21 days (Olyai & Dutta, 2020).

Menstrual cramps are a condition characterized by lower abdominal pain that begins two or more days prior to menstruation (Puja Dudej, 2018). As a severe menstrual condition, cramps associated with periods are a cramping and colic-like condition that is most frequently felt as back and abdominal discomfort. On the first day of the menstrual cycle, discomfort is typically felt. Many young females suffer from menstrual cramps, which are one of the most prevalent gynaecological conditions. (Karanth & Liya, 2018).

Worldwide, 45% to 95% of females of reproductive age experience menstrual cramps, with 2% to 29% reporting severe pain. The difference in rates may be explained by changes

in the methodology used to measure menstrual cramps, the population that was chosen, age groups, ethnicity, and regional disparities in pain perception. Younger females typically had a higher prevalence (70% to 90%) than older females (Itani et al., 2021; Kuphal, 2018; Mendiratta & Lentz, 2017).

According to Hidayatunnafiah et al. (2022), between 60 and 90% of adolescents frequently complain of menstrual cramps, with 75% of these adolescents' reporting mild to severe pain. Menstrual cramps can affect females' activities, particularly those of young girls, if they aren't treated right away. They need medical attention or prescription of medications in order to function normally. 7–15% of young females who experience menstrual cramps, which range from 30–60%, choose not to attend work or school.

Being less than 20 years old, having nulliparity, having an excessive period, using tobacco, dieting, being physically inactive, having depression, and having anxiety are all risk factors for menstrual cramps. Menstrual cramps can be moderate or severe enough to disrupt females' daily activities. In addition to abdominal and lower back pain, they may experience headache, syncope, pain in the legs, feeling nauseous, bowel problems, tiredness, feelings of depression, and breast discomfort may also be present besides abdominal and low backache (Ganesh, Chodankar, and Parvatkar, 2017).

Health care team typically fails to appropriately manage menstrual cramps because they are generally ignorant of their high incidence and morbidity. The general assumption is that 50% of young females who are menstruating have primary menstrual cramps, while up to 90% of them may have some degree of menstrual cramping. Some females might not be very disturbed by it, even though it interferes with their daily activities, and some of them don't use medications (Patricio & Sergio, 2019).

Help-seeking behaviours, whether through friends and family or formally through healthcare consultations, are notably complex and may be influenced by a lack of health literacy and psychosocial factors such as embarrassment, stigma, and perceptions that menstrual pain is not a legitimate health concern. Furthermore, menstrual cramps are significantly affected by sociocultural attitudes, with periods being

regarded as shameful in some sociocultural contexts. Additionally, communication about menstruation is culturally constrained and girls have been instructed to keep silent about menstruation; there is a taboo that makes discussing menstruation and associated symptoms socially unacceptable (Ní Chéileachair, McGuire, & Durand, 2022).

Adolescent girls with menstruation cramps might receive both pharmacological and non-pharmacological treatments. Pharmacological methods are those that use drugs to treat pain, such as analgesics or chemical therapy. One autonomous nursing intervention for managing pain is the use of non-pharmacological techniques. Non-pharmacological therapies include warm compresses, massages, yoga, hypnosis, and progressive muscle relaxation techniques (Sudhadevi, 2021).

Progressive muscle relaxation (PMR) involves prolonged breathing exercises with a sequence of targeted muscular contractions and relaxations. The technique focuses on muscle activation by identifying tight muscles and then relaxing them to reduce tension (Akilandeswari, 2020). A mental cue telling the individual to concentrate on the order in which the muscles are relaxing may be added to the 15 to 30 minutes of progressive muscle relaxation technique (SONIA, 2021). Because PMR is a less complicated and more affordable approach that gradually contracts and releases seven key muscle groups in the human body, it may be preferred in different setting because it is time-efficient and requires fewer sessions to finish training. As a result, PMR can be utilized as a body-mind intervention for adolescents (Tsai, Cheng, Yang, & Wang, 2021).

Progressive muscle relaxation, which can have a greater influence on both psychological and physical symptoms prior to the period, it is one of the complementary therapies that can help most females with menstrual cramps. (Jebakani, 2019). An efficient method for achieving a harmony of both the sympathetic and parasympathetic nervous systems is progressive muscle relaxation (PMR). When the body is relaxed, psychological tension is automatically relieved, which lessens the physical effects of stress (Sudhadevi, 2021). Therefore, it can be utilized as a therapy to alleviate stress, pain, and discomfort. (Ghorbannejad et al., 2022; Vinitha

and Madhuri, 2020).

Community health and gynaecological nurses are frequently the initial point of contact for adolescent students experiencing cramps during their menstruation. However, they have a unique chance and responsibility to actively work on menstruation-related issues in an attempt to enhance the well-being and health of students. (National Board of Health and Welfare, 2018). They should provide adolescents students with appropriate guidance for the rapid management of menstrual cramps and encourage them to use safe complementary therapy methods (Angelhoff & Grundström, 2023; Akilandeswari, 2017; De Sanctis et al., 2017).

### Significance of the study

Menstrual cramps are one of the most prevalent issues among adolescents since they are frequently associated with menarche and present at that time (Mole, 2017). Menstrual cramps were common (66.0%) in Egypt, with 28.4% of cases mild, 24.3% moderate, and 13.3% severe (Abdelhalim, Sweelam, Mohamed, Amer, & Shabory, 2023). Menstrual cramps can have a significant impact on an individual's psychological well-being and health-related quality of life, especially in adolescents (George, Suresh, & Alias, 2019). Severe menstrual cramps have been linked with activity restriction and absenteeism from school, college, or work. Menstrual cramps, as a result, represent a considerable health burden and social-economic cost (Çelik and Apay, 2021; Figueira et al., & Jebakani, 2019).

Self-care practices are essential for developing a fulfilled life and personal respect in adolescent and it is crucial for their dignity and good health. Education is a crucial part of managing menstrual cramps. It is the responsibility of nurses and other health personnel to offer comprehensive care for adolescent. As a result, providing teenage girls with proper information and skills regarding menstrual care serve to empower them with knowledge, which improves their self-esteem and academic achievement (Hassan et al., 2019).

