

# The Influence of Progressive Muscle Relaxation and Mental Imagery-based Relaxation on Psychological Characteristics of Women with Unintended First Pregnancy during COVID-19 Pandemic: A Single-Blind Clinical Trial

Mansoureh Mokaberian (PhD)<sup>1\*</sup>, Houriyeh Dehghanpouri (PhD)<sup>1</sup>

<sup>1</sup> Assistant Professor, Department of Physical Education and Sport Sciences, Faculty of Physical Education, Shahrood University of Technology, Shahrood, Iran

ARTICLE INFO	ABSTRACT
<p><i>Article type:</i> Original article</p>	<p><b>Background &amp; aim:</b> Pregnancy is one of the most important stages in a women's life. Occurance of unintended first pregnancy due to changes in women's life-style following COVID-19 pandemic has led to more stress, anxiety, and uncertainty pregnant women. Therefore, the current research aspires to examine how progressive muscle relaxation intervention and imagery-based relaxation technique can affect the psychological characteristics of women with unintended first pregnancy during COVID-19 pandemic.</p> <p><b>Methods:</b> This single-blind, parallel groups, pretest-posttest randomized controlled trial was conducted on 60 women with first unwanted pregnancy who attended the urban clinics in Semnan, Iran in 2020, and were assigned to experimental and control groups. Tools for measurement included a demographic questionnaire as well as Depression, Anxiety, Stress Scale (DASS-21). In the experimental group, women were given 8 weeks of progressive muscle relaxation and imagery-based relaxation intervention; while women in the control group only received the routine care. One day before and one day after the intervention, DASS-21 was completed by the subjects.</p> <p><b>Results:</b> The results of the multivariate analysis of covariance (MANCOVA) showed that after 8 weeks of intervention, the level of anxiety (<math>P=0.0001</math>), depression (<math>P=0.0001</math>) and stress (<math>P=0.0001</math>) decreased in the experimental group in comparison with the control group (<math>P\leq 0.016</math>).</p> <p><b>Conclusion:</b> According to the results, it can be concluded that in order to improve the psychological status of women with unintended pregnancy, especially in the stressful conditions of COVID-19 disease, the relaxation techniques can be used as cost-effective and non-pharmacological approaches to build more emotional stability.</p>
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## Introduction

Although pregnancy and childbirth are considered a natural phenomenon in the cycle of life, it is also regarded as a stressful experience (1). Some women get irritable and oversensitive following the changes after pregnancy and childbirth and feel some changes in their feelings and communications and all these cause stress for pregnant women (2). Such changes

depend on whether the pregnancy is intended or unintended, planned or unplanned, or happened after a long process of medical interference or not (3). Among all these, the stress caused because of the birth of the first-born baby is the considered as a severe form of stress among the sociopsychological stresses (4). As a matter of fact, perceived stress refers to

\* Corresponding author: Mansoureh Mokaberian, Assistant Professor, Department of Physical Education and Sport Sciences, Faculty of Physical Education, Shahrood University of Technology, Shahrood, Iran. Tel: 00989123319172; Email: mokaberian@shahroodut.ac.ir

the level which one considers their life events as unpredictable, uncontrollable, and stressful (5). Anxiety is also another aspect of stress which occurs as a reaction to internal and external stimulants (1) and is a negative emotional state which is accompanied with disquietude, discomfort, worry, and bodily activation or stimulation (6). The results of some studies show that severe stress and anxiety during pregnancy can affect the results and can have several negative consequences (1, 4, 7). The results of studies show that pregnancy and childbirth stress can cause the baby to be affected by asthma or different psychological disorders; it can also cause hyperactivity disorder and irritability for the child in the future (1). It may even lead to structural disorders, low birth weight, nervous system and immune system disorders (2). Besides, one can say that depression is one of the four most widespread diseases all over the world and the commonest cause of disabilities caused by illnesses. In depression (psychological cold) one feels sadness, displeasure, and dissatisfaction and is unable to feel happiness and pleasure which could happen for anyone in any rank, social status, or race; its special signs are dissatisfaction, lack of energy and interest, low self-confidence, feeling of sadness and guilt, changes in appetite and sleep patterns all of which can be considered as possible causes of low job performance (8). At the end of 2019, a new virus named COVID-19 started spreading all over the world which led to the imposition of a lot of restrictions for the people all over the world; it was recommended to all the people especially pregnant women to stay in lock-down and not leave their houses except with full medical precaution. Besides all the restrictions that this pandemic has had, it has challenged providing health services, medical care and laboratory services for pregnant women (9).

