

Effect of Progressive Muscle Relaxation Exercises during Pregnancy on Low Back Pain and Quality of Woman's Life

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Abstract

Background: Many women during pregnancy suffer from low back pain (LBP). This pain has a significant effect on women's quality of life. Fifty percent of women during pregnancy have low back pain. According to the related literature, LBP may be a weakening condition that influences on women's daily activities and their productivity and affecting women's quality of life. LBP must not be neglected and great attention should be given to this complaint. **The aim of the study** was to assess the effect of progressive muscle relaxation exercises during pregnancy on low back pain and quality of woman's life. **Subjects and Method: Design:** A quasi-experimental research design was carried out at Salah Abd-Rabo obstetric and gynecological clinic and Sahala obstetric and gynecologic center, Alexandria, Egypt. **Subjects:** A convenient sample of 40 pregnant women were assigned randomly to a muscle relaxation group or a control group (20 participants in each group) according to certain criteria. **Tools:** Three tools of data collection were used: A questionnaire sheet, a visual analog pain intensity scale (VAS) and health related quality of life (HRQOL) questionnaire. **Results:** There is a significant decrease in pain intensity at 2 months, ($p < 0.05$) among participants in the study group while, pain intensity increased among control group participants after the same period. In addition, there is a significant improvement in all quality of life aspects after two months among the study group than control group, ($p < 0.05$). **Conclusion and recommendations:** PMR can reduce low back pain among pregnant women and improve their quality of life. Pregnant women who wish to stop pharmacological pain relief should be taught about PMR.

Key Words: Progressive muscle relaxation, back pain, quality of life.

Introduction:

Pregnancy alters the physiology of a woman's body. It has an obvious changes on different systems in the body. Among these systems is the musculoskeletal especially the axial skeleton ^(1,2). Large percent of women suffer from low back pain (LBP) during pregnancy which may have adverse effect on women's quality of life. In this regard, around 50% of women will suffer from low back pain ^(3, 4).

There are different factors which are responsible for LBP. It occurs more frequently later in the pregnancy due to increase in the baby' weight and uterine expansion. Hormones are one of the most common cause of pregnancy-related low back pain. The progesterone and relax in hormones alleviate muscles tension and relax joints and ligaments, particularly in the area of pelvis ^(5,6). The additional weight and changes occurring during pregnancy alongside these loosened joints and ligaments may lead to discomfort ^(7- 9).

Low back pain occurs in the lumbar region, above the sacrum, and it can radiate to the leg. The pain is usually dull and aggravated by flexion ⁽¹⁰⁾. The gradual weight gain and the change in the body's center of gravity combined with the stretching of weak abdominal muscles often lead to a hollowing of the lumbar spine. There is a tendency of back muscles to shorten as the abdominal muscles stretch

and extra strain is put on the ligaments. This leads to backache, usually in the sacroiliac or lumbar origin ^(10, 11).

Some women suffer from mild discomfort after prolonged standing while others have debilitating pain that affects on their daily life negatively. The prevalence of low back pain during pregnancy can be considered as a normal change that occurs during this period but it can lead to physical inactivity during pregnancy ^(12, 13). Symptoms of LBP during pregnancy affect the daily living activities and decrease quality of women's life (QOL) leading to periodic bed rest and work absenteeism. Some studies showed that LBP increases as pregnancy advances and interferes with their daily activities. It can prevent pregnant women from going to work and to have disturbing sleep. It is also noticed that more than 80% of women who have low back pain during pregnancy experience difficulties with childcare, housework, and job performance ^(14, 15).

Pregnancy related low back pain can affect women's lives dramatically. So, early detection and safe intervention will lead to better outcome. Non-pharmacological intervention such as physiotherapy, massage and relaxation exercises may be beneficial to relieve low back pain that occurs during pregnancy ^(16- 18).

Relaxation exercises are called behavioral aspirin. Muscle relaxation and breathing exercises are examples of physiological processes that connect the mind and body, and can be used as a non-medicinal practice. Relaxation exercises have many benefits, such as reducing stress and anxiety, relieving muscle strain and contractions, diverting women's attention from pain and making it easier to sleep as well as relieving pregnant women's fatigue and discomforts^(19- 22).