Progressive muscle relaxation technique is a non-pharmacological management that helps the body to relax and relieve pain. Progressive muscle relaxation is regarded as the easiest

therapy to learn because it is widely available, affordable, client-initiated, and has no adverse effects on the body (Hassan, Ahmed & Fathalla, 2023; Çelik & Apay 2021). Hence, the study was performed to evaluate the effect of progressive muscle relaxation technique on menstrual cramps among adolescent students.

### Theoretical Framework

Nursing plays a vital role in assisting people who are sick or well to respond to a variety of stressors, achieve optimal well-being, and improve the quality of their lives via adaptation. The Roy Adaptation Model (Roy & Andrews, 1991) is an efficient framework for addressing people's, families', and communities' adaptive needs. The theoretical foundation of the study is based on "Sister Callista Roy's Adaptation Model" (1939), which has four basic elements. These concepts are the person, nursing, health, and environment. The adaptive system has four parts: input, processing, process, and output.

**Person.** According to the Roy adaptation model, humans are holistic, systems that adjust. "The human system is defined as a whole, with elements that work together to achieve a goal." Roy and Andrews (1999) define human systems as "humans as individuals or groups that involve families, organisations, communities, and society as a whole" "The person who is the main focus of nursing, and person who receives nursing care." The person is defined as "an adaptive system with cognator and regulator subsystems working to maintain adjustment in the four adaptive modes." (Roy, 2009). According to Roy, the goal of nursing is to adapt to stimuli to promote health in all life processes in order to achieve a greater level of wellness (Roy & Roberts, 1981). According to Roy, the person receiving nursing care could be an individual, a family, a group, a community, or a society. Each individual is viewed as an adaptive system. *The individual will be the focus of attention in the current study (Adolescent students who are having menstrual cramps.)*

**Regulator and Cognator sub system.** Internal and external changes in a person's surroundings characterize their continuing connection with their environment. Both subsystems (regulator and cognator) include input, processing, and output. Internal processes linked to physiological demands are regulated by

the regulator subsystem. The Cognator Subsystem controls internal processes associated with high cognitive performance, such as understanding, processing of information, learning from prior experience, judgement, and feeling. (Andrew & Roy, 1991; Phillips, 2010). *In this study, the cognator subsystem was identified as a physiological sign of menstrual cramps.*

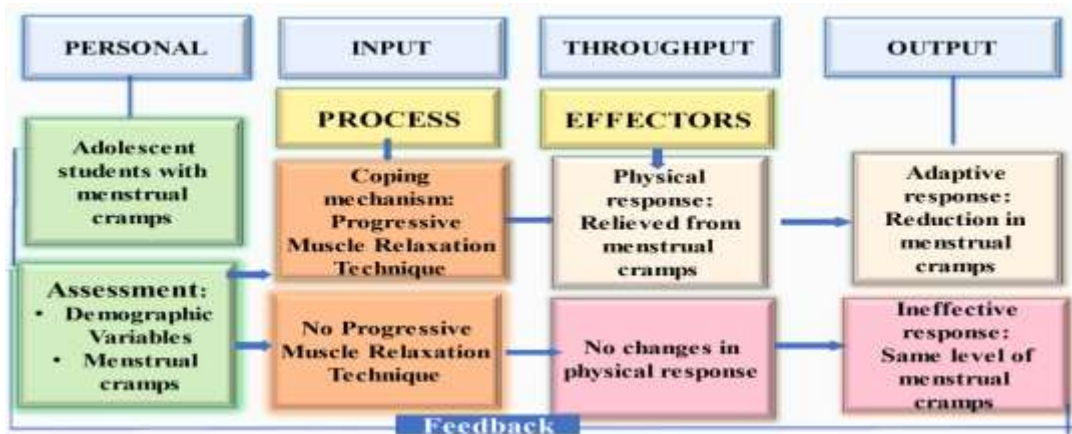
**Input.** According to Roy, input is the stimulation that comes from the environment or from inside a person. *Menstrual cramps will be regarded as an input in this study.*

**Process.** Process, in their opinion, refers to the adaptive changes that occur inside the system

(in the cognator subsystem). In this study, *the process relates to the Progressive Muscle Relaxation technique, which has a greater reduction in the severity of discomfort for adolescent girls with menstrual cramps.*

**Output.** Output is the result of the system, which is a person. The output of a person is their behaviour. Output is classified as an adaptive response to the Progressive Muscle Relaxation technique for adolescent students suffering from menstrual cramps. *The outcome of this study is the positive and negative responses to the progressive muscle relaxation technique.*

**Figure (1):** Application of Roy's adaptation model in this study



### Aim of the study

The aim of this study was to evaluate the effect of progressive muscle relaxation technique on menstrual cramps among adolescent students through:

- I. Assessing the level of menstrual cramps among adolescent students by conducting a pre-test using Numeric Pain Rating Scale.
- II. Applying a progressive muscle relaxation technique.
- III. Assessing the level of menstrual cramps among adolescent students after the intervention using Numeric Pain Rating Scale.
- IV. Comparing the pre/post-test Numeric Pain Rating Scale scores among adolescent students.

### Subjects and Methods

#### Research hypothesis:

To achieve the aim of the study, the following

research hypotheses were formulated:

**H1:** After intervention, there will be an improvement in menstrual cramps among adolescent students when compared to baseline measures.

**H2:** After intervention, there will be a significant difference in adolescent students' pain total scores when compared to baseline measures.

#### Research design:

A quasi-experimental research approach was adopted. One-group pre- and post-test research design was used to evaluate causal relationships between intervention and outcome. It is a method for assessing the effect of an intervention by comparing scores on a variable before and after an intervention (Thomas, 2022).

