

Effect of Progressive Muscle Relaxation Exercise on the First Trimester Nausea among Primigravida Women

Shaimaa Fouad Mohammed¹, Fatma Zakia Mohammed Farahat², Nadia Youssef Abd-Ella³

^{1&3}Woman's Health and Midwifery Nursing, Faculty of Nursing, Mansoura University, Egypt

²Maternity, Obstetrics and Gynecology Nursing, Faculty of Nursing, Port Said University, Egypt

Corresponding author: Assist. Prof. Dr. Nadia Youssef Abd-Ella.

Email Address: drnadiaabdella@gmail.com

Abstract

Background: Pregnancy is the most pleasant and delicate time in a woman's life. This study aimed to evaluate the effect of Progressive Muscle Relaxation exercise on the first trimester nausea among primigravida women. **Methods:** a quasi-experimental design was utilized in this study. The current study was conducted at the Antenatal Outpatient Clinic of Mansoura University Hospitals, Egypt. A non-probability purposive sample of 132 primigravida women in their first trimester was assigned to either the control group, which received regular antenatal care or the PMR group which conducted Progressive Muscle Relaxation exercise. A structured interview questionnaire schedule, Visual Analog Scale (VAS), and Likert Scale were utilized for data collection. **Results:** At the baseline assessment there was no statistical significant difference in VAS nausea scores between subjects in the control and PMR groups, a high statistical significant differences were found among the subjects from both groups at the 7th day after PMR exercising, in which, about 47% of the subjects in the control group had severe nausea compared to 0% subjects in PMR group (P <0.001), the frequency of nausea at the 7th day was decreased to be less than twice per day in about 54.5% of subjects in PMR group compared to 12.1% in control group (P <0.001), the majority of subjects were highly satisfied with PMR exercise as a convenient method to relieve nausea related to pregnancy. **Conclusion:** There was a statistical significant decrease in nausea severity and frequency in the PMR group compared to the control group with higher satisfaction with PMR exercise as convenient and simple method for relieving of nausea among primigravida women. **Recommendations:** The current study recommended that, progressive muscle relaxation exercise should be integrated into nursing care practices that relief nausea among pregnant women.

Keywords: First trimester, nausea, primigravida women, progressive muscle relaxation

Introduction

In normal pregnancies is characterized by several hormonal, metabolic, anatomical, psychological and physiological changes that may have a negative effect on the pregnant woman quality of life even in normal pregnancies (Celikgoz & Pinar, 2021). Nausea with or without vomiting is so prevalent in early pregnancy during which mild symptoms may be considered typical physiology of pregnancy in the first trimester (Smith, 2022).

Typically, nausea begins at 6-8 weeks of gestation and lasts until 16-20 weeks (Jarvis & Nelson-Piercy, 2011). Lacroix et al. (2000) conducted a prospective research with 160 women who submitted daily recordings of the frequency, duration and intensity of nausea and vomiting. Seventy-four percent of women had nausea for an average of 34.6 days. Only 1.8% of women

reported "morning sickness," while 80% reported that nausea continued throughout the day. Only half of women were relieved by week 14 and 90% by week 22.

The severity of nausea ranges from mild and moderate to extremely severe resulting in hypervolemia, weight loss and considered as pathological hyperemesis gravidarum that requires hospitalization (Smith, 2022). In general nausea and vomiting are not connected with an increased risk of unfavorable pregnancy outcomes, they have a substantial detrimental impact on women's lives because they reduce the quality of life and have severe consequences on social, vocational and home life functioning (Wood, McKellar, & Lightbody, 2013).

The exact mechanism of nausea remains unknown. However, it is thought that progesterone inhibit the smooth muscle of the pylorus and small bowel, slowing gastrointestinal motility and delaying gastric emptying (Body, & Christie,

2016). Nausea etiology is linked to developmental stage at the fetal-maternal interface and elevated level of human chorionic gonadotropin (Ahmed, Wafa, El-Omda, 2021).

Several approaches have been used in the management of nausea related to pregnancy including conservative treatment as dietary/lifestyle changes, supportive therapies such as fluid replacement and anti-emetics (Smith, 2022); complementary therapies as acupuncture, acupressure; positive psychology approach and relaxation techniques (Abbasi, Maleki, Ebrahimi, & Molaei, 2022; Lu, Zheng, Zhong, Cheng, & Zhou, 2021; El-Sayed, Hafez, Mohammed, & Abd Elhaleem, 2020; Safaa & El-Abd, 2019).

