

Enhancing Risk Communication In Adolescent Reproductive Health: The Effect Of Progressive Muscle Relaxation In Managing Dysmenorrhea Pain And Stress

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Abstract

Background: Dysmenorrhea is a menstrual disorder characterized by intense pain or tenderness in the lower abdomen, resulting from the action of prostaglandins. During menstruation, the damaged uterine lining is expelled by new compounds known as prostaglandins. For adolescent girls suffering from dysmenorrhea, intervention can be achieved through non-pharmacological methods, specifically progressive muscle relaxation. This technique is effective in alleviating dysmenorrhea pain and reducing stress following brief, fundamental training. It stands out as one of the most efficient complementary therapies due to its ease of learning, affordability, high utility, and absence of adverse side effects. **Aim:** The objective of this study is to assess the impact of progressive muscle relaxation on managing dysmenorrhea pain and stress in adolescent girls. **Design:** To fulfill the aim of this research, a quasi-experimental design involving a single group (pre/post-test) was employed. **Setting:** The research was carried out at the Faculty of Nursing - Sohag University. **Sample:** A purposive sample of 800 first-year adolescent girls enrolled at the Faculty of Nursing at Sohag University participated in the study. **Tools for data collection:** Tool I: A structured interview questionnaire comprising two sections; section (1) includes personal data of adolescent girls; section (2) covers their menstrual history; Tool II: Numeric Pain Rating Scale (NPRS); Tool III: Perceived Stress Scale-10 (PSS-10). **Results:** The majority of the adolescent girls reported mild pain, with less than one-fifth experiencing moderate pain, while none reported severe pain following the application of progressive muscle relaxation. There were highly statistically significant differences in the mean total pain scores among the adolescent girls before and after the intervention. Furthermore, a significant reduction in the total pain scores was observed post-application compared to pre-application of progressive muscle relaxation. A statistically significant difference and decrease were noted in the mean stress scores at ($P=0.001$) following the progressive muscle relaxation intervention. **Conclusion:** The progressive muscle relaxation technique positively impacts the reduction and management of dysmenorrhea pain and stress in adolescent girls. **Recommendations:** It is advisable to employ the progressive muscle relaxation technique as an adjunct therapy to assist adolescent girls in alleviating dysmenorrhea pain and stress.

Keywords: Dysmenorrhea, Pain, Progressive muscle relaxation, Stress.

Introduction

Adolescence marks the transition from childhood to adulthood. The teenage years are crucial for shaping one's future. During this transitional phase, adolescents encounter various complex issues, one of which is an unhealthy lifestyle. Adolescence is characterized by significant changes in cognitive (knowledge), emotional (feelings), social (interactions), and moral (ethical) dimensions. Menstruation refers to the periodic bleeding from the uterus that typically begins approximately 14 days post-ovulation, resulting from the shedding of the endometrial lining. This process occurs when fertilization of the egg by sperm does not take place, leading to the shedding of the thickened uterine lining (endometrium) that had prepared for potential pregnancy. If a woman is not pregnant, her menstrual cycle will recur monthly. Generally, a normal menstrual cycle for women ranges from 28 to 35 days, with menstruation lasting between 3 to 7 days. e (Hashemi et al., 2022).

A menstrual cycle is considered abnormal if it occurs in intervals shorter than 21 days or longer than 40 days. According to data from the World Health Organization (WHO) in 2018, the prevalence of dysmenorrhea globally is significant. On average, over 50% of women in various countries experience dysmenorrhea; for instance, in America, the incidence rate is approximately 60%, in Sweden around 72%, and in England, it is reported that 10% of high school adolescents miss 1-3 days of school each month due to dysmenorrhea. The highest rates of dysmenorrhea are frequently observed in adolescent girls, estimated to range between 20% to 90% (Anitha , 2023).

The occurrence of dysmenorrhea in adolescents is reported to have a prevalence between 43% and 93%. Among these, approximately 74-80% of adolescents experience mild dysmenorrhea. Additionally, the incidence of endometriosis in adolescents suffering from pelvic pain is estimated to be between 25% and 38%. In cases where adolescents do not respond positively to treatment for menstrual pain, endometriosis is identified in 67% of instances. This disorder affects 60-70% of women in Indonesia, with 15% of them indicating that their daily activities are hindered due to dysmenorrhea (Momma et al., 2022).

Dysmenorrhea is characterized as a menstrual disorder that manifests as pain or severe discomfort in the lower abdomen, attributed to the action of prostaglandins. During menstruation, the damaged uterine lining is expelled and replaced by new compounds known as prostaglandins. These compounds induce contractions in the uterine muscles. When these muscles contract, the blood supply to the endometrium is restricted (vasoconstriction). Typically, uterine muscle contractions go unnoticed; however, when they are intense, they can disrupt blood flow to the uterus, resulting in pain. Dysmenorrhea is categorized into two types: primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea arises from very strong contractions of the uterine muscles, which are necessary for shedding the unnecessary uterine lining. This type of dysmenorrhea is triggered by natural chemicals produced by the

cells lining the uterus, known as prostaglandins. Prostaglandins stimulate the smooth muscles of the uterine wall to contract. Consequently, higher levels of prostaglandins lead to more intense contractions, thereby increasing the pain experienced (Wang et al., 2022).

Acute pain refers to a sensory or emotional experience linked to actual or potential tissue damage, characterized by a sudden or delayed onset and varying in intensity from mild to severe, typically lasting less than three months (Çelenay et al., 2021).