#### Setting:

The study was conducted at the Faculty of Nursing, Sohag University, Egypt. It was

established by Republican Decree No. 129 of 2006 as one of the faculties affiliated with Sohag University with the aim of supplying the labor and employment markets with specialists in the fields of nursing, able to positively contribute to the process of modernization and development in the fields of nursing services at the local and regional levels and it includes eight scientific departments. This educational institution is characterized by large number of adolescent student which enhance application of the program.

#### **Sample:**

A purposive sample of 530 first-year adolescent students enrolled at the Faculty of Nursing-Sohag University was included in the study. They were included according to the following inclusion criteria: adolescent students have menstruation, having menstrual cramps, don't have any gynaecological diseases and don't have any chronic diseases.

#### **Tools for data collection:**

Following an extensive review of the relevant national and international literature, two tools have been utilized to collect data for the present study.

**Tool I: A structured interviewing questionnaire:** It was developed by the researchers in simple Arabic language and based on (World Health Organization, 2020; Patricio & Sergio., 2019) was used to collect data regarding adolescent students which included two parts: **Part (1):** adolescent students' personal data such as age, residence, marital status, family income, sleeping hours, regular physical activity, and dietary pattern. **Part (2):** adolescent students' menstrual history: It consists of (11) questions related to monthly menstruation such as the menarche age, total days of flow, frequency & interval of menstruation, amount of menstrual flow, family history of menstrual cramp, onset of menstrual & associated symptoms with menstrual cramps, home remedies used during menstrual cramps and previous knowledge regarding progressive muscle relaxation techniques.

**Tool II: Numeric Pain Rating Scale (NPRS):** It was adopted from (Ningsih et al., 2013). It is used to evaluate the intensity of the pain, which can affect how individual feels. The

NPRS pain scale is made up of a single, horizontal, straight line with the numbers 0-10. On a scale of 0 to 6, 0 indicates no pain, 1-3 indicates mild pain (felt cramping in the lower belly, but could still be held, walk around, and pay attention to studies), and 4-6 indicates considerable pain (felt cramping in the lower abdominal area, pain radiates to the lower abdomen), 7-9 indicates significant pain (severe cramping in the lower abdominal area, pain radiating to the waist, legs, or back, loss of appetite, nausea, and weakness, no strong in activities, unable to concentrate on studying) and 10 denotes the most severe painful degree (feeling very heavy cramps in the lower abdominal area, pain extending to the waist, legs, and back. inability to eat, nausea, vomiting, headache, inability to stand or get out of bed, inability to move on occasion, to the point of fainting).

#### **Tool validity and reliability:**

The study tools were distributed to a panel of five experts, including three professors of community health nursing from Cairo University-Faculty of Nursing, and two professors of obstetrics and gynaecological nursing at Sohag University-Faculty of Nursing. Each expert on the panel was requested to examine the instruments for face and content validity. Modifications were made based on the panel's evaluation of the clarity of the sentences and the appropriateness of the topic. Cronbach's alpha test was used to determine reliability for the study tools, structured interview questionnaire reliability was 0.957, and Numeric Pain Rating Scale reliability was 0.889 that showing the strong reliability of the study tools.

#### **Ethical considerations:**

- Official agreement to carry out the study was obtained from the Research Ethics Committee of Faculty of Nursing at Sohag University (approval number 2023- 41). Then formal permission was also received from the Dean of the Faculty of Nursing - Sohag University.
- The researchers emphasised that participation in the study was fully voluntary and that each participant had the ability to get out at any time. Data coding was utilized to maintain anonymity and confidentiality. They were assured that their data would not be used in another study without their permission, and

that the information acquired would be used only for the study. Before the distribution of the tool, the participants were informed that their responses would have absolutely no impact on their relationship with their university degree.

#### **Data collection procedure:**

Data were collected from the end of January 2023 through March 2023. It takes two months because the differences in menstrual cycles among adolescent students. The current study was conducted through the following phases:

#### **Phase I: Preparation:**

Official agreement to carry out the study was obtained from the Research Ethics Committee of Faculty of Nursing at Sohag University. A formal permission was also taken from the dean of Sohag University's Faculty of Nursing to approve the fieldwork and data collection. The researchers examined the internet, scholarly books, papers, magazines, and current national and international related literature to better understand the problem and design the study measures.

#### **Phase II: Assessment**

- The researchers met the adolescent students, introduced themselves, and requested participants consent to include them in the study after outlining the study's objectives, all the details and obtaining the participants' personal data. Adolescent students' pain thresholds were assessed prior to application. Each participant spent between 20 and 30 minutes filling out the questionnaires.

#### **Phase III: Planning:**

- During this phase, additional resources, such as teaching techniques, audiovisual materials, and handouts, were reviewed and organized. Teaching strategies and materials were prepared before the educational sessions were held. Basic teaching methods were used, including lectures, brainstorming sessions, demonstrations and re-demonstrations, models, and the use of visual aids including handouts, posters, a chalkboard, and images for progressive muscle relaxation technique.

#### **Phase IV: Implementation:**

- Training sessions were conducted in the faculty class room and skill lab. Each group had two sessions in total. Each group received one day or session and session lasted from 60

-90 minutes. The study group was divided into sub groups (25) by the research team. Each training session included around 20 to 25 adolescent students. To better understand the training, they viewed a video about progressive muscle relaxation techniques designed by the researchers. After that, the researchers demonstrated the progressive muscle relaxation technique to the participants.

- Teaching strategies such as group discussion, demonstrations and re-demonstration, models, and images were all employed (progressive muscle relaxation technique). During the implementation, the researchers instructed the adolescent students to do each phase on their own after demonstrating the progressive muscle relaxation technique to them. The researchers then instructed the adolescent students to repeat each step three to four times until they were competent. The adolescent students were told to practise the technique three times a day, in the morning, afternoon, and at night.
- The researchers developed a manual booklet about the progressive muscle relaxation technique. The booklet summarises the key components of each training session, such as the definition of the progressive muscle relaxation technique, its effectiveness, and steps. Following the implementation of the program, the adolescent students were given a booklet with the main ideas as a reference. In this study, phone calls were conducted following the continuation of the progressive muscle relaxation technique, and the questionnaire was distributed twice: before and after the four weeks mark of the application.