Progressive muscle relaxation or active relaxation is a technique during it, women can achieve relaxation by active contraction of a group of certain muscles and then releasing them in a progressive manner while taking deep breathing. It provides physiological and psychological relaxation by decreasing the response to stress, muscle contractions, and pain⁽²³⁾.

During pregnancy, woman usually has less energy, but regular exercise can provide her with the required energy during the day. Exercises stimulate the blood flow to shift away from the internal organs (including uterus) to give the lungs, heart and muscles more oxygen. It can reduce lower back pain and increase flexibility. Relaxation therapy has a positive effect on the fetus^(24, 25).

According to the findings of some researches, women who exercise regularly

during pregnancy have higher self-esteem than those who do not. When comparing an exercising group of pregnant women to a non-exercising group of pregnant women, the association between exercise and high self-esteem was linked to a reduction in the number of symptoms of backache, headache, and exhaustion⁽²⁶⁾.

The nurse has a pivotal role in providing guidance and education for the pregnant women who are based on the understanding that the maternal health is the lifeline to the fetus and her quality of life and any alteration can affect growth and survival of the fetus. Current health and fitness lifestyles recommend the inclusion of information concerning exercise during pregnancy in prenatal education programs⁽²⁷⁾. Thus, it was crucial to find out the effect of progressive muscle relaxation exercises during pregnancy on low back pain and quality of woman's life

Significance of the study:

Low back pain (LBP) is a significant complaint of pregnant women. Literature clearly indicates that LBP should not be neglected and good intervention must be provided, because it may be disabling, limiting everyday activities and affecting women's quality of life. In addition, QOL decreases as pregnancy advances because women may suffer from physical,

psychological and / or social problems with their consequent negative impact on their health ⁽²⁸⁾. As documented that progressive muscle relaxation exercises can decrease pain and mobility difficulties related to osteoarthritis but there are no adequate evidences regarding pregnancy-related LBP ⁽²⁹⁾.

Aim of the Study

The aim of this study was to assess the effect of progressive muscle relaxation exercises during pregnancy on low back pain and quality of woman's life

Research Hypotheses:

1. Participants who perform the progressive muscle relaxation exercises for two months during pregnancy will experience low back pain intensity than those who do not.
2. Participants who perform the progressive muscle relaxation exercises for two months during pregnancy will experience higher quality of life scores than those who do not.

Subjects and Method

Research Design:

A Quasi experimental research design.

Research Setting:

The study was carried out at Salah abd-Rabo obstetric and gynecological clinic

and Sahala obstetric and gynecologic center, Alexandria, Egypt.

Research subjects:

A convenient sample of 40 pregnant women were recruited. They were randomly divided into two groups, the study and control group with 20 women in each group.

Inclusion criteria:

1. Women suffer from LBP
2. Women can read and write
3. During the second trimester
4. No history of lumbar problem before pregnancy
5. Not receiving any pain relief medication for LBP.
6. Singleton pregnancy.
7. Free from any medical or gynecological problems
8. Free from past history of abortion or premature labour.

Tools of data collection:

Tool 1: A questionnaire sheet was used to collect socio-demographic data such as age, education and occupation. Obstetric history such as gravidity, parity was also collected, in addition to woman 'life style data such as performing exercises, types of exercises and her information about exercises.

Tool 2: The low back pain intensity was measured using a visual analogue scale. This tool depicts pain on a two-

dimensional scale, with a score of zero indicating no pain, a score of 1-3 indicating mild pain, 4-6 indicating moderate pain, and 7-10 indicating intense pain. It is valid and reliable tool [30]. The VAS was self-completed by the women. The women were instructed to draw a line perpendicular to the VAS line at the point where their pain level was the highest. The pain scores were registered three times, before intervention, after one month and again after two months from the intervention.

Tool 3: The Short Form-36 scale was used to evaluate health-related Quality of Life (HRQOL) [31]. It consists of 36 statements which assess eight main domains: physical functioning (ten statements), role-physical (four statements), bodily pain (two statements), general health (six statements), social functioning (two statements), and role emotional (three statements), and vitality (four statements), and mental health (five statements). The Turkish version of the SF-36 was used in this research. A Likert Scale is used to grade the responses. For each domain, the participants provided acceptable responses to the questions on the SF-36 scale of 0 to 100. The high scores on the scale indicate that HRQOL is improving in a positive way. This method

is available in two languages: English and Arabic [31].