Dysmenorrhea represents a significant health issue that adversely affects both physical and emotional well-being. It is the most prevalent disorder in Indonesia, with an incidence rate of 64.25%, comprising 54.89% primary dysmenorrhea and 9.36% secondary dysmenorrhea. It was reported that 50.5% of adolescent girls aged 10-19 years experience dysmenorrhea (Wang et al., 2022). The occurrence of primary dysmenorrhea can hinder productivity, as the intense pain often necessitates complete rest for adolescents. During menstruation, a majority of women experience cramps in the lower abdomen, accompanied by pain, commonly referred to as dysmenorrhea (menstrual pain). Various symptoms are associated with dysmenorrhea, including cramps in the lower abdomen that may radiate to the back, legs, groin, and vulva (the external female genitalia), with the pain occurring irregularly. Typically, the pain begins at the onset of menstruation or during the menstrual period, peaks within 24 hours, and subsides after two days. Additional symptoms may encompass anxiety, depression, sensitivity, irritability, sleep disturbances, fatigue, weakness, food cravings, and occasionally rapid mood fluctuations (Pakpour et al., 2020). Physical complaints can include breast tenderness or swelling, abdominal bloating, dizziness, joint pain, nausea, vomiting, diarrhea or constipation, and skin issues such as acne. Psychological factors, particularly stress, can contribute to dysmenorrhea. Stress may disrupt the endocrine system, leading to irregular menstruation and pain during menstruation (dysmenorrhea) (Zhao et al., 2020).

Nursing interventions for adolescent girls suffering from dysmenorrhea can be implemented through both pharmacological and non-pharmacological methods. Pharmacological methods involve the use of chemical therapies or medications, such as analgesics, to alleviate pain. In contrast, non-pharmacological methods represent independent nursing interventions aimed at pain reduction. Examples of non-pharmacological therapies include warm compresses, massage, yoga, hypnotherapy, and progressive muscle relaxation techniques (Elverisli et al., 2022).

Progressive muscle relaxation consists of extended breathing exercises combined with a sequence of targeted muscle contractions and relaxations. This technique aims to activate muscles by identifying areas of tightness and then relaxing them to diminish tension. A mental cue may be introduced to encourage the individual to focus on the order of muscle relaxation during the 15 to 30 minutes of the PMR technique (Bialas et al., 2020). Due to its simplicity and cost-effectiveness, PMR, which gradually contracts and relaxes seven major muscle groups in the body, may be favored in various settings as it is time-efficient and requires fewer sessions to complete the training (Sudhadevi, 2021).

Consequently, Progressive muscle relaxation can serve as a body-mind intervention for adolescents. Furthermore, progressive muscle relaxation has the potential to significantly impact both psychological and physical symptoms prior to menstruation, making it one of the complementary therapies that The use of progressive muscle relaxation can assist many females suffering from menstrual cramps. (Jebakani, 2019). progressive muscle relaxation serves as an effective approach to harmonize the sympathetic and parasympathetic nervous systems. When the body achieves relaxation, psychological tension is alleviated, which in turn diminishes the physical manifestations of stress. Consequently, it can be employed as a therapeutic method to relieve stress, pain, and discomfort (Ghorbannejad et al., 2022).

Adolescent girls frequently endure dysmenorrhea and stress, conditions that are often underreported due to societal stigma and inadequate health communication. Poor communication regarding menstrual health risks can pose a public health issue, resulting in school absenteeism, reduced productivity, and psychosocial distress. This study investigates the effects of Progressive Muscle Relaxation as a dual-purpose intervention for stress management and a communication tool aimed at enhancing awareness, risk mitigation, and empowerment among adolescent girls. The findings underscore the necessity of incorporating non-pharmacological methods into reproductive health education initiatives, highlighting the critical role of nurses in conveying risks, diminishing stigma, and promoting resilience within adolescent communities (De Sanctis et al., 2019).

Community health, psychiatric, and gynaecological nurses often serve as the first point of contact for adolescent students who are experiencing menstrual cramps. They possess a distinct opportunity and obligation to engage with menstruation-related concerns in order to improve the health and well-being of these students (National Board of Health and Welfare, 2018). It is essential for them to offer appropriate guidance to adolescent students for the swift management of menstrual cramps and to promote the use of safe complementary therapy methods (Angelhoff & Grundström, 2023).

Significance of the study

The progressive muscle relaxation technique is a non-pharmacological approach that aids in bodily relaxation and pain relief. This technique is considered one of the simplest therapies to master due to its wide availability, affordability, client-initiated nature, and absence of adverse effects on the body (Hassan et al., 2023; Çelik & Apay 2021). Therefore, the study was conducted to determine the effect of progressive muscle relaxation in managing dysmenorrhea pain and stress among adolescent girls.

Theoretical Framework

Nursing is essential in helping individuals, whether ill or healthy, to cope with various stressors, attain optimal well-being, and enhance their quality of life through adaptation. The Roy Adaptation Model (Roy & Andrews, 1991) serves as an effective framework for meeting the adaptive needs of individuals, families, and communities. The theoretical basis of this study is grounded in "Sister Callista Roy's Adaptation Model"

(1939), which comprises four fundamental elements: person, nursing, health, and environment. The adaptive system consists of four components: input, processing, process, and output.

Person. The Roy adaptation model posits that humans are holistic systems capable of adjustment. "The human system is characterized as a complete entity, with components that collaborate to achieve a specific objective." Roy & Andrews (1991) describe human systems as "individuals or groups that encompass families, organizations, communities, and society at large." The individual, who is the primary focus of nursing, is defined as "an adaptive system with cognator and regulator subsystems that function to maintain equilibrium across the four adaptive modes. Roy asserts that the aim of nursing is to adapt to stimuli to foster health across all life processes, thereby achieving a higher level of wellness (Roy & Roberts, 1981). The recipient of nursing care may be an individual, a family, a group, a community, or society as a whole. Each person is regarded as an adaptive system, with the current study concentrating on individuals (specifically adolescent girls experiencing dysmenorrhea).