#### **Phase V: Evaluation:**

- In this phase, the effectiveness of the progressive muscle relaxation technique on menstrual cramps among adolescent students was assessed. The same tool that was applied for the pretest was used for assessing menstrual pain four weeks post-application.

#### **Statistical analysis:**

Statistical analysis and data entry was carried out using Statistical Package for the Social Science (SPSS) program version 25. Frequencies and percentages as well as

means and standard deviations were used in the data presented. The t-test was used to analyze data and comparing the mean of the pre- and post-test for the same group. 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

The study results will be presented in the following sequence:

### **Section I: Personal characteristics of the adolescent students: Table (1)**

**Table 1** indicates that the mean age of the adolescent students was  $17.22 \pm 0.63$  years, and 78% of them were living in urban residences. Concerning marital status, 100% of the adolescent students were single, and 60% of them had family income just to meet routine expenses, table (1) also shows that 52% of the adolescent students slept from 6 to 9 hours, and 75% of them did not practice regular physical activity. Moreover, 90% of the adolescent students had an unhealthy diet.

### **Section II: Menstrual history among adolescent students: (Tables 2 - 3 & figures 2, 3).**

**Table 2** reveals that 68% of the adolescent students belong to the age of menarche 13-14 years. Total days of flow were within 5- 6 days among 66% of the adolescent students. As regard the interval of the menstrual cycle, table (2) also shows that the majority of the adolescent students (92%) had an interval from 28–30 days and 80% of them had moderate menstrual flow (2-3 pads/day). Moreover, 90% of the adolescent students had a family history of menstrual cramps.

**Table 3** shows that; 75% of the adolescent students have the onset of menstrual cramps were with the onset of menstruation. Concerning associated symptoms with menstrual cramps, 90% of the adolescent students experienced a feeling of pressure in the abdomen, and 85% experienced pain in the

lower back. Furthermore, 52% adopted non-pharmacological method to treat their menstrual cramps.

**Figure 2** shows the source of information regarding progressive muscle relaxation technique; it was observed that 90% of the adolescent students didn't have any information as compared to 10 % of them gained their information from the internet.

**Figure 3** indicates that 67% of adolescent students had regular menstruation.

### **Section III: Differences between pre & post test total pain scores of menstrual cramps among adolescent students (Table- 4). This part covered first research hypothesis.**

**Table 4** shows the distribution of pre-post-test total pain scores of menstrual cramps among adolescent students after progressive muscle relaxation technique application. It revealed that, 10% the adolescent students have mild pain, 80% have moderate pain & 10% have severe pain in the pretest compared to 81%, 19% & 0 % in the post test respectively.

### **Section IV: Differences between mean total pain scores pre and post-progressive muscle relaxation technique application among adolescent students (Table - 5 & figure 4). This part covered second research hypothesis.**

**Table (5):** Clarifies the mean pain scores of Numeric Pain Rating Scale (NPRS) among adolescent students. As shown post-progressive muscle relaxation technique application, there were changes in the mean pain scores that indicate highly statistically significant differences in the pain total scores among the adolescent students ( $P = <0.001$ ).

**Figure 4:** Highlights the distribution of adolescent students regarding their pain levels post-progressive muscle relaxation technique application, it clarifies that no one from adolescent students had severe pain compared to (90%) in the pre-application.

**Table (1):** Distributions of personal characteristics of the adolescent students (n=530).

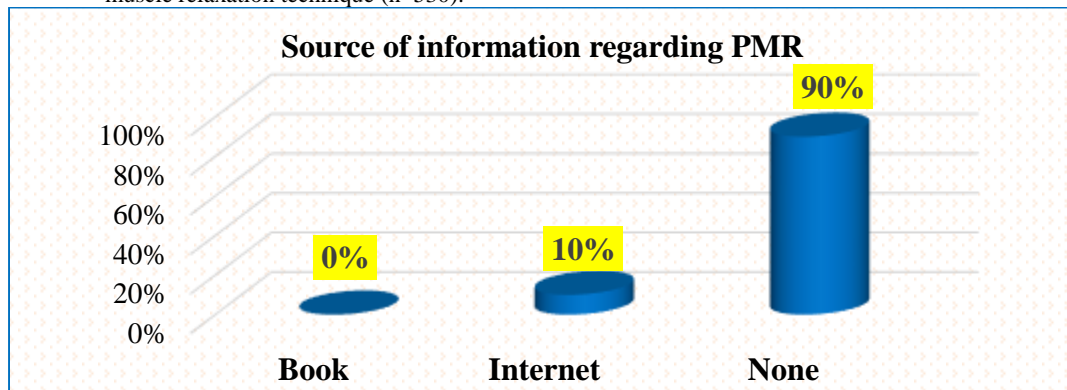
| Personal characteristics              | No.           | %                |
|---------------------------------------|---------------|------------------|
| <b>Age in years:</b>                  | Mean $\pm$ SD | 17.22 $\pm$ 0.63 |
| <b>Residence:</b>                     |               |                  |
| Urban                                 | 413           | 78.0             |
| Rural                                 | 117           | 22.0             |
| <b>Marital Status:</b>                |               |                  |
| Single                                | 530           | 100              |
| Married                               | 0             | 0.0              |
| <b>Family income</b>                  |               |                  |
| Don't meet routine expenses           | 135           | 24.0             |
| Just meet routine expenses            | 318           | 60.0             |
| Meet routine expenses and emergencies | 77            | 16.0             |
| Able to save/invest money             | 0             | 0.0              |
| <b>Sleeping (hours)</b>               |               |                  |
| <6                                    | 85            | 16.0             |
| 6-9                                   | 276           | 52.0             |
| >9                                    | 169           | 32.0             |
| <b>Regular physical activity</b>      |               |                  |
| Yes                                   | 132           | 25.0             |
| No                                    | 398           | 75.0             |
| <b>Dietary pattern</b>                |               |                  |
| Healthy diet                          | 53            | 10.0             |
| Un healthy diet                       | 477           | 90.0             |