Prior research discovered that, Progressive Muscle Relaxation (PMR) is one of relaxing strategies that improves quality of life and reduces low back pain in pregnant women (Aswitami, Surya, & Maryani, 2021; Lamadah, Ahmed, Abo El maged, & Shamekh, 2021). PMR is a deep relaxation technique that was first described by Edmund Jacobson in the 1920s; it is based on the idea that the physical relaxation is linked to mental calmness (Lanier, 1930). This technique is very simple to learn and is one of the best therapies because of the ease of learning and cost savings, as well as it does not require any particular equipment, allowing for quick application (El-Sayed, Hafez, Mohammed, & Abd Elhaleem., 2020). So, teaching primigravida women the PMR exercise for managing nausea is discussed in this study.

Significance of the study:

Pregnancy is characterized by numerous physiological changes that can result in a wide range of symptoms including heartburn, nausea and vomiting (Gomes, Sousa, Lourenço, Martins, & Torres, 2018). Nausea related to pregnancy affects approximately 80 - 94% of pregnant women. It affects their lives, including considerable decline in their quality of life, individual and social performance (Biabani, Fatemeh, Vahid, Niknezhad, Manizhe, & Zahra, 2018; Boelig, Barton, Saccone, Kelly, Edwards, & Berghella, 2018; Gadsby, Ivanova, Trevelyan, Hutton, 2021).

Several studies have approved the efficacy of PMR on managing nausea induced by chemotherapy (Soliman, Eltantawy, & El-Kurdy 2022; Amer, Hamad, & El-Sayed, 2020; Tian, Tang, Xu, Xie, Chen, Pi & Chen., 2020). However few studies have been conducted specifically on research that investigated PMR effect on nausea

during pregnancy. This, prompt us to investigate the effect of PMR exercise on the first trimester nausea among primigravida women.

Aim of the study:

The current research work aimed to evaluate the effect of Progressive Muscle Relaxation exercise on the first trimester nausea among primigravida women.

Hypotheses of the study:

Primigravida women suffering from the first trimester nausea who practice progressive muscle relaxation exercise exhibit decrease in the severity and frequency of nausea than those who do not.

Primigravida women suffering from the first trimester nausea who practice progressive muscle relaxation exercise are highly satisfied than those who do not.

Subjects and Method:

Study design

At this study a quasi-experimental design was used. Hence, the effect of the independent variable (i.e., progressive muscle relaxation exercise) on the dependent variable (i.e., 1st trimester nausea) was assessed in this study.

Study setting

This study was carried out in the Antenatal Outpatient Clinic of Mansoura University Hospitals, Egypt. The clinic offers diagnostic and therapeutic services to pregnant women (Saturday to Wednesday, from 9 a.m. to 12 p.m.). It consists of reception area, patient waiting hall, laboratory, ultrasound, vesicular mole, and examination rooms. Also the clinic contains lecture hall equipped with a number of seats, computer and data show device whereas the researchers interviewed the recruited subjects to conduct this study.

Sampling

A non-probability purposive sample of 132 primigravida women in the 1st trimester was invited to participate in the study during the period from the beginning of November 2021 to the end of April 2022. Women were eligible to participate when fulfilled the following criteria; primigravida women in their 1st trimester suffering from nausea, aged between 20-35 years, with gestational age of 5 -10 weeks, and had singleton pregnancy. They were excluded if they had high risk conditions related to pregnancy as history of diabetes,

hypertension, mental, gastrointestinal and muscular disorders and or administrating antidepressants, or other drugs resulting in nausea.

Sample size calculation:

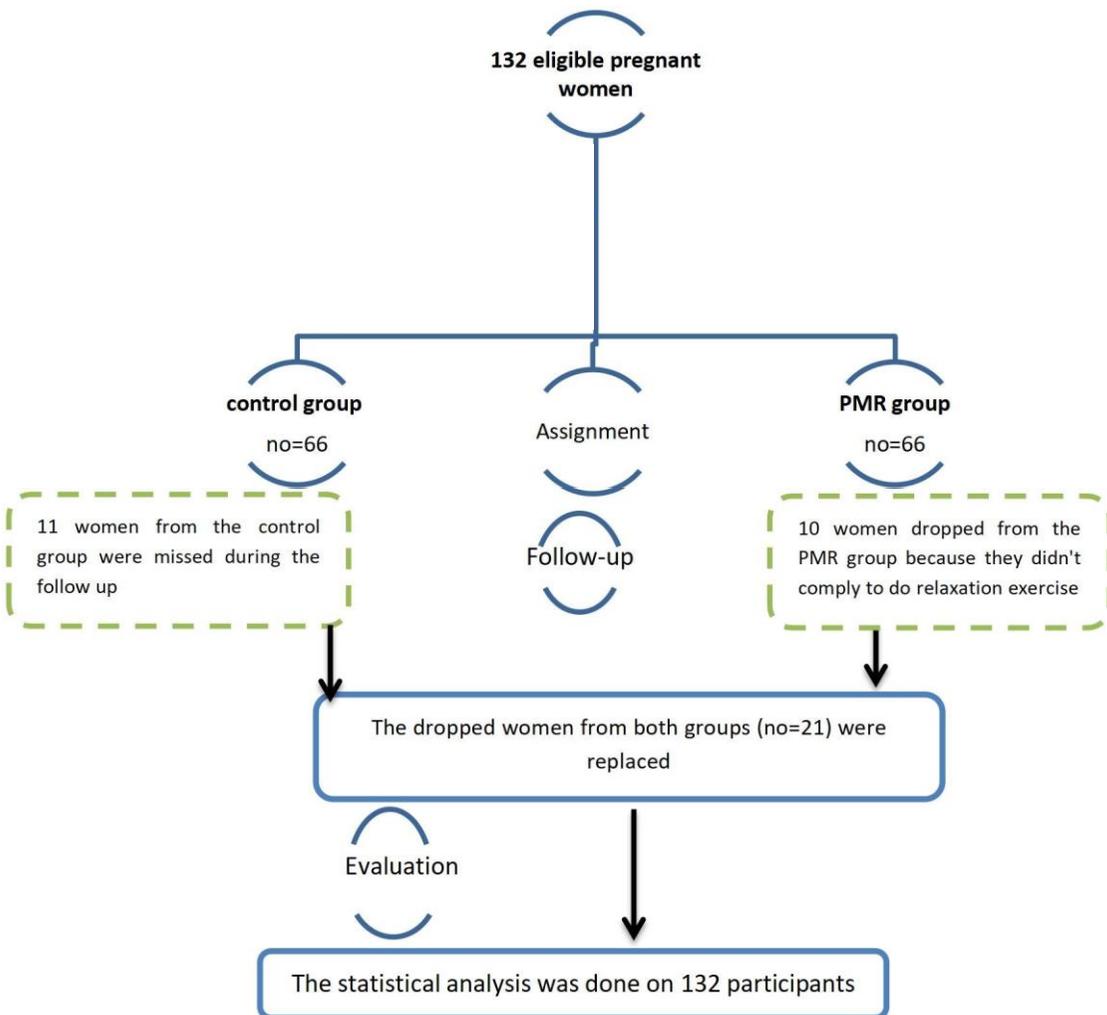
Based on data from literature (Gawande et al., 2011) assessed progressive muscle relaxation exercise in hyperemesis gravidarum, considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula: $n = [(Z\alpha/2 + Z\beta) \times \{2(SD)^2\}] / (\text{mean difference between the two groups})^2$, where; SD = standard deviation, $Z\alpha/2$: This depends on level of significance, for 5% this is 1.96, $Z\beta$: This depends on power, for 80% this is 0.84

Therefore, $n = [(1.96 + 0.84)^2 \times \{2(0.52)^2\}] / (0.27)^2 = 65.4$. Accordingly, the required sample size is 66 per each group.

Recruitment of the study sample:

About 132 eligible primigravida women were invited to participate in the study. They were assigned either to the control or to the PMR group using lottery method (66 per each group). During the study period, 10 women dropped from the PMR group because they didn't comply to do relaxation exercise and 11 women from the control group were missed during the follow up, thus, they were replaced with the next potential candidates. The statistical analysis was done on 132 participants, flowchart of the study sample indicated in Figure 1.

Figure 1. Flowchart of the study sample.



Tools of data collection:

A structured interview questionnaire schedule, Visual Analog Scale (VAS) and Likert Scale for women's satisfaction were used as data collecting tools.

Tool I: A Structured Interview questionnaire Schedule

The researchers designed this tool after reviewing related literature; the necessary data was gathered through an individual interview with each participant. It concerned with the general characteristics of the enrolled subjects such as age, occupation, education, residence and gestational age.

Tool II: Visual Analog Scale (VAS)

It was adopted from **Boogaerts., et al (2000)**, several studies have proven the utility of the numeric version of the visual analogue scale (VAS) to assess the severity of nausea, VAS is a 10 mm long vertical line scale, the left end of the line is 0 mm " indicates a lack of nausea", and the right end is 10 mm" indicates the sever nausea". The VAS cut-off points were assessed as follows: 0-1 "no nausea," 1+/-4 "mild nausea," 4+/-7 "moderate nausea," and 7+/-10 "severe nausea."

Tool III: Likert Scale for women' satisfaction

It was adopted from **Jacoby & Matell (1971)** to assess maternal satisfaction with PMR exercise. It is one dimensional three points Likert scale. The score ranges from 1 to 3; score 1 indicate dissatisfaction, 2 indicate neutrality and 3 indicate satisfaction; the higher the score, the better the satisfaction with PMR exercise.