On the other side, change of lifestyle due to COVID-19 has had a negative effect on pregnant women and led to more stress, anxiety, and uncertainty in them (10). Generally, it has had these effects on all age-groups and all social strata that are exposed to covid-19, but due to unique immune state in which the pregnant women are and the rise of the possibility of infection in pregnant women, it is of more

importance with regard to pregnant women (11). As the results of Derya's study (2021) show, pregnant women may be worried about the possibility of infection of the fetus and this causes them to be exposed to stress (10). The findings of the study done by Wu et al (2020) indicate that after the announcement of the start of the COVID-19 pandemic, there was a higher number of signs of depression, stress, and anxiety reported in pregnant women (12). Du et al (2020) also reported that pregnant women experience severe worries about the danger of getting COVID-19(13). Hence, it seems that, due to unpredictability of COVID-19 and the restrictions imposed because of it, pregnant women are more affected and their stress and anxiety scale increases. Therefore, controlling pregnant women's psychological state is of high importance (10).

Meanwhile the results of the studies demonstrate that some interference during pregnancy can lead to a decrease in stress, anxiety, and depression in women. Such sports as yoga, massaging, aromatherapy, laughter therapy, music therapy, respiratory methods, and relaxation are among effective methods in this regard (1). Among all these methods, relaxation is a mixture of perceptive-behavioral with psycho-physical interferences which leads to a balance of intellectual and emotional function; so through creating proper psychological and physical responses, they decrease psychological and physical tensions (6). Relaxation is a behavioral tool which is also called behavioral aspirin which is probably the main method of treating stress and psychological pressures (4). It includes two techniques of Progressive Muscle Relaxation (PMR), focusing on physiologic responses, (Jacobson breathing training) and mental imagery-based relaxation (14).

The first technique, that is progressive muscle relaxation, includes exercises during which one contracts the chosen muscles until they get to relaxation state and then they expand the same muscles (15). This technique was first introduced by Edmund Jacobson with the purpose of providing awareness of relaxation and tension in muscles (1) and can have significant physiologic and psychological effects besides controlling stress (6). There are evidences which prove that progressive muscle

relaxation can be an effective method in reducing stress, anxiety, and depression during pregnancy (16, 17) and it generally improves our feeling of rehabilitation and causes happiness in pregnant women (3). Seyed Ahmadinejad et al. (2015) analyzed how progressive muscle relaxation can affect the depression, stress, and anxiety scale in first-time pregnant women (15). The results of the study indicates that after interference the depression, stress, and anxiety scale in the experimental group is significantly much less than in control group. In their study, Alipour et al. (2016) entitled as "Analysis of the Effect of Relaxation Techniques on the Depression, Anxiety, and Stress Scale in Pregnant Women" conclude that after interference the anxiety and stress scale in the treatment group decreased significantly after interference (2). The study conducted by Tragea et al. (2014) Also showed that progressive muscle relaxation and breathing techniques can be effective in lowering the perceived-stress scale in pregnant women (18). The findings of a study conducted by Alder et al. (2011) also demonstrate that the relaxation techniques are among the most standard behavioral treatments in reducing stress in pregnant women (19). The findings of study done by Pan, Zhang & Li (2012) shows that training progressive muscle relaxation improves the quality of life and also reduces the stress in women with ectopic pregnancy (20). The results of a study conducted by Mokaberian et al. (2020) about how progressive muscle relaxation and mental imagery-based relaxation can influence mental health of women with unintentional first pregnancy also shows that one period of interference through relaxation methods leads to a significant effect on pregnant women's mental health (21). Rajeswari and SanjeevaReddy (2020) also found out that progressive muscle relaxation is very effective in reducing stress and anxiety and also post-effects of childbirth in women in India (3). All in all, progressive muscle relaxation can be used as an independent method or a complementary method alongside other treatments (1). The second technique that is mental imagery-based relaxation is another effective nonpharmacological method for dealing with stressors (22). Mental imagery-based relaxation is a technique in which imagination is used to achieve such desirable effects as lowering

pain and reducing stress. This method is described as an internal communication which engages all the senses and it is believed that it makes an emotional communication between mind and body. To put it simply, imagery is a process through which one sees and feels mental images and scenes. However, more studies have been devoted on investigating the influence of this method on athletes (23).