The validity and reliability:

Three academic Obstetric nursing experts evaluated the face and content validity of tool 1 and recommended modifications were done. Tool reliability was examined by (Alpha Cronbach test). Its result was 0.73. Tool (II) & (III) were adopted by the researchers and used for data collection.

Method:

-An approval from Ethical Research Committee of the Faculty of Nursing / University of Alexandria was obtained

-An official letter from the Faculty of Nursing, Alexandria University was taken and directed to the responsible managers of the study settings to take their permission to conduct the study.

-A pilot study was carried out on a sample of 4 women. These women were excluded from the total sample size.

-Women who had the inclusion criteria were recruited randomly to the study and control groups.

-Every woman was interviewed individually to maintain privacy during the collection of the socio-demographic, obstetric and life style data using tool (1).

-For the study group (n=20): during the first session, participants completed the

questionnaire sheet, SF-36 scale, and VAS. Then, the study group received educational session about technique of the progressive muscle relaxation exercises with the aid of educational video in a quiet room. After that, the researchers performed the exercises in front of the participants and women were asked to re-demonstrate it. Every participant was asked to lie back on the examination bed with performing contraction and releasing of different muscle groups. During tightening of the muscles, the woman was asked to hold for 15 seconds until feeling the muscles tighter and tensor. Then, she slowly released the tension while counting for 30 seconds. Practice progressed in the same technique, beginning with the muscles in the forehead, face, neck, shoulders, forearms, hands, chest, abdomen, gluteal muscles, thigh, calf and finally the feet. The session lasts about 20 minutes. Participants were asked to breathe slowly and evenly. Each woman was given a handbook with photos and was asked to perform the exercises at home, two times per day (at the morning and at the evening), 20 minutes for two months. After one month from the first session, women came to the clinic for pregnancy follow up. Participants were asked to complete the SF-36 and VAS scale. The researchers confirmed with the participants about the continuity of the

exercises. After another one month, women came again to the clinic and filled out the SF-36 and VAS scale again.

As regarding control group (n=20), women also were asked to complete the questionnaire sheet, SF-36 scale and VAS at the first session. Then, the researcher educated the women to lie back and do nothing at the morning and at the evening for 20 minutes. Then, they came to the clinic after one month and after two months for pregnancy follow up and marked their pain and QOL on the VAS and SF-36 scale.

For both study and control groups, the researchers followed the women through phone to ensure that they adhered to the instructions and to get sure that they will come at the date of follow up.

Ethical consideration and data collection:

Before participating in the study, each woman gave her written consent after informing them about the study's goals. The women were assured of the confidentiality of their personal details by the researchers, who also gave them the option to withdraw from the study at any time. Data collection was done from April to December 2019.

Statistical Analysis:

The statistical software package SPSS 21.0 was used to analyze the results.

Descriptive statistics were used to explain the data. By using the Chi square and ANOVA tests, the researchers calculated the statistical significance of variations between the variables. Statistical significance was considered at $p < 0.05$

Results:

As illustrated in **table (1)**, the majority of the participants in the study group (90%) were between 21-35 years old compared to (85%) of the control group. Moreover, the education of most of the study group (80%) was higher education compared to (35%) among the control group. Most of the participants in every group (95%) were housewives.

Table (2) reveals participants' obstetric history. It can be observed that, the gestational age of 70% of the study group was between 17-20 weeks compared to 80% of the control group. In addition. Three quarters of the participants (75%) in the study group were multipara compared to 85% of the control group. Moreover, the beginning of pain among 60% in the study group was in the second trimester compared to (50%) of the control group. Prolonged standing and continuous movement were the most common pain aggravating factors among 40% and 20% respectively of the study group compared

to 40% and 35% respectively among the control group. Pain was relieved by bed rest among 50% of women in the study group compared to 80 % of control group.