Validity of the tools

The content of the developed questionnaire was validated and confirmed by a panel of five experts in woman's health & midwifery nursing and obstetric medicine specialties before being presented to pregnant women. Validation was performed to ensure

that the questions were consistently presented and bore the expected meaning. Their feedback on the tools' consistency, accuracy, and relevance was solicited. There were no recommended modifications.

Reliability of the tools

The Cronbach's alpha value of the test-retest reliability of the VAS-nausea score was 0.837 and for the satisfaction was 0.883, so, the questionnaire was found to be highly reliable.

Pilot study:

Before starting the procedure of data collection, a pilot study was conducted on 10% (14 primigravida women) of the total sample size according to the selection criteria to test the clarity, efficacy and applicability of the tool in order to estimate and determine the time required to apply the study and identify the required modification. Subjects of the pilot study were excluded from the study.

Ethical considerations:

An ethical approval was taken from the Research Ethics Committee-Faculty of Nursing-Mansoura University. An oral consent was taken from each subject involved in the study after clarification of its aim and approach. The researcher validated the anonymity and uniqueness of the data acquired in the current study, and the researcher underlined that participation is voluntary and participants had the ability to withdraw from the study at any moment.

Field work:

The researchers interviewed participants of the study two days/week on (Sunday and Wednesday), at the previously mentioned study setting. Three phases were followed to accomplish the study including preparatory and implementation phases as well as the phase of evaluating study outcomes.

1. Preparatory phase:

After massive reviewing of the literature about the effectiveness of applying PMR exercise on management of nausea using available periodicals, books and internet

resources to get acquainted with the various aspects of the study problem, the data collection tools and an educational brochure that clarifies definition, benefits and steps of PMR exercise were prepared. Additionally, before commencing the study, the researchers secured the availability of a well-prepared, quiet and private room at the study sitting.

2. Implementation phase

This phase included both assessment and actual intervention work with primigravida women;

A. Assessment:

The researcher interviewed primigravida women, ensuring that they were eligible to share in the study, clarified the aim of the research work and took their oral consent to participate in the study. After that, the subjects' sociodemographic data, obstetric history and brief history about nausea (e.g. frequency, severity) were collected from each participant.

B. Intervention:

Control group

Subjects in the control group received pharmacotherapy as dictated by their obstetricians.

Intervention group

- Subjects in the PMR group provided both pharmacotherapy alongside with PMR exercise educational session. The session was provided to ten groups; each group consisted of six or seven participants and lasted for 60:90 minutes. During the session, participants were familiarized with the concept of relaxation technique, the benefits of PMR exercise in relieving nausea, steps of PMR exercise and then they were given instructions to wear comfortable clothes, empty the bladder and assume a comfortable position (supine or sitting) in a well-ventilated silent room to enhance relaxation as much as possible before exercising at home.

- After that, the researchers started to explain PMR procedure then making sure that the subjects have learnt the practical training of exercise, the researchers requested them to

practice the technique step by step and clarified any mistakes that they had. During procedure, participants were instructed to tense each muscle group (feet, calf, thigh, gluteal, chest, hand, forearms, shoulders, neck, facial, and then forehead) according to the mother's maximum ability about five to seven seconds, but not tensed to the point of pain with inspiration and then the mother relaxed for about ten seconds with expiration, then rested through taking a deep breath for 10 to 15 seconds apart before moving to next muscle.

- At the end of the session, the participants were provided with PMR brochure, so that they remember relaxation steps during practicing at home. They were also instructed to practice PMR daily in early morning for one week and recorded the results of the practice in a daily report checklist before and daily after performing PMR exercise. Meanwhile, during the study period, the researchers were in contact with the participants via phone to answer their questions and follow them to ensure that they complied with PMR procedure.

3. Outcome evaluation phase:

The severity of nausea was evaluated through VAS scale after performing PMR exercise (daily for one week), while, the frequency of nausea was assessed at the end of intervention (at the 7th day). The third tool (Likert scale) evaluated participants' satisfaction with PMR exercise for relief of nausea one week after the PMR educational session via phone call. Accordingly, a comparison was done to assess the differences between the control and PMR groups related to the effect of applying PMR exercise on 1st trimester nausea.

Statistical analysis

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean \pm standard deviation (SD). Categorical data were expressed in number and percentage. One-way analysis of variance (ANOVA) test was used for comparison among more than two for variables with continuous data while independent sample Student's t test was used between two for variables with continuous data. Chi-square test was used for comparison of variables with

categorical data. The reliability (internal consistency) test for the questionnaires used in the study was calculated. Statistical significance was set at $p < 0.05$.

limitations of the study

There were two limitations for the current study work; the first one was lacking of the necessary references from both national and international sources consequently, the researchers had difficulties in discussing the research topic. The second one was that participants were limited to low-risk primigravida between 6 and 10 weeks of gestation. As a result, extending the current findings to a broader varied sample of women, including high risk pregnant women, was not acceptable.