As mentioned earlier, most of the studies on pregnant women focused on the effect of progressive muscle relaxation, while the second relaxation technique that is mental imagery-based relaxation, which has been ignored can also be very effective. Furthermore, in few studies first-time pregnant women with unintentional pregnancy have been under study. Besides, in the former studied, the COVID-19 pandemic did not exist. All these factors maximize the stress scale in pregnant women. Therefore, the importance of studying the effect of these two techniques in psychological state of pregnant women is heightened, considering the fact that stress, anxiety, and depression can cause of many diseases (5) and also regarding the fact that pregnancy is a stressful situation for women (15) and is considered as an important period in a woman's life during which proper training can improve the quality of the mother's life (1). Hence, the current research aspires to examine how progressive muscle relaxation intervention and imagery-based relaxation technique can change the psychological characteristics of women with unintended first pregnancy during COVID-19 pandemic.

Therefore, the purpose of this research was to analyze how progressive muscle relaxation and mental imagery-based relaxation can change the level of stress, anxiety, and depression on first-time pregnant women with unintended pregnancy during COVID-19 pandemic.

## Materials and Methods

The present study was a single-blind, parallel groups, pretest-posttest randomized controlled trial. The research population included all women with first unwanted pregnancy referred to the urban clinics of Semnan city. Reviewing the medical records of the participants and considering the inclusion criteria of the current study, 60 people were selected as the statistical sample and by simple random sampling (cards

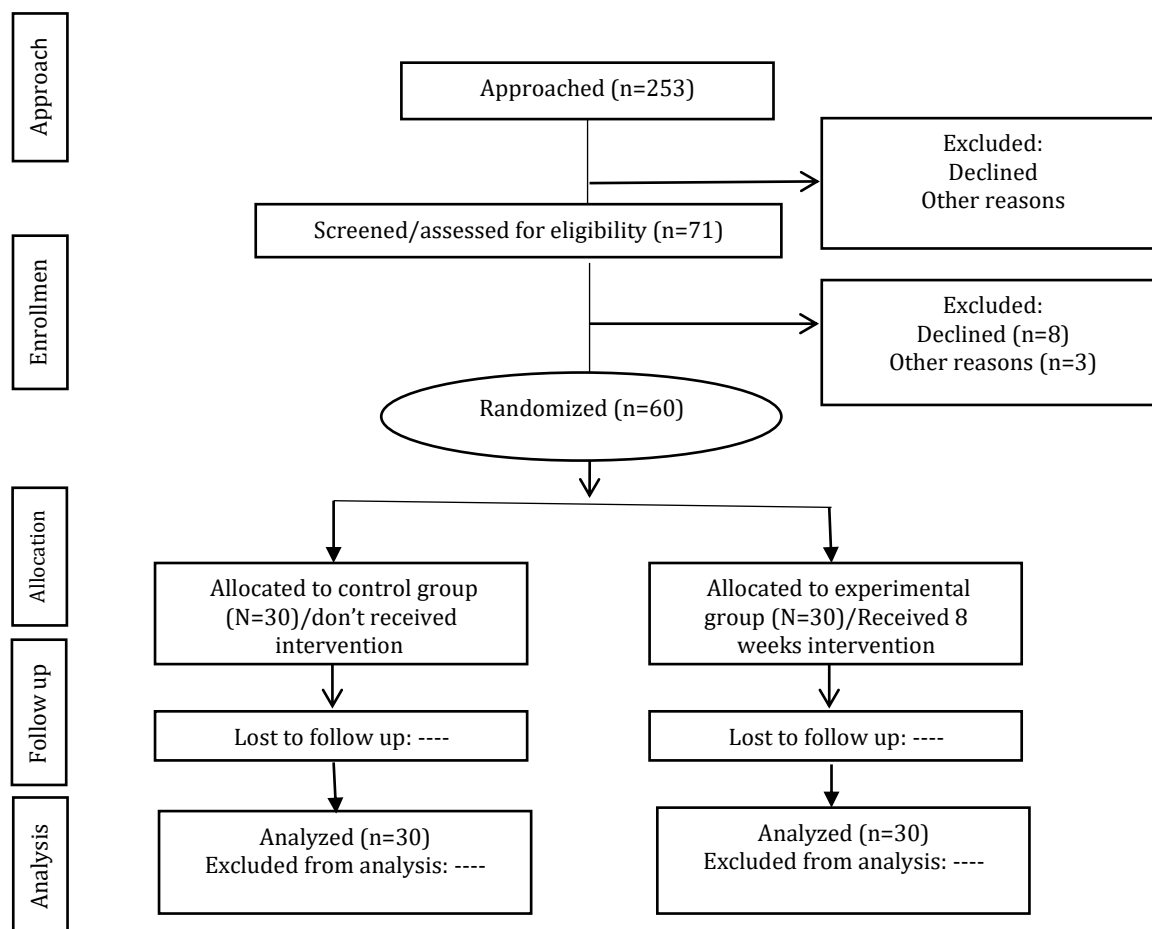
shuffling) divided into the experimental and control groups. The inclusion criteria included: mothers' age of 18-35 years, gestational age of 28-30 weeks, single pregnancy, no history of chronic diseases, no history of taking psychotropic drugs, alcohol and cigarettes, first pregnancy, unwanted pregnancy and no history of infertility and abortion, having a minimum of secondary educations, no occurrence of stressful events in life during the last 6 months, no history of using relaxation techniques during the pregnancy before the intervention and low-risk pregnancy. Besides, the exclusion criteria included the occurrence of any adverse events during the study, the examinee's dissatisfaction with continuing to participate in the research, not performing relaxation exercises for at least one day a week, occurrence of obstetric problems and prohibition of doing research by a gynecologist (17, 22).