As shown in **table (3)**, 70% of women in the study group did not perform exercises before implementation of the progressive muscle relaxation exercises compared to 75% in the control group. Moreover, 50% and 80% of women among both study and control group respectively performed walking exercises. In addition, (50%) from study group performed exercises once every week compared to 20% of control group. About two thirds (66.67%) of women among the study group felt well after performing exercises compared to 80% of the control group. Among the factors that prevent women from performing exercises were ignorance as mentioned by 40% of the study group compared to 30% of the control group. In addition, fear of abortion was mentioned by 30% of the study group compared to 45% of the control group. There were no significant differences in life style between the two groups.

Table (4) and figure (1), illustrate the effect of progressive muscle relaxation exercises on low back pain intensity among the study and control group

according to VAS at the beginning of the study (baseline) and then again after one month and after two months. Participants in the study group reported significant decrease in pain intensity after two months, than women in the control group, Mean \pm SD = 3.25 \pm 0.72 and Mean \pm SD=5.05 \pm 1.05 respectively and p =0.042*

As regards to the impact of muscle relaxation exercises on the participants' quality of life, **table (5)** shows that there is a significant improvement in all quality of life aspects after 2 months among the study group than control group, p < 0.05.

Table (1): Socio- demographic characteristics of the participants (n = 40)

characteristic	Intervention Group		Control Group	
	N=20	%	N=20	%
Age:				
<20	0	0	1	5
21-35	18	90	17	85
36-40	2	10	1	5
>40	0	0	1	5
X², P - value	2.36 , 0.500			
Educational level:				
Primary school	0	0	3	15
Preparatory school	3	15	1	5
Secondary school	1	5	9	45
University	16	80	7	35
X², P - value	13.92 , 0.003			
Residence:				
Village	2	10	1	5
City	18	90	19	95
X², P - value	0.36 , 0.548			
Economic status:				
Low	11	55	2	10
good	9	45	18	90
X², P - value	9.23 , 0.002			
Occupational status:				
Work	1	5	1	5
housewife	19	95	19	95
X², P - value	0.00 , 1.000			

Table (2): Participants' obstetric history (n=40)

Items	Study		Control	
	(N=20)	(%)	(N=20)	%
Gestational weeks at the entry of the study :				
13-16	3	15	2	10
17-20	14	70	16	80
21-24	3	15	2	10
X², P - value	0.30 , 0.86			
Gravity:				
1	5	25	3	15
≥ 2	15	75	17	85
X², P - value	0.63 , 0.422			
Medication intake during pregnancy:				
No	5	25	6	30
Vitamins	8	40	10	50
Analgesic	4	20	3	15
Antibiotic	3	15	1	5
X², P - value	1.46 , 0.692			
Beginning of pain :				
First trimester	8	40	10	50
Second trimester	12	60	10	50
X², P - value	0.40 , 0.52			
Pain aggravating factors :				
Prolonged standing	8	40	8	40
Continuous movement	4	20	7	35
Prolonged sitting	8	40	5	25
X², P - value	1.51 , 0.469			
Period of pain :				
Continuous	2	10	3	15
Intermittent	18	90	17	85
X², P - value	0.23 , 0.632			
Measures to relieve pain:				
Bed rest	10	50	16	80
Relaxation	2	10	3	15
None	1	5	1	5
Topical ointment	1	5	0	0
Warm shower	1	5	0	0
Analgesic	5	25	0	0
X², P - value	8.58 , 0.126			

Table (3): Participants' life style during pregnancy (n=40)

Items	Intervention Group		Control Group	
	(N=20)	(%)	(N=20)	(%)
Exercise during the current pregnancy.				
Yes	6	30	5	25
No	14	70	15	75
X², P - value	0.13 , 0.72			
Type of exercise	n=6		n=5	
Walking	3	50	4	80
Relaxation	0	0	1	20
Hands and legs exercises	2	33.33	0	0
Breathing exercise	1	16.67	0	0
X², P - value	5.62 , 0.131			
Times of exercises	n=6		n=5	
Every day	1	16.67	0	0
3 times / week	0	0	1	20
Once every week	3	50	1	20
Once every month	2	33.33	3	60
X², P - value	0.92 , 0.821			
Do you feel well after doing the Exercise:	n=6		n=5	
Yes	4	66.67	4	80
No	2	33.33	1	20
X², P - value	0.24 , 0.621			
Factors preventing pregnant women from performing exercises				
Do not know about exercise.	8	40	6	30
House work	6	30	3	15
No physical ability	0	0	2	10
Afraid of abortion	6	30	9	45
X², P - value	3.89 , 0.27			