Regulator and Cognator subsystems. The ongoing relationship between an individual and their environment is defined by both internal and external changes in their surroundings. Each subsystem (regulator and cognator) encompasses input, processing, and output. The regulator subsystem manages internal processes related to physiological needs. Conversely, the Cognator Subsystem oversees internal functions linked to advanced cognitive abilities, including comprehension, information processing, learning from past experiences, judgment, and emotional responses. (Andrew & Roy, 1991; Phillips, 2010). In this research, the cognator subsystem was recognized as a physiological indicator of dysmenorrhea.

Input. As per Roy, input refers to the stimuli originating from the environment or from within an individual. In this research, dysmenorrhea will be considered an input.

Process. According to their perspective, process denotes the adaptive transformations that take place within the system (specifically in the cognator subsystem). In this study, the process pertains to the Progressive Muscle Relaxation technique, which significantly alleviates pain and stress in adolescent girls experiencing dysmenorrhea.

Output. Output represents the outcome of the system, which is the individual. A person's output is reflected in their behavior. Output is categorized as an adaptive response to the Progressive Muscle Relaxation technique for adolescent girls enduring dysmenorrhea. The findings of this study reveal both positive and negative reactions to the progressive muscle relaxation technique.

Aim of the study

The aim of this study was to determine the effect of progressive muscle relaxation in managing dysmenorrhea pain and stress among adolescent girls through:

- I. Assessing the level of dysmenorrhea pain among adolescent girls by conducting a pre-test using Numeric Pain Rating Scale.
- II. Assessing the level of dysmenorrhea stress among adolescent girls by conducting a pre-test using Numeric Pain Rating Scale.
- III. Applying a progressive muscle relaxation technique.

- IV. Assessing the level of dysmenorrhea pain among adolescent girls by conducting a post-test using Numeric Pain Rating Scale.
- V. Assessing the level of dysmenorrhea stress among adolescent girls by conducting a pre-test using Perceived Stress Scale-10.
- VI. Comparing the pre/post-test Numeric Pain Rating Scale scores among adolescent girls.
- VII. Comparing the pre/post-test Perceived Stress Scale-10 scores among adolescent girls .

Subjects and Methods

Research hypothesis:

H1: Following the intervention, there will be an enhancement in dysmenorrhea pain and stress levels among adolescent girls when compared to baseline measurements.

H2: Following the intervention, there will be a notable difference in the total mean scores of pain and stress among adolescent girls when compared to baseline measurements.

Research design:

In order to fulfill the objective of the current study, a quasi-experimental research design utilizing a one-group (pre/post-test) approach was employed to evaluate the causal relationships between the intervention and the outcomes. This method assesses the impact of an intervention by comparing scores on a variable before and after the intervention (Thomas, 2022).

Setting:

The research was carried out at the Faculty of Nursing, Sohag University, Egypt. It was established by Republican Decree No. 129 of 2006 as one of the faculties associated with Sohag University, aimed at providing the labor and employment markets with specialists in nursing who can positively contribute to the modernization and development of nursing services at both local and regional levels, encompassing eight scientific departments. This educational institution is distinguished by a large number of adolescent students, which facilitates the implementation of the program.

Sample:

A purposive sample of 800 first-year adolescent girls enrolled at the Faculty of Nursing at Sohag University was included in the study. They were selected based on the following inclusion criteria: adolescent girls who menstruate, experience dysmenorrhea pain and stress, do not have any gynecological diseases, and do not have any chronic illnesses.

Tools for data collection:

After conducting a thorough examination of pertinent national and international literature, two instruments have been employed to gather data for the current study.

Tool I: A structured interview questionnaire: This was created by the researchers in

straightforward Arabic and is based on the works of the World Health Organization (2020) and Mendiratta & Lentz (2022). It was utilized to collect information concerning adolescent students, which was divided into two sections:

Section (1): personal information of adolescent girls, including age, place of residence, family income, hours of sleep, regular physical activity, and dietary habits.

Section (2): menstrual history of adolescent girls: This includes two questions pertaining to monthly menstruation, such as the age of menarche, family history of dysmenorrhea, and prior knowledge of the progressive muscle relaxation technique.

Tool II: Numeric Pain Rating Scale (NPRS): The information was derived from (Ningsih et al., 2013). It serves to assess the severity of pain, which can influence an individual's feelings. The NPRS pain scale consists of a single, horizontal line marked with numbers ranging from 0 to 10. On this scale, a score of 0 to 6 indicates varying levels of pain: 0 signifies no pain, while scores of 1 to 3 represent mild pain (characterized by cramping in the lower abdomen, yet allowing the individual to engage in activities such as walking and studying), and scores of 4 to 6 denote moderate pain (involving cramping in the lower abdominal region with pain radiating to the lower abdomen). Scores of 7 to 9 indicate significant pain (marked by severe cramping in the lower abdomen, pain radiating to the waist, legs, or back, accompanied by loss of appetite, nausea, weakness, and difficulty concentrating on studies), and a score of 10 represents the highest level of pain (experiencing intense cramps in the lower abdomen, with pain extending to the waist, legs, and back, along with an inability to eat, nausea, vomiting, headaches, and an incapacity to stand or get out of bed, occasionally leading to fainting).