Results

Table 1 presents that the mean age of subjects in the control and PMR groups was almost similar (27.8 ± 4.4 and 28.0 ± 4.5 , respectively). Likewise, more than half (54.5% & 51.5%) of subject in both control and PMR groups were at their 8th to 10th weeks of gestation, respectively. There was no statistical significant difference among both groups concerning age, educational level, occupation, residence and gestational age ($p > 0.05$).

Table 2 shows that, 54.5% of subjects in the control group suffered from severe nausea at the baseline assessment compared to 47 % at the 7th day within the same group with no significant change in the severity of nausea ($p > 0.05$). On the contrary, there was a highly significant decrease in the severity of nausea among subjects within the PMR group in which the severity of nausea was lower on the 7th day compared to base baseline assessment (0% vs. 53%, respectively) with highly significant decrease ($p < 0.001$). Meanwhile, at the baseline assessment there was no statistical significant difference in VAS nausea scores between subjects in the control and PMR groups, a high statistical significant differences were found among the subjects from both groups at the 7th day after PMR exercising, in which, about 47% of the subjects in the control group had severe

nausea compared to 0% subjects in PMR group ($P < 0.001$).

Figure 2 shows that at the baseline assessment there was no significant difference in VAS nausea score between the studied groups ($p < 0.05$). However, at the 2nd day after PMR exercise, the VAS nausea score was significantly lower in the PMR group than in the control group (6.7 ± 1.9 vs. 7.4 ± 2.1 , respectively). Moreover, a highly statistical significant difference ($p < 0.001$) was noticed on the 6th and 7th day after exercise, in which, the VAS nausea scores were further reduced in the PMR group compared to the control group ($4.1 \pm 1.7\%$ vs. 7.1 ± 2.1 and 2.8 ± 1.4 vs. 7.0 ± 2.2 , respectively).

Table 3 demonstrates that at baseline assessment the majority of subjects in the control and PMR groups complained of nausea for more than 5 times per day (89.4% & 92.4%, respectively). Meanwhile, the frequency of nausea at the 7th day was decreased to be less than twice per day in about 54.5% of subjects in PMR group compared to 12.1% in the control group with high statistical significant decrease between both groups ($P < 0.001$).

Figure 3 illustrates that the majority (80.3%) of participants were satisfied with PMR exercise in relieving of nausea related to pregnancy.

Table 4 shows that, there was statistical significant association between the severity of nausea among primigravida women in the PMR group and their educational level ($P < 0.05$) and highly statistical significant association between the severity of nausea and their occupation & residence ($P < 0.001$) as women who had higher education, housewives and from urban areas had no nausea after applying the PMR exercise (60.0%, 86.7% and 80.0%, respectively).

Table 1. General characteristics of the control and PMR groups

	Control group		PMR group		Significance test	
	No.(66)	%	No.(66)	%	X ²	P
Age (years)						
21 – 25	25	37.9	22	33.3		
>25- 30	16	24.2	24	36.4		
>30- 35	25	37.9	20	30.3	2.347	0.309
Mean ±SD	27.8 ±4.4		28.0 ±4.5		0.350	0.727#
Educational level						
Basic	21	31.8	21	31.8		
Secondary	30	45.5	25	37.9		
Higher	15	22.7	20	30.3	1.169	0.557
Occupation						
Housewife	51	77.3	46	69.7		
Working	15	22.7	20	30.3	0.972	0.324
Residence						
Rural	48	72.0	44	66.7		
Urban	18	27.3%	22	33.3	0.574	0.449
Gestational age (weeks)						
5-7	30	45.5	32	48.5		
8-10	36	54.5	34	51.5	0.122	0.727
Mean ±SD	7.4 ±1.7		7.7 ±1.8		0.900	0.370#

Student's t test

Table2. The severity of nausea before and after PMR exercise between the control and PMR groups