In present study the demographic questionnaire was used which included such information as the mother's age, gestation age, income, parents' education, address, and parents' job. In addition, the DASS- 21 was used to measure depression, anxiety and stress and is designed as Likert including four short-response options (never, sometimes, often, and almost always). Questions number 3, 5, 10, 13, 16, 17, 21 analyze depression, questions number 2, 4, 7, 9, 15, 19, 20 analyze the anxiety scale and questions number 1, 6, 8, 11, 12, 14, 18 analyze the stress scale. The reliability in sample consisting 1771 people in England with Cronbach's alpha for depression is reported as to be 95%, for anxiety 90%, and for stress 93% and for the total number 97%. The present questionnaire is a standard questionnaire which is used in most studies in our country as well as other countries all around the world. In Iran, the validity and reliability of this tool has been approved by Moradipناه et al (2009) and Aghebati (2005) (24, 25). In Moradipناه et al (2009) the Cronbach's alpha for depression is

reported as to be 94%, for anxiety 92%, and for stress 82% (24) The reliability of this scale for all the items in the current study is 86% and its validity is 91%.

To collect data, for eight weeks, the experimental group had to attend sessions of progressive muscle relaxation and mental imagery-based relaxation exercises which lasted for thirty minutes, twice a week. The experimental group underwent 30-minute sessions of progressive muscle relaxation as well as mental imagery-based relaxation exercises twice a week for a total period of 8 weeks. After selecting the study groups, the office of a gynecologist was used for research. By observing all health protocols and individually, the research intervention was performed on pregnant women in the experimental group. In order for the mother to be physically relaxed, in the first 20 minutes, she was given a comfortable position and then was asked to start exercises which include deep and slow abdominal breathing to bring about concentration. This should have been done through contracting and then expanding the muscles consciously. Then in the last ten minutes, relaxation was done by the use of mental imagery which means that the mother was asked to imagine a scene in which she felt safe, relieved of any stress and anxiety. Then a pleasant atmosphere, which was enjoyable to the patient, was created through using appropriate music and a therapist's voice (22). In the meantime, the control group was busy with daily activities without any external guidance.

This research has an ethics code number from Sports Sciences Research Institute, Tehran, Iran (IR.SSRC.REC.1399.087). All participants were notified about the purposes of the study as well as its benefits. Besides, they were assured that the data received in the trial will be confidential and that they were free to withdraw from the study at any time. Finally, a written consent was received from all the participants.



**Figure 1.** The CONSORT flow diagram

In order to statistically analyze the obtained raw data, the descriptive statistics of central tendency and dispersion measures were used. Furthermore, in order to analyze the difference between the variables of the studied groups, chi-squared and multivariate analysis of covariance (MANCOVA) tests were used and the pre-test measurements were considered as the covariate variables. Dividing the conventional level of 0.05 by the number of dependent variables (3 variables), the significance level was considered to be 0.016, which is called Bonferroni adjustment method which is employed to decrease the type 1 error. The data analysis was performed with SPSS 20 software. Before performing the MANCOVA test, the corresponding assumptions, namely, the normality of the scores associated with the

dependent variables, variance-covariance homogeneity, conventional correlation of the covariates with each other and interaction of the covariate variables with the dependent variable were examined using Kolmogorov-Smirnov (KS), Box, Pearson's correlation coefficient and one-way ANOVA tests, respectively and all the mentioned assumptions were confirmed.