Tool (III): Perceived Stress Scale-10 (PSS-10):

The Perceived Stress Scale-10 (PSS-10) was adapted from Cohen et al. (1983). This tool is a ten-item self-report measure intended to evaluate an individual's level of stress. Nurses are instructed to assess their thoughts and feelings over the past month. Each nurse rates the items on a five-point scale ranging from never (0) to very often (4). As a result, the scores for each patient can range from 0 to 40, with higher scores indicating greater levels of reported stress.

Scoring system:

PSS-10 scores between 0 and 13 indicate low stress levels, scores from 14 to 26 indicate moderate stress levels, and scores of 27 or above signify severe stress levels. Items 4, 5, 7, and 8 utilized reverse scoring. The PSS demonstrated a correlation with measures of anxiety, sadness, helplessness, and disease activity to establish convergent validity, achieving an internal consistency of 0.78 on the scale.

Tool validity and reliability:

The study tools were provided to a panel consisting of five experts, which included two professors from the community health nursing department at the Faculty of Nursing, two professors specializing in obstetrics and gynaecological nursing, and one expert from the Psychiatric nursing field at Sohag University - Faculty of

Nursing. Each member of the panel was asked to assess the instruments for both face and content validity. No changes were made following the panel's assessment regarding the clarity of the sentences and the relevance of the topic. The reliability of the study tools was evaluated using Cronbach's alpha test, which indicated a reliability score of 0.957 for the structured interview questionnaire, 0.889 for the Numeric Pain Rating Scale, and an internal consistency of 0.78 for the PSS, demonstrating the strong reliability of the study tools.

Ethical considerations:

□An official agreement to conduct the study was secured from the Research Ethics Committee of the Faculty of Nursing at Sohag University (approval number 2023-130). Subsequently, formal permission was also granted by the Dean of the Faculty of Nursing at Sohag University.

□The researchers highlighted that participation in the study was entirely voluntary, and each participant had the right to withdraw at any time. Data coding was implemented to ensure anonymity and confidentiality. Participants were assured that their data would not be utilized in any other study without their consent, and that the information collected would be exclusively for the purposes of this study. Prior to the distribution of the tool, participants were informed that their responses would have no effect on their relationship with their university degree.

Data collection procedure:

Data were gathered from the end of September 2023 until October 2023. The duration of two months was necessary due to the variations in menstrual cycles among adolescent girls. The present study was executed through the following stages:

Phase I: Preparation:

An official agreement to conduct the study was secured from the Research Ethics Committee of the Faculty of Nursing at Sohag University. Additionally, formal permission was obtained from the dean of the Faculty of Nursing at Sohag University to authorize the fieldwork and data collection. The researchers explored the internet, scholarly books, articles, magazines, and relevant national and international literature to gain a deeper understanding of the issue and to design the study measures effectively.

Phase II: Assessment

□The researchers engaged with the adolescent students, introduced themselves, and sought the participants' consent to include them in the study after explaining the study's objectives and details, as well as collecting the participants' personal information. The pain and stress thresholds of the adolescent girls were evaluated prior to the application. Each participant dedicated between 25 and 35 minutes to complete the questionnaires.

Phase III: Planning:

□In this phase, supplementary resources, including teaching techniques, audiovisual materials, and handouts, were reviewed and organized. Teaching strategies and materials were prepared in advance of the educational sessions. Fundamental teaching methods were employed, such as lectures, brainstorming sessions,

demonstrations and re-demonstrations, models, and the use of visual aids including handouts, posters, a chalkboard, and images for the progressive muscle relaxation technique.

Phase IV: Implementation:

Training sessions were held in the faculty classroom and skill lab. Each group participated in a total of two sessions. Each group had one session per day, with each session lasting between 60 to 90 minutes. The research team divided the study group into subgroups of 30 participants. Each training session included approximately 25 to 30 adolescent girls. To enhance their understanding of the training, the participants watched a video created by the researchers that demonstrated progressive muscle relaxation techniques. Subsequently, the researchers showcased the progressive muscle relaxation technique to the participants.

□ Various teaching strategies were utilized, including group discussions, demonstrations, re-demonstrations, models, and images related to the progressive muscle relaxation technique. During the implementation phase, the researchers guided the adolescent girls to perform each phase independently after demonstrating the technique. The researchers instructed the girls to repeat each step three to four times until they achieved proficiency. The adolescent girls were advised to practice the technique three times daily: in the morning, afternoon, and evening.

□ The researchers produced a manual booklet detailing the progressive muscle relaxation technique. This booklet encapsulates the essential elements of each training session, including the definition of the progressive muscle relaxation technique, its benefits, and the procedural steps. After the program's implementation, the adolescent girls received a booklet containing the main concepts for reference. In this study, follow-up phone calls were made after the continuation of the progressive muscle relaxation technique, and a questionnaire was administered twice: once before and once after the four-week application period.

Phase V: Evaluation:

In this phase, the effect of the progressive muscle relaxation technique on dysmenorrhea pain and stress among adolescent girls was assessed. The same tools that were applied for the pretest were used for assessing dysmenorrhea pain and stress four weeks post- application.

Statistical analysis:

Statistical analysis and data entry were conducted utilizing the Statistical Package for the Social Sciences (SPSS) version 25. Frequencies, percentages, means, and standard deviations were employed in the data presentation. The t-test was applied to analyze the data and to compare the means of the pre-test and post-test for the same group. The strength of the correlation between two variable sets was assessed using Pearson's correlation test. A P-value of less than 0.05 was considered statistically significant.

Results

Table 1 indicates that the mean age of the adolescent girls was 17.13 ± 0.55 years, and 80% of them were living in urban residences. More than three fifths (62%) of them had family income just to meet routine expenses, table (1) also shows that 54% of the adolescent girls slept from 6 to 9 hours, and 77% of them did not practice regular physical activity. Moreover, 92% of the adolescent girls had an unhealthy diet.