Table (4): Effect of progressive muscle relaxation exercises on low back pain among the study and the control groups

Pain	Baseline VAS	After 1 month VAS	After 2 months VAS	F	P
	Mean ± SD	Mean ± SD	Mean ± SD		
Study Group	5.50 ± 0.95	4.25 ± 0.72	3.25 ± 0.72	4.05	0.042*
Control Group	4.75 ± 1.02	4.70 ± 1.03	5.05 ± 1.05	1.25	0.254

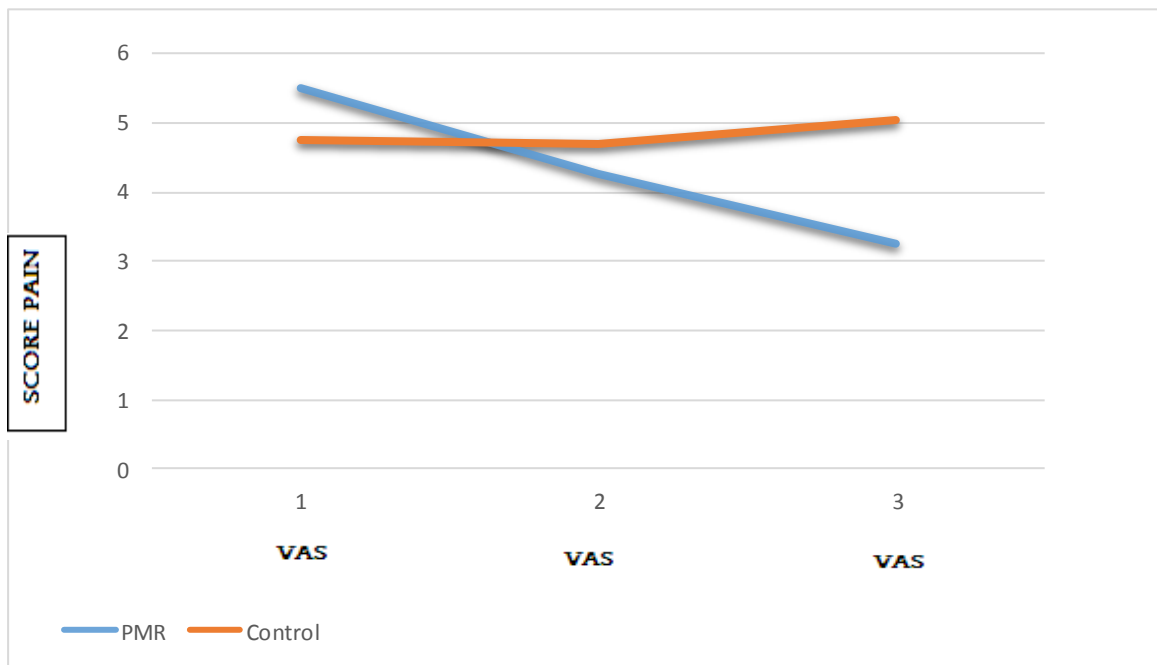


Figure (1): Effect of progressive muscle relaxation exercises on low back pain among the study and the control groups

Table (5): Effect of progressive muscle relaxation exercises on participants' quality of life