**Table (2):** Distributions of adolescent students' menstrual history (n=530).

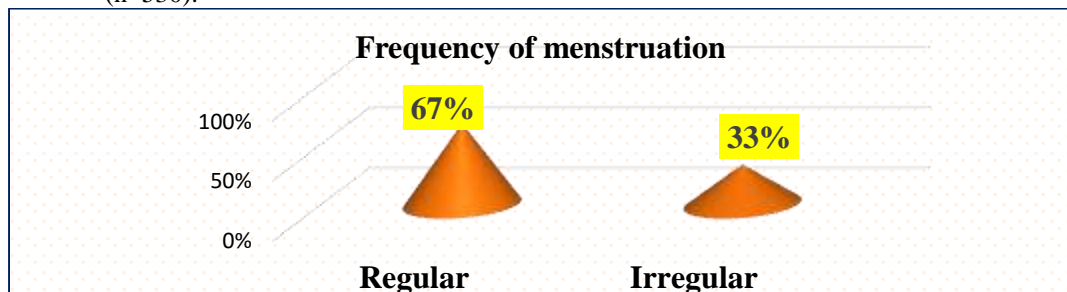
| Menstrual History                                   | No. | %    |
|---|-----|------|
| <b>Age of menarche:</b>                             |     |      |
| 11-12 years   | 127 | 24   |
| 13-14 years   | 360 | 68   |
| 15-16 years   | 43  | 8    |
| <b>Total days of flow:</b>                          |     |      |
| 3-4 days  | 159 | 30   |
| 5-6 days  | 350 | 66   |
| 7-8 days  | 21  | 4    |
| <b>The interval of the menstrual cycle/ days</b>    |     |      |
| < 28  | 45  | 8.0  |
| 28-30   | 485 | 92.0 |
| <b>Amount of menstrual flow (No. of pads /day):</b> |     |      |
| Mild (One)  | 80  | 15.0 |
| Moderate (2-3)                                      | 424 | 80.0 |
| Sever ( $\geq$ 4)                                   | 26  | 5.0  |
| <b>Family history of menstrual cramps</b>           |     |      |
| Yes   | 477 | 90.0 |
| No  | 53  | 10.0 |



**Figure (2):** Percentage distribution of adolescent students' sources of information regarding progressive muscle relaxation technique (n=530).



**Figure (3):** Percentage distribution of adolescent students regarding their frequency of menstruation (n=530).



**Table (3):** Distributions of menstrual cramps characteristics among adolescent students (n=530).

| Menstrual cramps characteristics                                     | No. | %    |
|--|-----|------|
| <b>The onset of Menstrual cramps:</b>                                |     |      |
| Before the menstrual period  | 132 | 25.0 |
| With the onset of menstruation                                       | 398 | 75.0 |
| <b>*Associated symptoms with Menstrual cramps:</b>                   |     |      |
| The feeling of pressure in the abdomen                               | 477 | 90.0 |
| Pain in the lower abdomen  | 450 | 85.0 |
| Low back pain  | 445 | 84.0 |
| Pain radiating down the legs   | 397 | 75.0 |
| Nausea   | 371 | 70.0 |
| Vomiting   | 302 | 57.0 |
| Diarrhea   | 281 | 53.0 |
| Fatigue  | 424 | 80.0 |
| Weakness   | 318 | 60.0 |
| Headaches  | 260 | 49.0 |
| Fainting   | 233 | 44.0 |
| <b>Do you practice home remedies during Menstrual cramps?</b>        |     |      |
| Yes  | 477 | 90.0 |
| No   | 53  | 10.0 |
| <b>If Yes, Specify (n = 477)</b>                                     |     |      |
| Pharmacological as analgesic, ...                                    | 77  | 16   |
| Non-Pharmacological as applying heat, Massaging, drinking herbs, ... | 247 | 52.0 |
| Both   | 153 | 32.0 |

\*Responses are not mutually exclusive.

**Table (4):** Distributions of pre-posttest pain total scores of menstrual cramps among adolescent students (n=530).

| pre- posttest pain score of menstrual cramps | Pre-progressive muscle relaxation technique |      | Post-progressive muscle relaxation technique |      | P- value |
|--|---|------|--|------|----------|
|  | No.   | %    | No.  | %    |          |
| Mild pain (1-3)                              | 53  | 10.0 | 429  | 81.0 | 0.001*   |
| Moderate pain (4-6)                          | 424   | 80.0 | 101  | 19.0 |          |
| Severe pain (7-10)                           | 53  | 10.0 | 0  | 0    |          |

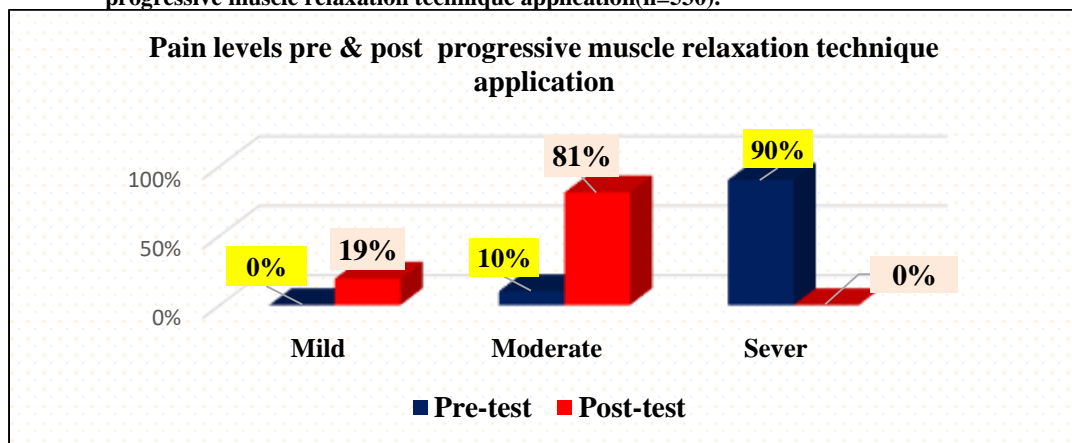
\*Highly statistically significant level at P < .0001