## Results

According to the demographic characteristics of the two groups, there was no significant difference ( $p > 0.05$ ) between the mother's age ( $p = 0.34$ ,  $X^2 = 17.66$ ), mother's educations ( $p = 0.95$ ,  $X^2 = 0.93$ ), father's educations ( $p = 1.00$ ,  $X^2 = 0.00$ ), mother's job ( $p = 0.60$ , Fisher's Exact = 0.61), father's job ( $p = 0.061$ ,  $X^2 = 5.61$ ) and family's economic status ( $p = 0.28$ ,  $X^2 = 2.50$ ) of

the two groups. The mean and standard deviation of the dependent variables of the research corresponding to the experimental and

control groups in the pre-test and post-test are listed in Table 1.

**Table 1.** The central tendency and dispersion measures of the studied variables associated with the experimental and control groups in the pre- and post-intervention period

Group	Number	Pre-test Mean±SD	Post-test Mean±SD
<b>Anxiety</b>			
Experimental	30	14.96±0.92	7.26±0.82
Control	30	15.03±0.80	1.76±1.43
<b>Depression</b>			
Experimental	30	13.13±1.16	5.96±0.88
Control	30	13.03±1.09	12.30±0.95
<b>Stress</b>			
Experimental	30	11.93±1.11	5.66±1.06
Control	30	11.46±1.07	12.10±1.09

For the purpose of analyzing the influence of relaxation intervention on the level of the mothers' anxiety, depression and stress, MANCOVA was used and the results are presented in Table 2.

According to Table 2, the tests' significance levels show that there is a significant difference between psychological characteristics of women in both groups in terms of at least one of the subscales ( $F=695.905$ ,  $p < 0.0001$ ).

**Table 2.** Results of MANCOVA to analyze the influence of relaxation intervention on psychological characteristics of pregnant women in experimental and control groups

Test	Value	Hypothesis df	Error df	F	Sig	$\eta^2$
Pillai's trace	0.974	3	55	695.905	0.0001	0.974
Wilks' lambda	0.0265	3	55	695.905	0.0001	0.974
Hotelling's Trace	37.958	3	55	695.905	0.0001	0.974
Roy's largest root	37.958	3	55	695.905	0.0001	0.974

**Table 3.** Results of one-way ANOVA within the context of MANCOVA on the post-test of psychological characteristics in pregnant women of the experimental and control groups

Source of changes	Sum of squares	Df	Mean squares	F	Sig	$\eta^2$
<b>Anxiety</b>						
Pre-test	2.054	1	2.054	1.57	0.22	0.026
Group	450.69	1	450.69	332.85	0.0001**	0.85
Error	77.179	57	1.35			
<b>Depression</b>						
Pre-test	0.647	1	0.647	0.75	0.38	0.013
Group	602.29	1	602.29	706.11	0.0001**	0.92
Error	48.61	57	0.85			
<b>Stress</b>						
Pre-test	0.135	1	0.135	0.114	0.73	0.002
Group	620.58	1	620.58	526.14	0.0001	0.90
Error	67.23	57	1.18			

\*\* Significance level:  $p \leq 0.016$

Moreover, Partial eta square ( $\eta^2$ ) is equal to 0.97 which means that 97% of the psychological

characteristic differences between the two groups of pregnant women are because of using

relaxation techniques. Therefore, in order to find out in which of the subscales of the two groups there is a significant difference, one-way ANOVA was performed in the context of MANCOVA, the results of which are presented in Table 3.

Based on the pre-test data listed in Table 3, with regard to the psychological variables (anxiety, depression and stress), there is a significant difference between the two groups of pregnant women.