Table 2 reveals that 70% of the adolescent girls belong to the age of menarche 13-14 years. Moreover, 92% of the adolescent students had a family history of dysmenorrhea .

Figure 1 shows the source of information regarding progressive muscle relaxation technique; it was observed that 96% of the adolescent girls didn't have any information as compared to 4% of them gained their information from the their friends.

Table 3 shows the distribution of pre-post- test total pain scores of dysmenorrhea among adolescent girls after . It revealed that, no one of the adolescent girls have mild pain, 20% have moderate pain & 80% have severe pain in the pretest of progressive muscle relaxation technique application compared to 40%, 55% & 5 % in the post progressive muscle relaxation technique application respectively.

Table (4): Clarifies there were changes in the mean pain scores that indicate highly statistically significant differences in the pain total scores among the adolescent girls post-progressive muscle relaxation technique application, ($P = < 0.001$).

Figure (2): Illustrates that 92%of the-adolescent girls have mild pain post-progressive muscle relaxation technique application compared to no one pre progressive muscle relaxation technique application. Also there was a reduction in pain level where 65% of the studied adolescent girls had severe total pain level pre-application that become 6% post-application .

Table 5 shows that in the pretest, the majority of studied adolescent girls (68%) had high perceived stress, and (32%) had moderate levels of stress. In the post-test, the majority of studied adolescent girls (87%) their stress levels and had low stress, and (13%) had moderate levels of stress. A significant decrease and improvement were detected regarding the effect of progressive muscle relaxation technique application on stress among studied adolescent girls pre and post-application.

Table 6 shows that in the pretest, the mean and standard deviation of the level of stress among studied adolescent girls was 30.91 ± 4.33 . In the post-progressive muscle relaxation technique application, the mean and standard deviation of the level of stress among studied adolescent girls was 12.11 ± 2.35 with a highly statistically significant difference found pre and post-progressive muscle relaxation technique application among studied adolescent girls.

Figure3 predicts that there was a significant reduction in the level of stress among the studied adolescent girls post-progressive muscle relaxation application. The

assessment of the post-test stress level displays that (72%) had a mild level of stress, (28%) had a moderate stress level, and none had severe stress.

Table 7 illustrates that were statistically positive correlation was determined between the stress and pain levels among the studied adolescent girls pre and post- progressive muscle relaxation technique application at ($p < 0.001$).

Table (1): Distributions of personal characteristics of the adolescent girls (n=800).

Personal characteristics	No.	%
Age in years:	Mean $\pm$ SD 17.22 $\pm$ 0.63	
Residence:		
Urban	640	80.0
Rural	160	20.0
Family income		
Don't meet routine expenses	184	23.0
Just meet routine expenses	496	62.0
Meet routine expenses and emergencies	120	15.0
Able to save/invest money	0	0.0
Sleeping (hours)		
<6	120	15.0
6–9	432	54.0
>9	248	31.0
Regular physical activity		
Yes	184	23.0
No	616	77.0
Dietary pattern		
Healthy diet	64	8.0
Un healthy diet	736	92.0

Table (2): Distributions of adolescent girls' menstrual history (n=800).

Menstrual History	No.	%
Age of menarche:		
11-12 years	184	23
13-14 years	560	70
15-16 years	56	7
Family history of dysmenorrha		
Yes	736	92.0
No	64	8.0

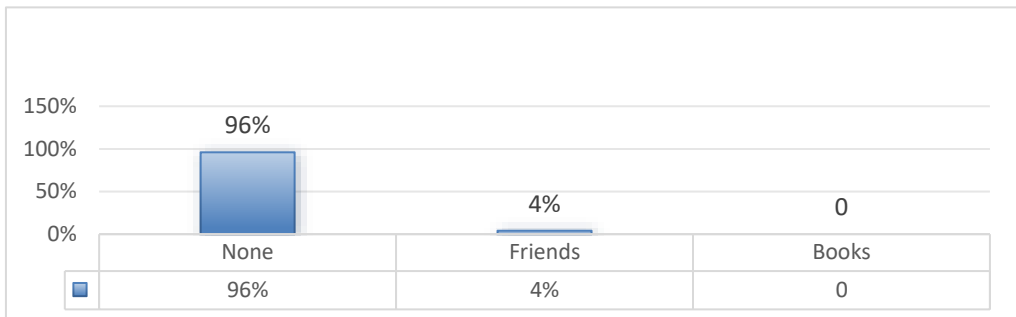


Figure (1): Percentage distribution of adolescent girls' sources of information regarding progressive muscle relaxation technique (n=800).

Table (3): Total dysmenorrhea pain scores among adolescent girls pre and post progressive muscle relaxation technique (n=800).