	Control group No. (66)								PMR group No. (66)								Significance test X ² p	
	None		Mild		Moderate		Severe		None		Mild		Moderate		Severe			
	N	%	n	%	n	%	N	%	n	%	N	%	n	%	N	%	n	%
Baseline	0	0.0	0	0.0	30	45.5	36	53.0	0	0.0	0	0.0	3	4.7	3	5.3	0.03	0.861
Day 1	0	0.0	0	0.0	32	48.5	34	51.5	0	0.0	0	0.0	3	5.6	2	4.3	0.75	0.384
Day 2	0	0.0	0	0.0	31	47.0	35	53.0	0	0.0	3	4.5	4	6.0	2	3.4	6.62	0.036*
Day 3	0	0.0	1	1.5	31	47.0	34	51.5	0	0.0	6	9.1	3	5.9	2	3.1	7.55	0.023*
Day 4	0	0.0	0	0.0	33	50.0	33	50.0	0	0.0	7	10.6	3	5.9	2	3.0	10.6	0.005*
Day 5	0	0.0	0	0.0	34	51.5	32	48.5	2	3.0							14.7	0.002*
Day 6	0	0.0	2	3.0	33	50.0	31	47.0	9	13.6	2	3.4	2	3.4	1	1.6	37.9	<0.001**
Day 7	0	0.0	5	7.6	30	45.5	31	47.0	1	2.2	2	3.9	2	3.7	0	0.0	60.6	<0.001**
Significance test within the group	X ² =7.209				P=0.926				X ² =310.719				p<0.001**					

* Statistical Significant at P<0.05

**Highly Statistical Significant at P<0.001

Figure (2). Comparison of the mean severity of VAS nausea score between the control and PMR groups.

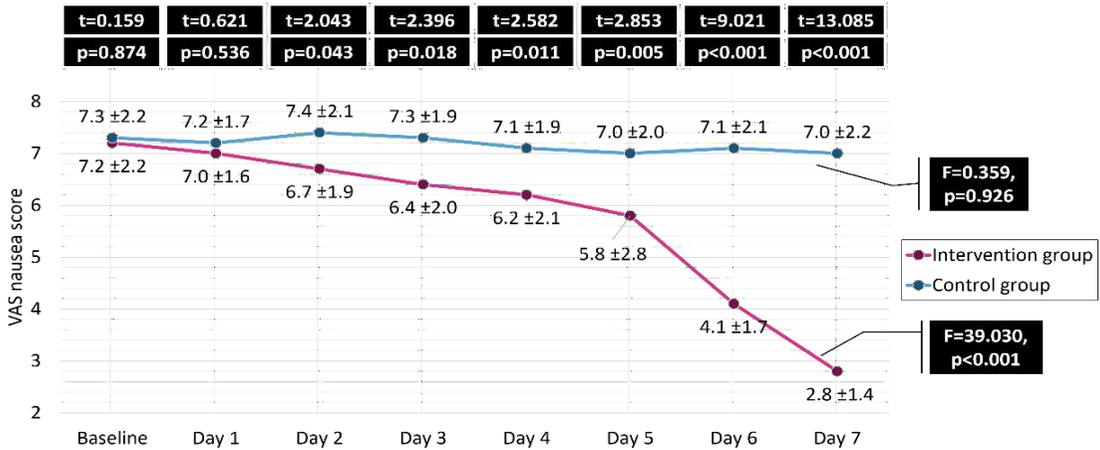


Table 3. Comparison between the control and PMR groups according to frequency of nausea

Frequency of nausea pre day	Control group		Intervention group		Significance test	
	No. (66)	%	No. (66)	%	X ²	p
Baseline						
>5	59	89.4	61	92.4		
2 - 5	7	10.6	5	7.6	0.367	0.545
Mean ±SD	7.6 ±1.8		7.5 ±1.8		0.319#	0.750
At day 7						
>5	39	59.1	9	13.6		
2 - 5	19	28.8	21	31.8		
<2	8	12.1	36	54.5	36.668	<0.001**
Mean ±SD	5.8 ±2.9		3.9 ±1.9		4.522#	<0.001