**Table (5):** Comparison between mean pain scores of Numeric Pain Rating Scale (NPRS) pre- and post-progressive muscle relaxation technique application among adolescent students (n=530).

| Item             | Pre-application | Post application | t-test | P-value |
|------------------|-----------------|------------------|--------|---------|
|                  | Mean ±SD        | Mean ±SD         |        |         |
| Mean pain scores | 8.7 ±0.9        | 5.4 ±1.3         | 7.456  | 0.001 * |

\*Highly statistically significant level at P < .0001

**Figure (4):** Percentage distribution of adolescent students regarding their pain levels pre and post progressive muscle relaxation technique application(n=530).



**Discussion**

Menstrual cramps are a prevalent, underdiagnosed, and undertreated condition among both adolescent and adult females. It can be identified by painful cramps in the lower part of the abdomen that hat begin shortly prior to or at the beginning of menstruation and may persist for up to three days. Menstrual cramps, in particular, have a negative effect on young females' quality of life (QOL) and are the primary cause of their absenteeism from school or employment (Itani et al., 2021). So, this study was done to evaluate the effect of progressive muscle relaxation technique on menstrual cramps among adolescent students.

Regarding demographic characteristics of adolescent students, the current study found that the mean age of adolescent students was 17.22±0.63 years. This finding was supported by Akilandesarie et al., (2020), who conducted a

study to investigate the impact of Jacobson's Relaxation Technique on adolescent female with difficulties in menstruation and discovered that the average age of adolescence ranged from 13 to 18 years. According to the United Nations,2019; Schoumaker & Bruno, 2019), adolescence can be described as the period between the ages of 12 and 19 years, or 10 and 19 years to include the traditional quinquennial age groups of 10–14 and 15–19 years. There's no doubt that this age is considered the adolescent age for females.

Based on the current study's results, more than two-thirds of adolescent students start menarche between the ages of 13 and 14. This finding is supported by a previous study carried out by Gebeyehuet al., (2017) to assess the prevalence, impact, and management practices of dysmenorrhea among 400 female students at the University of Gondar in northwestern Ethiopia, they discovered that the average age at which

women started having periods was twelve to fourteen years.

At the same line (Vlachou et al., 2019; El-Mawgoda, Alshaibany & Al-anazib, 2016) discovered that the average age for the first menstruation was 13 years. It is a unique stage of human development and a crucial time for setting the foundation for good health, and the global average age of menarche, one of the markers of the onset of puberty in girls, is about 12 years, according to (United Nations, 2019).

The study reflected that more than two thirds of adolescent students had regular menstruation and majority of them had an interval of 28–30 days. The current findings agreed with the findings reported by (Sudhadevi, 2021; Jebakani, 2019) who conducted a study to assess the effectiveness of progressive muscle relaxation on premenstrual syndrome among students from selected colleges at Sri Ramachandra University in Chennai and discovered that more than two-thirds of students have a regular menstrual cycle. This result could be related to that is the normal physiological changes for most females. And this is the normal characteristics for menstruating females.

In terms of the onset of menstrual cramps among adolescent students, more than two-thirds reported that the onset of menstrual cramps was associated with the start of menstruation. This finding was supported by Hashem, Ahmed, Zaky, and El-Adham (2018), who conducted a study on 120 female faculty nursing students at Tanta University to determine the effect of reflex therapy on controlling primary dysmenorrhea and found that the majority of adolescent girls suffering from menstrual cramps experienced them at the start of menstruation. This result could be related to that is the normal physiological changes for most females that associated with menstruation and menstrual cramps are a usually begins prior or with the onset of menstruation.

Furthermore, the current finding is consistent with the aforementioned study of Hashemi, Babakhani, and Sheikhhoseini, (2022), who conducted a study on 40 female students at Allameh Tabatabaei University in Tehran, Iran, to examine the effect of water yoga exercises on both the duration and intensity of pain in girls with primary menstrual disorders and noticed that female students complain of menstrual cramps that began on the first day of menstruation. A study conducted by Wong (2018) to measure

health-related quality of life among Chinese adolescent females with menstrual cramps presented similar data.

According to the literature, the etiology of menstrual cramps is linked with higher secretion of prostaglandin F<sub>2</sub> (PGF<sub>2</sub>) and prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) in the uterus during endometrium sloughing. These prostaglandins are implicated in enhancing myometrial contractions and vasoconstriction, resulting in uterine ischemia and the formation of anaerobic metabolites as clarified by (Abreu-Sanchez et al., 2020; Mendiratta & Lentz, 2017; Bernardi, Lazzeri, Perelli, Reis, & Petraglia, 2017).

Concerning associated symptoms with menstrual cramps, the majority of the adolescent students reported feeling pressure in the abdomen, pain in the lower back, pain radiating down the legs, nausea & fatigue. This result is consistent with the findings of a study conducted by (Itani et al., 2021; Calis, Dang, Kalantaridou, & Eroglu, 2019; Kuphal, 2018). They claimed that menstrual cramps are frequently associated with common symptoms, the most prevalent of which are systemic, gastrointestinal, and elimination-related. Headache, lethargy, restlessness, heavy lower abdominal area, backache aching knees and inner thighs, fatigue, joint pain, and swelling legs are among the systemic symptoms. Constipation, diarrhea, and frequent urination are examples of gastrointestinal symptoms, whereas nausea, vomiting, and bloating are examples of elimination-related symptoms. This may be causing mood abnormalities such as anxiety, depression, irritability, and anxiousness in terms of psychological symptoms.