Dysmenorrhea pain scores	Pre-progressive muscle relaxation technique		Post-progressive muscle relaxation technique		P- value
	No.	%	No.	%	
Mild pain (1-3)	0	0.0	320	40.0	0.001*
Moderate pain (4-6)	160	20.0	440	55.0	
Severe pain (7-10)	640	80.0	40	5	

*Highly statistically significant level at $P < .0001$

Table (4): Comparison between adolescent girls' mean pain scores pre- and post- progressive muscle relaxation technique application (n=800)

Item	Pre-application	Post application	t-test	P-value
	Mean $\pm$ SD	Mean $\pm$ SD		
Mean pain scores	8.6 $\pm$ 0.8	5.3 $\pm$ 1.2	8.372	0.001 *

*Highly statistically significant level at $P < .0001$

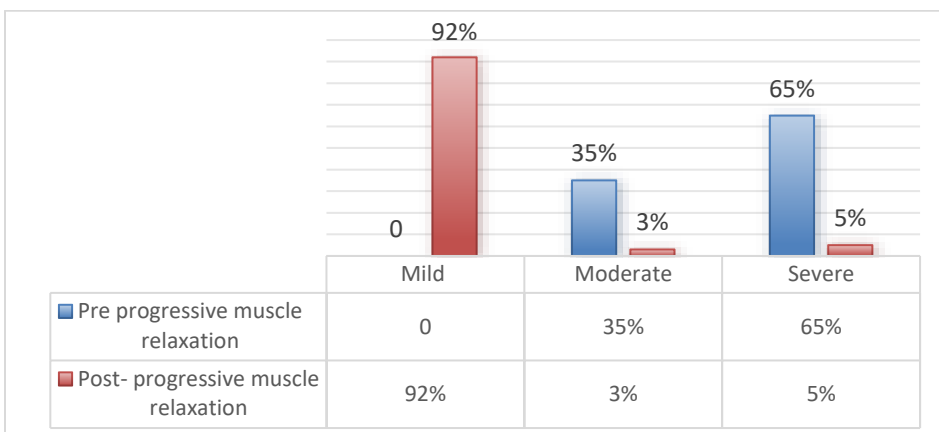


Figure (2): Total pain levels among adolescent girls' pre and post progressive muscle relaxation technique application(n=800).

Table 5: Differences between the stress scores among the studied adolescent girls pre and post- progressive muscle relaxation technique application (n=800)

Level of Stress	Pre-application		Post application		P –value
	No	(%)	No	(%)	
Low Stress	0	0	696	87%	<0.001*
Moderate Stress	256	32%	104	13%	
High Perceived Stress	544	68%	0	0	

Table 6: Differences between mean scores of the stress levels among the studied adolescent girls pre and post-progressive muscle relaxation technique application (n=800)

Items	Pre-application	Post application	P –value
	Mean Standard deviation	Mean Standard deviation	
Stress mean scores	30.91±4.33	12.11±2.35	<0.001*

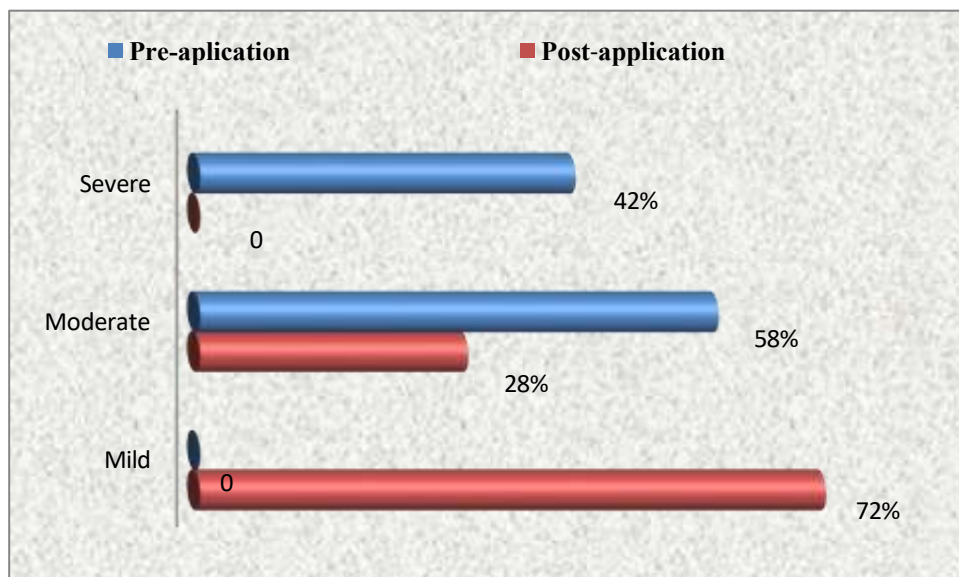


Figure 3 : Total stress levels among the studied adolescent girls pre and post-progressive muscle relaxation technique application (n=800)

Table 7: Correlation between total pain and stress levels among the studied adolescent girls pre and post-progressive muscle relaxation technique application (n=800)

Pain levels	Stress levels	
Pre-application	r	0.142
	p	.128
Post – application	r	0.568
	p	.001

*= significant at $p < 0.05$ level

Discussion

Progressive muscle relaxation therapy combines deep breathing exercises with a sequence of targeted muscle contractions and relaxations. This method highlights muscle engagement by recognizing tense muscles and then relieving tension through relaxation to attain a tranquil state. Progressive muscle relaxation sessions usually last from 15 to 30 minutes and may feature recorded guidance that directs the individual to concentrate on the order of muscles being relaxed (Vinitha & Madhuri, 2020). So, this study was done to determine the effect of progressive muscle relaxation in managing dysmenorrhea pain and stress among adolescent girls.

Concerning the demographic information of adolescent girls, the present study revealed that the average age of adolescent students was 17.13 ± 0.55 years. This observation aligns with the findings of Akilandeswarie et al. (2020), who explored the effects of Jacobson's Relaxation Technique on adolescent females experiencing menstrual difficulties and found that the average age of adolescence varied from 13 to 18 years. The United Nations (2019) and Schoumaker & Bruno (2019) define adolescence as the stage between the ages of 12 and 19 years, or alternatively, from 10 to 19 years to encompass the traditional quinquennial age categories of 10–14 and 15–19 years. It is unequivocal that this age range is recognized as the adolescent period for females.