**Highly Statistical Significant at P<0.001

t value, student's t test

Figure (3). Primigravida satisfaction with PMR exercise for relieving of nausea

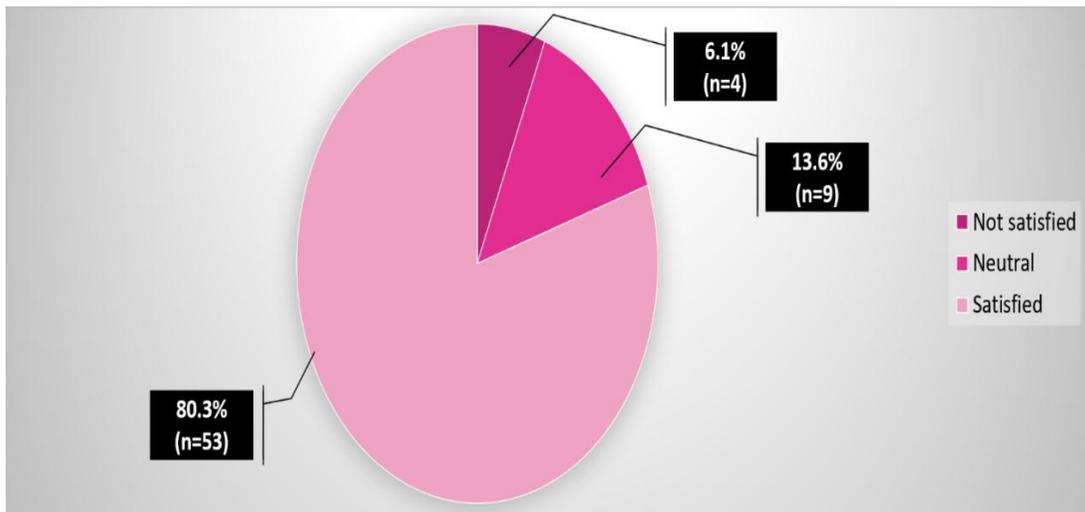


Table 4. Association between the severity of nausea at the 7th day after PMR exercise and general characteristics & obstetric history in the PMR group

	VAS-nausea level at day 7						Significance test	
	No (n=15)		Mild (n=26)		Moderate (n=25)		X ²	p
	n	%	N	%	N	%		
Age (years)								
21 – 25	4	26.7	8	30.8	10	40.0		
26 – 30	8	53.3	8	30.8	8	32.0		
31 – 35	3	20.0	10	38.5	7	28.0	3.267	0.514
Mean ±SD	28.1 ±3.8		28.4 ±4.6		27.6 ±4.9		0.234	0.661#
Educational level								
Basic	0	0.0	9	34.6	12	48.0		
Secondary	6	40.0	8	30.8	11	44.0		
Higher	9	60.0	9	34.6	2	8.0	16.135	0.003*
Occupation								
Housewife	13	86.7	23	92.0	10	40.0		
Working	2	13.3	3	8.0	15	60.0	16.819	<0.001**
Residence								
Rural	3	20.0	17	65.4	24	96.0		
Urban	12	80.0	9	34.6	1	4.0	24.399	<0.001**
Gestational age (weeks)								
5 – 7	7	46.7	14	53.8	11	44.0		
8 – 10	8	53.3	12	46.2	14	56.0	0.520	0.771
Mean ±SD	7.6 ±1.7		7.5 ±1.7		7.2 ±1.8		0.417	0.661#

* Statistical Significant at P<0.05 **Highly Statistical Significant at P<0.001 # one-way ANOVA test

Discussion

This study aimed to evaluate the effect of progressive muscle relaxation exercise on the first trimester nausea among primigravida women. This aim was accomplished through the present study findings which revealed that, after application of the PMR exercise there was statistical significant decrease in the severity and frequency of first trimester nausea in the PMR group compared to the control group. Also, the majority of participants in the PMR group were satisfied with PMR exercise in management of nausea related to pregnancy. Therefore, the study hypothesis “Primigravida women suffering of the first trimester nausea who practice PMR exercise exhibit decrease in the severity and frequency of nausea and were highly satisfied than those who do not” was reinforced.

The present study findings showed that, there was a statistical significant decrease in the severity and frequency of nausea among subjects of the PMR group compared to subjects of the control group. This might be explained by

the autonomic nervous system, which experiences tension and relaxation as a result of sympathetic and parasympathetic nerve fiber activation, may be affected by progressive muscle relaxation. The parasympathetic nervous system takes over during and after exercise because muscle relaxation is a crucial part of PMR, resulting in, decrease in heart rate, respiration rate, blood pressure and alpha waves in the brain as well as increased cellular immunity function which leads to a general relaxing response that includes decreased tissue oxygen, decreased levels of chemicals like lactic acid and the release of endorphins. Thus, it may be used as an effective coping strategy to manage nausea (Rokhman , Ahsan & Supriati., 2015; Akmesse et al., 2014).

Shourgashti et al. (2019) agreed with the present study findings who evaluated the effect of progressive muscle relaxation on nausea and vomiting in pregnant women and concluded that after utilizing progressive muscle relaxation during all stages of measurement, the intervention group's mean score and total score of nausea, vomiting and

gagging considerably decreased ($p < 0.001$), whereas there was no significant decrease in the control group.

Likewise, **Gawande et al. (2011)** analyzed the effects of progressive muscle relaxation on pregnant women with hyperemesis gravidarum revealed that patients in the experimental group responded to treatment significantly earlier and needed significantly fewer antiemetic drugs. Patients in the experimental group also experienced a complete recovery in 2.73 ± 0.46 days (mean) on average after two to three sessions of PMR. Additionally, **Lamadah et al. (2021)** examined the effects of PMR exercise on low backache and quality of woman's life and found that all quality of life subscales including mental health, pain, vitality, physical, social function and general health which included relieve of physical complaints as nausea were significantly improved in the PMR group.