The current finding is also in harmony with a study done by Sima et al., (2022) who conducted a study among 1720 Romanian medical students to assess the prevalence, treatment, and effect of menstrual cramping on medical students and reported that the most common symptoms associated with menstrual cramping were: restlessness or irritability; tiredness; headache; diarrhoea; sickness, and feeling dizzy.

In this respect, Armour et al., (2019) performed a systematic review and meta-analysis of thirty-eight studies involving 21,573 young women to investigate the prevalence and academic impact of dysmenorrhea. They added that the most prevalent consequences of dysmenorrhea were absence from school, poor

attention, insomnia, depression, and behavioural changes such as social withdrawal and limitation from normal daily tasks. Similar findings are presented by Gebeyehu et al, (2017).

This illustrates how menstrual cramps have an adverse effect on girls' quality of life since they interfere with relationships with family and friends, university (or professional) performance, and leisure activities. In terms of university activity and individual studies, the presence of pain influences the ability to concentrate on the courses as well as the amount of information gathered. Both school and higher education have been shown to have a negative impact on academic performance (Vlachou et al.,2019). This may cause the possible negative impact of menstrual cramps and related symptoms on young females' academic performance. So appropriate understanding and management of menstrual cramps are required.

Additionally, Chen et al., (2019) stated that, despite the high prevalence of menstrual cramps and their impact on everyday activities, they are frequently inadequately managed and even ignored, because many young girls choose to suffer silently, without seeking medical help. Females perceive menstrual cramps as an embarrassment and a taboo, and interpret pain as an unavoidable response to menstruation that should be tolerated, and reporting rates on menstruation and related concerns are predicted to be lower due to stigma, shame, or misunderstanding (Rafique & Al-Sheikh,2018; Parra-Fernandez et al.,2018). This emphasized that, primary healthcare providers frequently deal with women with menstrual cramps which means that they play a significant role in identifying, informing, reassuring, and giving them with the treatment required to optimise the overall treatment outcomes of menstrual cramps.

Cultural influences such as a female status in society, life stage, religion, education, and work determine whether a female seeks healthcare for menstruation difficulties and the personal significance of menstrual cramps (Maulingin-Gumbaketi et al., 2022). The researchers' point of view that, community health nurses and gynaecological nurses should perform a comprehensive assessment that takes into account pain, related symptoms, the impact on lifestyle and daily activities, as well as a psychological and cultural assessment.

The current study found that the majority of adolescent students use home remedies during menstrual cramps and that more than half adopt non-pharmacological methods to manage their menstrual cramps. This finding stands in line with other studies conducted by (Gebeyehu et al, 2017; Jones & Mishra, 2013), which discovered that the majority of females used home remedies as a nonpharmacologic treatment option for menstrual cramps, and they used more than one type of home remedy at a time during menstrual cramps. Furthermore, Helwa et al. (2018) corroborated with the findings. These findings revealed that the university students were adopting traditional medicine as a nonpharmacological treatment.

Added to that, this finding is in line with the findings of a study conducted by (Abdelhalim, Sweelam, Mohamed, Amer, & Shabory, 2023) to examine the effect of progressive muscle relaxation technique on pain intensity and fatigue associated with primary dysmenorrhea among 150 female adolescents at secondary schools in Port Said City. Egypt and indicated that more than half of female adolescents adopted non-pharmacological techniques to treat the menstrual pain. This clarified the effectiveness of non-pharmacological measures in managing menstrual cramps and the majority of women self-medicate and do not consult health care professionals in this matter.

For the reason that the main barrier to dealing with menstrual discomfort, whether through pharmaceutical or non-pharmacological treatment, is that the intervention must be both time and money efficient. Non-pharmacological self-care techniques, either physical or psychological lifestyle changes that women might use, such as exercise, heat, or self-massage, may fit into these guidelines, allowing women to potentially lessen menstruation pain and improve their health-related quality of life (Armouret al., 2019).

Conversely, in a study done by Warulkar, Salvi & Naik (2020) they performed a study on 60 adolescent girls to investigate the efficiency of Relaxation Technique on dysmenorrhea in India and stated that 63% of adolescent girls did not practise home remedies during menstrual cramps. This finding is also reported by Sima et al., (2022). This difference between the two studies could be related to the traditional, cultural beliefs and practices around menstruation vary between countries and context due to education, economic

factors, influence from religion and changes in traditional lifestyles.

Concerning the pre and post-test pain total scores of menstrual cramps among adolescent students who experienced menstrual cramps following the application of the progressive muscle relaxation technique. The majority of the adolescent students reported moderate pain in the pre-test compared to mild pain in the post-test. Regarding to pain levels for adolescent students who used the progressive muscle relaxation technique, the majority of adolescent students experienced severe pain levels before application that disappeared after application. These emphasized that the application of progressive muscle relaxation technique was effective in minimizing menstrual cramps among adolescent students. This finding supports hypothesis H1: After intervention, there will be an improvement in menstrual cramps among adolescent students when compared to baseline measures.

In the same context, the findings revealed a highly statistically significant difference in mean Numeric Pain Rating Scale (NPRS) pain scores among adolescent students ( $P = 0.001$ ). in pre- and post-tests. From the researchers' point of view, this confirmed the positive effects of progressive muscle relaxation technique application in reducing menstrual cramps among adolescent students. This result supports hypothesis H2: After intervention, there will be a significant difference in adolescent students' pain total scores when compared to baseline measures.

These findings agree with the findings of many other studies, such as Monori et al., (2017), who carried out a study that compares the impact of progressive muscle relaxation and perineal strengthening exercises among women with menstrual cramps and indicated that progressive muscle relaxation has a significant positive effect on decreasing menstrual cramps among adolescent students. Furthermore, the current finding is consistent with the previously mentioned study by Kustriyanti and Boediarsih (2017), which illustrated the effect of muscle relaxation on reducing menstrual discomfort among adolescent students. In their investigation, the average pain score declined after applying muscle relaxation techniques. This finding is also similar to another study conducted by Ganesh, Chodanka, and Parvatkar (2017), which found that physiological relaxation techniques had a greater influence on decreasing pain severity. It

was found to have a greater impact on improving quality of life in women suffering from menstrual discomfort.