According to the findings of the current study, over two-thirds of adolescent girls commence menarche between the ages of 13 and 14. This conclusion is corroborated by a prior study conducted by Gebeyehu et al. (2019), which assessed the prevalence, impact, and management practices of dysmenorrhea among 400 female students at the University of Gondar in northwestern Ethiopia, revealing that the average age at which women began menstruating was between twelve and fourteen years. Similarly, Vlachou et al. (2019) found that the average age for the onset of menstruation was 13 years. This period represents a distinctive phase of human development and is critical for establishing a foundation for good health; the global average age of menarche, a key indicator of the onset of puberty in girls, is approximately 12 years, as reported

by the United Nations (2019).

The findings of the current study indicated that a majority of the adolescent girls lacked sufficient information. From the perspective of the researchers, this underscored the necessity for the adolescent girls involved in the study to gain knowledge regarding the progressive muscle relaxation technique in order to implement it effectively.

The results of the current study demonstrated that there were alterations in the average pain scores, which signify highly statistically significant differences in the total pain scores among the adolescent girls following the application of the progressive muscle relaxation technique. From the researchers' viewpoint, this reflected the beneficial effects of applying the progressive muscle relaxation technique. The outcomes of our study illustrated the effectiveness of the progressive muscle relaxation technique in alleviating stress among adolescent girls, thereby fulfilling the objectives of the current research.

Hamdy et al. (2023) reported that the progressive muscle relaxation technique could serve as an effective approach to diminish pain intensity in adolescents suffering from dysmenorrhea. Furthermore, Patwestri et al. (2023) conducted a comparison between the effects of the progressive muscle relaxation technique and endorphin massage on dysmenorrhea pain. Their findings revealed that the progressive muscle relaxation technique was more effective in managing menstrual pain than endorphin massage.

Additionally, this finding aligns with the results of a study conducted by Abdelhalim et al., (2023), which examined the impact of the progressive muscle relaxation technique on pain intensity and fatigue associated with primary dysmenorrhea among 150 female adolescents in secondary schools in Port Said City, Egypt. The study indicated that over half of the female adolescents utilized non-pharmacological techniques to address dysmenorrhea pain. This highlights the efficacy of non-pharmacological strategies in managing dysmenorrhea pain, as the majority of women tend to self-medicate without consulting healthcare professionals regarding this issue.

The findings of the current study demonstrated that the majority of adolescent girls experienced mild pain following the application of the progressive muscle relaxation technique, in contrast to the absence of pain prior to its application. Furthermore, there was a notable decrease in pain levels among two-thirds of the adolescent girls who initially reported severe pain before the application, with their pain levels dropping to less than ten percent afterward. From the researchers' perspective, this outcome signifies the effectiveness of the progressive muscle relaxation technique. Relaxation training in clinical settings can be beneficial for addressing various pain and stress-related issues. The impacts of the progressive muscle relaxation technique have been explored in several studies, some of which included a control group with no intervention, while others involved different treatment groups (Pawestri et al., 2023).

Celik & Apay (2021) carried out a randomized prospective controlled study to evaluate the effects of the progressive muscle relaxation technique, supplemented with a compact disc, on pain in women suffering from dysmenorrhea. They advocated for this

relaxation technique as a means to alleviate menstrual pain. Additionally, Abdelhalim et al. (2023) examined the effects of the progressive muscle relaxation technique on women with dysmenorrhea, reporting a reduction in both the intensity of dysmenorrhea pain and associated symptoms.

According to the findings of the current study, it was revealed that during the pretest, the mean and standard deviation of stress levels among the adolescent girls examined was 30.91 ± 4.33 . Following the application of the progressive muscle relaxation technique, the mean and standard deviation of stress levels among the same group of adolescent girls decreased to 12.11 ± 2.35 , indicating a highly statistically significant difference between the pre and post-application of the technique. Furthermore, our study demonstrated that the progressive muscle relaxation technique was effective in alleviating anxiety associated with dysmenorrhea. This technique operates on the principles of both top-down and bottom-up neuronal processing. In top-down processing, participants engage higher brain regions, such as the cerebral cortex and cerebellum, to contract muscles and gradually release tension. Conversely, bottom-up processing involves the holding and releasing of bodily tension, which generates proprioceptive stimulation from peripheral muscles that ascends to the brain via the spinal cord and brainstem. By activating both pathways, the progressive muscle relaxation technique offers participants rapid and immediate relief. The literature indicates that elevated stress levels are significantly linked to various physical and psychological issues, including chronic pain, anxiety, and depression (Keptner et al., 2021). Consequently, this relaxation technique may prove beneficial in mitigating stress, enhancing psychological well-being, and alleviating dysmenorrhea pain.

Kamel & Hanfy (2020) conducted a comparison of the effects of the progressive muscle relaxation technique. The results following its application indicated a notable reduction in both pain and serum cortisol levels across both groups; however, it was determined that the progressive muscle relaxation technique was more effective in alleviating pain intensity when contrasted with no intervention. Additionally, while menstrual symptoms showed a decrease with the use of the progressive muscle relaxation technique, this change was not statistically significant.

These findings may be attributed to the benefits of the progressive muscle relaxation technique, which include a reduction in abnormal sympathetic nerve basal activity, decreased muscle tension, and altered pain perception, along with an increase in blood circulation (Jacobson, 1938; McCallie et al., 2006). Consequently, the progressive muscle relaxation technique, recognized for its simplicity and cost-effectiveness, should be more widely implemented in the treatment of dysmenorrhea.