In congruent with the present study findings, **Soliman, Eltantawy & El-Kurdy (2022)** assessed the effect of PMR on chemotherapy-induced nausea, vomiting and anxiety in Egyptian women with breast cancer, founded that participants who received PMR along with an antiemetic showed more improvement in post-chemotherapy nausea and vomiting as shown by frequency, severity and duration. Interestingly, have better control over early and late nausea and vomiting. Again this finding was in agreement with **Anugrahini, Nuswantoro & Sriyono (2019)** and **Amer, El-Sayed & Hamad (2020)** assessed the impact of applying PMR technique on nausea and vomiting induced by chemotherapy among breast cancer women and children with leukemia, reported that PMR technique significantly decreased the frequency, severity, duration of the symptoms.

The current study also evaluated the mother's satisfaction with PMR exercise for reducing the severity of nausea related to pregnancy. The results showed that, the majority of primigravida women were satisfied with this PMR exercise as a convenient method to treat nausea. This result can be explained as PMR exercise promote general health, quality of life and psychobiological wellbeing among

pregnant women as well as reduces physical symptoms. Thus, this exercise works on the aggravating factor for nausea that induces a state of discomfort among mothers and enhances relaxation of muscles that reduce nausea and promote women's satisfaction. In the same line **Boryri, Navidian & Marghzari. (2019)** compared the effect of muscle relaxation and guided imagery on happiness and fear of childbirth in primiparous women, concluded that, both relaxation training and guided imagery techniques increases happiness among pregnant women.

The current study findings revealed a statistically significant association between the severity of nausea among subjects in the PMR group and their educational level and residence, with urban and highly educated women experiencing no nausea after performing the PMR exercise. This might be construed to mean that more educated women are more engaged in and understand PMR exercise instructions. Meanwhile, urban women are concerned about their health and are aware of the benefits of exercise during pregnancy. Disagreed with the current findings, **Soltaniet et al (2007)** evaluated "pregnancy-related variables that aggravate nausea and vomiting throughout the 1st trimester". Their results didn't show a significant relationship between education level and nausea score.

Also, the present study findings showed that, there was statistical significant association between the severity of nausea and working condition among subjects in the intervention group, means that, employed women had severe nausea compared to housewives. This can be interpreted as working women have various job duties and family obligations causing them to be overwhelmed and had no time to exercise as required. Another explanation is that, they have little time to rest and/or relax, accordingly, their general health affected and they suffer from severe nausea. Consistent with this study **Tabatabaei Chahar et al. (2005)** investigated the incidence, severity of nausea and vomiting among housewives and employed pregnant women in Bojnourd prenatal care centers and reported that employee pregnant women experience nausea and vomiting with a higher degree of severity. In contrast, **Fateme et al.**

(2019) assessed the effect of Benson's muscle relaxation technique on the intensity of pregnancy nausea revealed no significant association between occupation and nausea severity.

The current study finding revealed no association between gestational age and nausea severity. This might be due to the study's short duration, as the subjects were only observed for a short period of time, making it difficult to investigate the association between gestational age and nausea severity. Disagreed with the current findings, a study by **Soltaniet et al. (2007)** on the frequency of pregnancy nausea and vomiting in pregnant women and its related factors revealed a significant relationship between the gestational age and the intensity of nausea and vomiting in pregnancy.

Considering the treatment of nausea and vomiting during pregnancy, there are enormous cost every year including financial resources, time wasting, the cost of visiting physicians, midwifery, nursing care and treating this issue raises the hospital occupancy rate, which has unfavorable effects. Furthermore, the negative effects of pharmacological and chemical therapy on pregnant mothers and their fetuses. On the other hand, PMR exercise is non-pharmacological, affordable relaxing therapy, has no adverse effects, simple to apply and it has a positive effect on reducing nausea related to pregnancy thus promoting women general health and wellbeing.

Conclusion

Based on the present study results, the tested hypotheses were accepted where there was statistical significant decrease in nausea severity and frequency in the PMR group compared to the control group. Also, primigravida women were satisfied with PMR exercise as convenient and simple method for relieving of nausea related to pregnancy.

Recommendations

The current study findings incite the following recommendations:

- Progressive muscle relaxation exercise should be integrated into nursing care practices for relieving of nausea among pregnant women.

- Providing an in service education program for maternity nursing personnel about progressive muscle relaxation exercise.

- **Further study:** A comparative study of the efficacy of progressive muscle relaxation exercise and other non-pharmacological nausea management during pregnancy may also be conducted.

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Conflict of Interest

The authors declared that there was no dispute with respect to this research.

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