Subscale	Time	Study Mean \pm SD	Control Mean \pm SD	T	P
General health	baseline	55.42 \pm 11.48	53.96 \pm 6.12	1.07	0.15
	1-month	60.04 \pm 10.16	35.97 \pm 4.72	3.85	0.004*
	2-month	70.74 \pm 7.29	54.38 \pm 9.31	5.22	0.001*
F,P		8.5, 0.002*	2.68, 0.107		
Role physical	baseline	40.25 \pm 17.88	46.67 \pm 20.87	1.00	0.365
	1-month	56.25 \pm 13.66	38.61 \pm 19.54	4.22	0.0021*
	2-month	65.50 \pm 13.95	35.61 \pm 24.36	6.98	0.001*
F,P		8.11, 0.005*	3.01, 0.098		
Physical function	baseline	26.25 \pm 26.25	21.25 \pm 33.71	1.21	0.107
	1-month	37.50 \pm 23.65	20.00 \pm 27.63	4.21	0.0021*
	2-month	61.25 \pm 35.79	18.75 \pm 24.16	24.6	0.001*
F,P		25.6, 0.001*	2.14, 0.214		
Mental health	baseline	25.00 \pm 26.21	21.67 \pm 37.89	1.08	0.152
	1-month	33.88 \pm 26.60	33.88 \pm 26.60	0.11	0.785
	2-month	60.00 \pm 39.88	25.00 \pm 35.66	11.85	0.001*
F,P		20.30, 0.001*	1.25, 0.51		
Role emotional	baseline	66.25 \pm 18.63	51.25 \pm 23.61	2.36	0.025*
	1-month	70.00 \pm 18.85	40.50 \pm 18.32	8.98	0.001*
	2-month	80.00 \pm 17.01	30.00 \pm 18.85	9.68	0.001*
F,P		6.98, 0.013*	3.65, 0.035*		
Body pain	baseline	31.88 \pm 15.43	31.86 \pm 15.43	0.106	0.896
	1-month	41.25 \pm 11.54	41.25 \pm 11.54	0.052	0.985
	2-month	57.50 \pm 17.40	41.88 \pm 15.32	2.45	0.012*
F,P		5.65, 0.013*	3.05, 0.041*		
Vitality	baseline	53.22 \pm 11.77	58.44 \pm 11.45	1.25	0.107
	1-month	60.56 \pm 9.60	58.23 \pm 13.05	0.85	0.685
	2-month	63.22 \pm 6.21	58.31 \pm 13.18	1.98	0.048*
F,P		6.01, 0.013*	0.013, 0.987		
Social function	baseline	43.75 \pm 22.76	52.50 \pm 21.31	2.98	0.017*
	1-month	52.50 \pm 21.31	52.50 \pm 21.31	0.21	0.86
	2-month	67.50 \pm 14.28	50.00 \pm 19.87	8.25	0.001*
F,P		17.21, 0.001*	0.321, 0.748		

Discussion

During pregnancy, the pregnant woman undergoes many anatomical and physiological changes. These alterations have an effect on her musculoskeletal system, resulting in lower back pain⁽³²⁾. In the United States of America, Europe, and some parts of Africa, the reported incidence of low back pain during pregnancy ranges from 30% to 78%⁽³³⁾. The aim of this study was to assess the effect of progressive muscle relaxation exercises during pregnancy on low back pain and quality of woman's life. The study accomplished its proposition in illustrating that progressive muscle relaxation is an efficient way in decreasing low back pain and improving women's quality of life.

The present study revealed that nearly three quarters of the study and control group didn't exercise during the current pregnancy. According to a study conducted in southern Brazil, 14.8 % of women were active prior to pregnancy and only 12.9 % were active during pregnancy⁽³⁴⁾. There were different factors preventing them from practicing exercise such as, housework, fear of abortion, lack of physical ability and ignorance about exercises. These results are in accordance with the results of Flannery et al. (2018) and Evenson et al. (2009) who reported that women didn't know about types of

exercises they could engage in while pregnant and if it was safe or not^(35,36). Maternity nurses are key source of information to enhance pregnant women's knowledge about the importance of exercises during pregnancy. In the current study, walking was the most reported exercises among participants of the two groups, similar results were reported by Nascimento et al. (2015)⁽³⁷⁾.

Moreover, the current study showed that, the beginning of low back pain occurred in the second trimester among three fifths of the study group compared with one half of the control group. Other studies illustrated the same results as Carvalho et al. (2017), they mentioned that 43.9% of the participants suffered from low back pain during the second trimester⁽³⁸⁾. This observation may explain that low back pain is the result of musculoskeletal system alteration that including postural changes and lordosis resulting from increasing spinal load due to the growing fetus⁽³⁹⁾.