## Discussion

The results of the current study indicate that after 8 weeks of progressive muscle relaxation and mental imagery-based relaxation interference in the first-time pregnant women with unintentional pregnancy during COVID-19 pandemic, the depression, anxiety and stress scales significantly decreased in comparison with control group. What is of high importance with regard to the findings of the current research in comparison with those of the other researches on the same subject is the unfavorable psychological state of the pregnant women at the beginning of the study which shows the higher level of stress and anxiety in pregnant women during covid-19. Nevertheless, the findings of the current study go with the results of some other studies on the same issue. Through analyzing the influence of progressive muscle relaxation on first-time pregnant women, Shabbiri et al. (2016) concluded that there is a significant decrease in the anxiety scale in treatment group and a significant increase in the stress scale in the control group after interference (1). Analyzing the effectiveness of relaxation techniques on first-time pregnant women, Alipour et al. (2017) stated that four weeks of interference causes a significant change in depression anxiety stress scale and self-efficacy in experimental group in comparison with control group (2). The results of a study conducted by Baleghi et al. (2016) shows that relaxation in first-time pregnant women in the last three months of pregnancy with decrease in fear of childbirth causes an increase in the number of natural childbirth (26). The findings of the study done by Seyed Ahmadinejad et al. (2015), Nasiri et al (2018) and Rajeswari and SanjeevaReddy (2020) also approve of the significant effect of relaxation

techniques in improving psychological state of pregnant women (3, 15, 17).

Considering the negative effects of depression, anxiety, and stress during pregnancy on the mother, and fetus and also the child's childhood, it is necessary to use the most powerful coping force, that is relaxation techniques, for a successful and easy confrontation with stressful situations during pregnancy (2). Generally, physical activity decreases the stress and depression. This can be justified by the increase in the amount of serotonin and norepinephrine during sport activities which reduces depression. In other words, physical exercise is effective in two ways: first through releasing endorphin and second through reducing cortisol, a hormone which is released due to tension. Based on physiology specialists, endorphins are natural drugs for reducing pain which causes a pleasant feeling; sport activities cause an increase in the level of release of endorphin. Some other researchers say that physical exercises are very effective in increasing the amount of serotonin, the hormone which improves our moods. Therefore, it seems that exercising helps the body receives more endorphin and serotonin which is kept for a long period of time during exercise (27). Besides making us spend extra expenses, depression has other negative effects as well. During depression and stress, the possibility of having a proper self-care, a good diet, physical activity decreases and one is exposed to more health problems. However, exercising and physical activity has a lot of advantages among which one can name a decrease in depression (28).

The influence of mental relaxation on the anxiety of sportspeople is that it can decrease the negative thoughts which lead to anxiety and this can be done through using imagery-based relaxation by adjusting and changing the contents of images in one's mind (14, 29). Furthermore, decreasing the level of the cortisol secretion, the progressive muscle relaxation reduces physical anxiety. Besides, showing a decline in the signs of one's physical anxiety, muscle relaxation decreases the consumption of oxygen, heart rate, respiration rate and blood lactate through a regular set of physiological changes (14). Aghebati et al. (2010) state that while there can be no emotional state in which all the organs are thoroughly relaxed, muscle

relaxation can lead to mental relaxation (25). That is to say, negative thoughts and emotions such as anxiety and stress can be controlled and even prevented by relaxation and the impacts of the increased muscle tension on the body can be counterbalanced through muscle relaxation. Moreover, this method helps make a balance between the posterior and anterior hypothalamus which consequently prevents the negative effects of the anxiety and stress (25).

Regarding the fact that stress increases during the first three months of pregnancy, decreases during the second three months and again increases in the last three months (1), a significant decrease in the anxiety scale of the experimental groups can be considered as to be the result of relaxation interference. Thus, training progressive muscle relaxation along with mental imagery-based relaxation can improve the psychological state of pregnant women which is also proved in the current study.

## Conclusion

The findings of the present research prove that 8 weeks of progressive muscle relaxation along with mental imagery-based relaxation causes a significant decrease in anxiety, stress and depression in first-time pregnant women with unintentional pregnancy during COVID-19 pandemic. Therefore, considering the importance of improving physical and psychological health of pregnant women, especially for those with unwanted pregnancy and with COVID-19 pandemic, it is recommended that this cheap nonpharmacological method of interference be trained to all pregnant women. Besides, it is recommended that in the future researches these interferences be analyzed in different experimental groups (one group with progressive muscle relaxation and the other group with mental imagery-based relaxation) and also in women with abortion or infertility record. One of the limitations of the present study was the concern of some mothers in the case of COVID-19 to enter the study, who were assured that the intervention will be performed individually in the office of a gynecologist and with full observance of health protocols. The most significant strength of the present study was the encouragement of other pregnant women to physical activity and relaxation at

home, according to the reports of women in the experimental group. Generally, based on the findings of the current research, a brochure can be prepared and asked clinics, midwives, gynecologists and health professionals to teach this method of relaxation even at home, to improve the mental state of pregnant women, especially in the condition of Covid- 19.

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## Conflicts of interest

Authors declared no conflicts of interest.

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