This finding stands in line with the findings of a study conducted by Kokilavani, Usharamamoorth, and Shirley Sathya (2018), who conducted a study on 30 adolescent girls at Roman Cathelic Matriculation High School and reported that progressive muscle relaxation technique is an effective approach for reducing the level of menstrual cramps among adolescent girls. The current finding is also in harmony with a study conducted by George, Suresh, and Alias (2019) on 30 adolescent girls in India to assess the efficacy of physical activity and relaxation strategies in the management of pain associated with menstruation. They discovered that physical activity and relaxation strategies are efficient in lowering the pain associated with periods.

This finding corroborates other studies performed by (Akilandeswarriet al., 2020; Warulkar, Salvi, & Naik, 2020), who conducted a study on 60 adolescent girls to determine the effect of Jacobson's Relaxation Method on menstrual cramps in particular schools in India and concluded that menstrual cramps among adolescent girls decreased after the Relaxation Technique.

Moreover, these findings parallel those of Marfuah, Srinatania, Nurhayati, and Fauziah (2021), who studied the efficacy of mobile health as a progressive muscle relaxation training media for premenstrual discomfort in 52 university students in Bandung, Indonesia. They found that progressive muscle relaxation training reduced premenstrual symptoms significantly in the experimental group. This proves the efficacy of progressive muscular relaxation in minimizing menstrual cramps.

Similarly, the current finding agrees with the aforementioned study of Çelik and Apay, (2021), who conducted a study on 510 female students at the School of Health Sciences in Turkey to explore the effect of progressive relaxation exercises on primary dysmenorrhea and found that progressive relaxation exercises are an effective approach to alleviate menstrual cramps when carried out on a regular basis. The current finding is also compatible with the findings of (Abdelhalim, Sweelam, Mohamed, Amer, & Shabory, 2023).

In this respect, relaxing techniques can improve immunity, reduce anxiety, and improve

daily living. They are also shown to reduce tension and anxiety. As a result, they have been shown to improve human psychological wellness. Relaxation therapy is one of the nonpharmacological therapy strategies that could help relieve menstruation discomfort (Aboualsoltani et al., 2020; Ibrahimoglu & Kanan, 2017).

Relaxation exercises reduce sympathetic activity while increasing parasympathetic activity. As a result, heart rate, blood pressure, respiratory rate, oxygen demand, dilatation in peripheral vessels, muscle tension, and discomfort or pain perception all decrease, while blood flow in major muscle groups increases and quality of sleep improves. Exercise additionally lowers the levels of stress hormones in the body, such as cortisol and adrenaline. It enhances the synthesis of endorphins, which are the body's natural painkillers and mood lifters, and progressive relaxation therapy eliminates menstrual discomfort following short, basic training. It is a prevalent complementary therapy since it is non-pharmacological, simple to learn, highly effective, free, and can also use it independently (Harvard Health, 2020; Parra-Fernández et al., 2020; Liu et al., 2017).

Finally, the majority of menstruating females do not seek medical advice for severe menstrual cramps and may be ignorant of effective treatment options. Cultural norms, beliefs, and practises were discovered to have an impact on females' ability to manage menstrual related complains properly and with dignity. For the reason, adolescent students must be aware of appropriate self-management measures in order to lessen the uncomfortable symptoms that occur on a monthly basis and decrease negative effect of menstrual cramps on their ' quality of life. So, they can apply the progressive muscle relaxation technique to reducing pain. It is one of the most efficient alternative therapies, it is simple to learn, inexpensive, and does not require any special equipment and this method is considered an efficient nursing practise.

#### **Implications of the study**

- **Implications for nursing practice.** The community health nurses & gynecological nurses can employ progressive muscle relaxation techniques across different health care settings, particularly in the community, because menstrual cramps are widespread

among adolescent students but are undertreated, misdiagnosed, and poorly managed. The results of this study highlighted the significance of the nurse's role in decreasing menstrual cramps among adolescent students through the use of cost-effective, safe, non-pharmacological management.

- **Implications for Nursing Education.** Community health nurses & gynecological nurses working in different community settings as well as gynecological wards should be given in service education regarding females with menstrual cramps and the beneficial effects of progressive muscle relaxation techniques.
- **Implications for nursing research.** The results of the current study have added to the current literature, and the implications for nursing research are offered in the form of recommendations. This study can serve as the basis for future studies and inspire other academics to perform additional research.

#### **Conclusion:**

The current study concluded that progressive muscle relaxation techniques have an effect on reducing menstrual cramps when used on a regular basis. There is a highly significantly decrease in the pain total scores in the post-application compared to the pre application of progressive muscle relaxation technique.

#### **Recommendations:**

In light of the current result, the following recommendations were suggested:

1. Community health nurses should organize enlightenment program on non-pharmacological self-help strategies for menstrual cramps and how to employ progressive muscle relaxation techniques effectively.
2. Progressive muscle relaxation techniques should be utilized as a supportive therapy to help adolescent students to reduce menstrual cramps.
3. Adequate counselling should be provided by the nurses to adolescent students who experience menstrual cramps to avoid or reduce the rate of absenteeism among them.
4. Structured, documented standards and methods for treating, supporting, following up on, and referring young females experiencing menstruation pain.

5. For generalization, this study needs to be replicated on a wide scale and in varied settings.

### Limitation of the Study

The study participants were chosen from a single educational institution, limiting the generalizability of the findings to other contexts.

### List of Abbreviations

**NPRS** = Numeric Pain Rating Scale

**PMR** = Progressive muscle relaxation

**PGE2** = prostaglandin E2

**PGF2 $\alpha$**  = prostaglandin F2 $\alpha$

**QOL** = Quality of life

### Availability of data and materials

The data that support the findings of this study are available on request from the corresponding author.

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### Conflict of interest

The authors confirm that there are no conflicts of interest in the content of this article.

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