There are number of methods can be done to treat back pain during pregnancy. The common interventions are medication, ice or heat compresses, sleeping on the left side, massage, and progressive muscles relaxation. In the current study, half of the women in the study group while most of control group tend to take bed rest for relieving back pain. Similar results by

Manyozo et al. (2019) who found that resting of women from the pain aggravating activity was an effective pain alleviating modality among women with LBP. They reported that most of women during pregnancy utilized self-care procedures by using exercises, stretching, and massage ⁽⁷⁾ However, there are evidence-based management interventions for preventing and treating LBP during pregnancy. Stabilization, manual therapy, and hydrotherapy are examples of these treatments, which are often delivered by physiotherapists ⁽³⁾.

After 2 months of conducting the progressive muscle relaxation exercises, the study group showed a substantial reduction in pain intensity compared to the control group according to the VAS. These findings are consistent with those of Akmes and Oran (2014), who found that women who received PMR training and performed it on a daily basis had a substantial reduction in pain perception ⁽¹⁴⁾. Furthermore, Mohammed and Fattah (2019) discovered that participants with low back pain had a statistically significant increase in functional ability and a statistically significant decrease in pain severity after 4 weeks of exercising compared to the control group ⁽⁸⁾. In addition, Relaxation can reduce pain or its perception, increase feeling of control,

energize and improve sleep. It can also help with physical health and interpersonal relationships, so progressive muscular relaxation has long-term benefits that boost quality of life ⁽⁴⁰⁾.

In the present study, when compared to the control group, the PMR group showed a substantial improvement in all QOL subscales 2 months after the intervention (general health, role physical, physical function, mental health, role emotional, body pain, vitality, and social function). However, these findings are consistent with Akmes and Oran (2014) who reported the same results ⁽¹⁴⁾. On the other hand, Tendais et al. found no connection between exercise and general health, physical and mental HRQOL among pregnant women in a prospective trial using the SF-36 questionnaire in 2011 ⁽⁴¹⁾. When pregnant women from Brazil were studied in an RCT, the same findings were obtained ⁽⁴²⁾. In addition, Gustafsson et al. (2016) investigated the impact of an exercise regimen during pregnancy on health-related quality of life in pregnant women and discovered no changes in any aspects of psychological well-being or general health ⁽⁴³⁾. Liu et al. (2019) systematically examine the effect of various forms of exercises on the quality of life of pregnant women. Overall, their findings showed that exercise can improve

women's quality of life during pregnancy and is a feasible, appropriate, and successful intervention which is in agreement with the present study⁽⁴⁴⁾.

Therefore, the findings of the present study demonstrated that progressive muscle relaxation exercise is an effective therapy for improving LBP and QOL among pregnant women. There are a lot of causes behind the benefits of progressive muscle relaxation exercises. Tension and relaxation in the autonomic nervous system are caused by the firing of sympathetic and parasympathetic nerve fibers, respectively. Since muscle relaxation is such a large part of PMR, the parasympathetic nervous system takes over during and after it, resulting in a reduction in respiratory rate, heart rate, and blood pressure. Deep somatic restfulness, in combination with parasympathetic dominance, has been shown to alleviate anxiety. The relaxation response decreases tissue oxygen demand, lowers lactic acid levels, and releases endorphins, all of which can help to relieve pain. Therefore, a PMR-induced decrease in anxiety, along with the reduction of pain perception, may improve QOL among the pregnant women^(14, 45, 46).

Conclusion

According to the findings of this study, many pregnant women experienced low

back pain during their pregnancy. The findings also support the researchers' hypotheses and provide a strong evidence that progressive muscle relaxation exercises can minimize low back pain and enhance women's quality of life during pregnancy.

Recommendations

The following recommendations are made based on the results of this study:

1. Pregnant women who wish to avoid pharmacological pain relief should be taught about progressive muscle relaxation exercises.
2. A comparative study of the efficacy of different non-pharmacological pain management during pregnancy may also be conducted.

Study limitations

The number of the study subjects is limited because the enrolled women from the beginning of the study was 60, then, about 11 women were not able to continue practicing the PMR regularly and /or adhere to the researchers' instructions. The other 9 women didn't come for follow up. The remaining number was 40 women who continued to participate in the study and was divided between the two groups, 20 women in each group. Another limitation of the study is the presence of significant difference among the study and control group in their educational level and

economic status as well as in the baseline data of role emotional and social function aspects of quality of life.

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