The findings of the present study indicated a notable decrease in stress levels among the adolescent girls who participated, following the application of progressive muscle relaxation. Therefore, it is crucial to consider various treatment methods for addressing psychological distress in the management of dysmenorrhea. The

progressive muscle relaxation technique has proven effective in alleviating anxiety, depression, and stress (Harorani et al., 2020). Additionally, George et al. (2019) noted that both relaxation methods (including progressive muscle relaxation, Mitchell's relaxation technique, and breathing exercises) as well as physical activities (such as stretching and core exercises) were comparably effective in alleviating dysmenorrhea pain and depression. These findings underscore the effectiveness of the progressive muscle relaxation technique in reducing dysmenorrhea among adolescent girls. This evidence supports hypothesis H1: Following the intervention, there will be a noticeable improvement in dysmenorrhea pain among adolescent girls when assessed against baseline measurements.

This finding supports the results of other research conducted by Akilandeswari et al. (2020) and Warulkar et al., (2020), who examined 60 adolescent girls to assess the impact of Jacobson's Relaxation Method on dysmenorrhea in specific schools in India. They concluded that the incidence of dysmenorrhea among these girls diminished following the application of the Relaxation Technique. Furthermore, these results align with those of Marfuah et al., (2021), who investigated the effectiveness of mobile health as a medium for progressive muscle relaxation training aimed at alleviating premenstrual discomfort in 52 university students in Bandung, Indonesia. Their findings indicated that progressive muscle relaxation training significantly alleviated premenstrual symptoms in the experimental group. This substantiates the effectiveness of progressive muscular relaxation in reducing menstrual cramps.

In this context, relaxation techniques have the potential to enhance immunity, alleviate anxiety, and improve overall daily functioning. They have also been demonstrated to diminish tension and anxiety levels, thereby contributing positively to psychological well-being. Relaxation therapy is recognized as one of the non-pharmacological strategies that can assist in alleviating menstrual discomfort, as noted by (Aboualsoltani et al. , 2020).

Relaxation exercises are effective in decreasing sympathetic activity while promoting parasympathetic activity. Consequently, there is a reduction in heart rate, blood pressure, respiratory rate, oxygen demand, dilation of peripheral vessels, muscle tension, and the perception of discomfort or pain. Simultaneously, blood flow to major muscle groups is enhanced, and sleep quality improves. Additionally, exercise contributes to lowering stress hormone levels in the body, including cortisol and adrenaline. It also boosts the production of endorphins, which serve as the body's natural pain relievers and mood enhancers. Progressive relaxation therapy effectively alleviates menstrual discomfort following brief, straightforward training sessions. It is a widely accepted complementary therapy due to its non-pharmacological nature, ease of learning, high efficacy, cost-free aspect, and the ability to be practiced independently, as highlighted by Harvard Health (2020) and Parra-Fernández et al., (2020).

The findings illustrated that there was a statistically positive correlation as determined

between the stress and pain levels among the studied adolescent girls pre and post-progressive muscle relaxation technique application. It reflected the association between stress and pain, where stress increased with increased pain.

Implications of the study

Implications for Nursing Practice. Community health nurses and gynecological nurses can utilize progressive muscle relaxation techniques in various healthcare environments, especially within the community, as dysmenorrhea is prevalent among adolescent girls yet often remains undertreated, misdiagnosed, and inadequately managed. The findings of this study underscored the crucial role of nurses in alleviating dysmenorrhea pain and stress in adolescent students through the implementation of cost-effective, safe, non-pharmacological interventions.

Implications for Nursing Education. Community health nurses, as well as psychiatric and gynecological nurses operating in diverse community settings and gynecological wards, should receive in-service education and emotional support for females experiencing dysmenorrhea, along with training on the positive effects of progressive muscle relaxation techniques.

Implications for Nursing Research. The findings of the present study have contributed to the existing body of literature, and the implications for nursing research are presented in the form of recommendations. This study can act as a foundation for future research endeavors and motivate other scholars to conduct further investigations.

Conclusion:

The study found that regular use of progressive muscle relaxation techniques can effectively reduce dysmenorrhea pain. A significant decrease in pain scores was observed after applying the technique, compared to before its application. This suggests that progressive muscle relaxation can be a useful tool for managing dysmenorrhea pain.

Recommendations:

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

- It is advisable to employ the progressive muscle relaxation technique as an adjunct therapy to assist adolescent girls in alleviating dysmenorrhea pain and stress.
- Community health and nurses should organize enlightenment program on non-pharmacological self-help strategies for dysmenorrhea and how to employ progressive muscle relaxation techniques effectively.
- Progressive muscle relaxation techniques should be utilized as a supportive therapy to help adolescent students to reduce menstrual cramps.

- 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.
- Structured, documented standards and methods for treating, supporting, following up on, and referring young females experiencing menstruation pain.
- For generalization, this study needs to be replicated on a wide scale and in varied settings.

The study strengths and limitations:

This study has several notable strengths. Its prospective randomized controlled trial design provides a robust framework for evaluating the effects of Jacobson Progressive Muscle Relaxation Technique (JPMRT) on primary dysmenorrhea. The involvement of a physiotherapist ensures proper implementation and follow-up of the technique.

The study's use of valid and reliable outcome measures adds credibility to its findings. Notably, the research demonstrates the positive effects of Progressive Muscle Relaxation in the short term, specifically from ovulation to the onset of the next menstruation.

However, the study's limitations include the absence of long-term follow-up and the lack of blinding for participants and assessors. Future research should prioritize investigating the long-term effects of Progressive Muscle Relaxation and employ blinded designs to enhance the validity of the findings. The study participants were chosen from a single educational institution, limiting the generalizability of the findings to other contexts.

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