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Effects of Benson Relaxation Technique on the Anxiety and Hemodynamic Parameters in Women before Cesarean Section: Randomized Controlled Trial

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Abstract

Background: *Cesarean section (CS) as a delivery method is commonly used in Iran and other countries. Many women experience anxiety before CS. This study aimed to determine the effects of the Benson relaxation on the anxiety and hemodynamic parameters of women before CS.*

Methods: *A two-group clinical trial was conducted with a study population consisting of 108 women waiting for CS in educational hospitals in Shahroud City, Iran. The participants were randomly allocated to two groups of control and intervention, each with 31 participants. After receiving a face-to-face relaxation method from the researcher, the intervention group listened to a relaxation training audio file three to five hours before CS and exercised Benson muscle relaxation at least three times. Data were collected using a demographic characteristics questionnaire, Standard Hospital Anxiety and Depression Scale, and Hemodynamic Parameters questionnaire. The collected data was analyzed in SPSS v23 using descriptive and inferential tests.*

Results: *The results showed that the mean and standard deviation of the anxiety score in the intervention group before the intervention was 10±2.43, significantly higher than after the intervention (6.86±1.45). On the other hand, the mean and standard deviation of the anxiety score in the control group before the intervention was 10±3.08 and increased to 10.19±3.19 after the intervention. There was also a significant difference between the intervention and control groups in terms of the mean and standard deviation of the hemodynamic parameters scores, including systolic blood pressure index (P-value=0.021), diastolic blood pressure index (P-value=0.010), respiratory index (P-value=0.037), and heart rate index (P-value=0.042) after the intervention.*

Conclusions: *Based on the results of this study, Benson muscle relaxation significantly reduced the anxiety and hemodynamic parameters scores in the intervention group. Given that this method is uncomplicated, non-pharmacological, and inexpensive, it can be useful for pregnant women in stressful conditions before CS.*

Keywords: Anxiety, Muscle relaxation, Hemodynamic.
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Introduction

Countries are trying to reduce the cesarean rate to less than 15% according to the recommendation of the World Health Organization[1]. In contrast, in some countries, including the capital of Iran, the average cesarean rate is reported to be 67.1%[2]. Several factors, including factors related to the mother or the fetus, can lead to the choice of cesarean section for delivery and because cesarean delivery seems to be safer than natural delivery, especially in these conditions, this has become common, especially in advanced urban centers[3]. Many efforts are made to promote natural delivery, but in special medical conditions, cesarean section is unavoidable[4]. In addition to the complications of cesarean section[5], anxiety is an inseparable part of surgery[6]. It has been observed that women undergoing cesarean section suffer even more anxiety than other surgeries[7,8]. Studies have shown that about 80% of women feel this tension and unpleasant excitement before cesarean surgery[7].

With the patient's anxiety, his hemodynamic conditions are changed in response to the hormones epinephrine and norepinephrine released from the sympathetic system and glucocorticoid secreted from the adrenal glands, and it is manifested as an increase in heart rate and blood pressure[9]. Accordingly, pre-operative anxiety affects hemodynamic parameters causing dysfunction and blood supply to the heart, and can be associated with complications such as myocardial infarction and acute pulmonary edema[10]. Also, the activation of the sympathetic system and the created vascular contraction cause a decrease in blood supply to tissues, experience long-term pain and are associated with mood disorders[7]. On the other hand, high levels of cortisol also suppress the immune system[9].

Therefore, the healing process of the wound, the volume of bleeding after childbirth, the process of relieving the patient's pain are disturbed and can have a negative effect on the

duration of the mother's hospitalization and her satisfaction with childbirth[11]. Mother's health is one of the most important indicators of socio-economic development in any society[12]. The incidence of fetal strangulation at birth has been found mainly in anxious women.

Other possible side effects of fear include abnormal patterns of fetal heart rate, low Apgar score[13], increased mortality at delivery, and birth of infants with low weights due to increased resistance of the uterine artery caused by mother's anxiety[14]. The main goal of the pre-operative stage is to maximize the physical and mental health of patients. Helping the patient to adapt to the situation and anxiety is one of the important responsibilities of nurses[15,16].

In addition, the anxiety can impair mothers' ability to provide optimal care to the infant and breastfeeding in the postpartum period[17].

Nurses play a key role in managing patients' anxiety. As nurses spend more time with patients, they could assess patients' anxiety and use non-pharmacological techniques if necessary[18]. Relaxation is a non-pharmacological method that could be used as one of the complementary and alternative therapeutic methods to reduce patients' anxiety[19,20]. Relaxation methods include Benson relaxation, progressive muscle relaxation, and relaxation with mental imagery, hypnosis, breathing techniques, yoga, and meditation, massage, and music therapy. The Benson relaxation method, introduced by Herbert Benson in 1970, is relatively more desirable and common due to the ease of learning and teaching[21,22]. It is a method of concentration that affects a wide range of physical and psychological symptoms such as anxiety, pain, depression, mood, and self-confidence[23-25]. The Benson relaxation method is a non-pharmacological and behavioral method designed to deal with anxiety, which is easily learned by the patient[26].

In several studies, Benson relaxation has been successfully used to lower patients' anxiety. Pardede et al. (2020) found that the level of mothers' anxiety before the CS in the intervention group significantly decreased through Benson relaxation[27]. Salmanzadeh et al. (2018) tried to determine the effects of the Benson relaxation on CS pre-operation anxiety in nulliparous women. They showed that Benson relaxation led to a reduction in pre-operation anxiety in women[13]. However, the results of this study are not consistent with Anisa Nuri Kurniasari et al.[28], who reported that Benson relaxation had no effect on the anxiety of hemodialysis patients.

Given the high rate of cesarean delivery and the findings that emphasize anxiety is one of the most common psychological symptoms[13] and that nurses can use complementary techniques in clinical environments, research-based evidences are necessary to compare different complementary methods and determine the most effective intervention[18]. Moreover, considering the different results of studies on hemodynamic parameters; the prevalence of anxiety in patients; researchers' suggestion to repeat such studies; the need to address the anxiety caused by fear in the patients; and the necessity of collecting hemodynamic information, which is an important part in all procedures, the authors decided to conduct the present study[29]. This study aimed to investigate the effects of the Benson relaxation method on the anxiety and hemodynamic status of patients undergoing CS.

Materials and Methods

The present clinical trial was conducted in two parallel groups. The participants were women referring for cesarean section to two hospitals in one of the cities of Iran. Sampling was done from November 2018 to February 2020.

The criteria for entering the study include the age range of 18 to 36 years, proficiency in the Persian language, no history of cesarean section, no medical problems such as hearing problems, muscle paralysis, thyroid disorder, and known mental illness, not attending similar courses of muscle relaxation and not using sedative drugs in the last 24 hours. The participants who received sedatives for any reason during the intervention or were unable to complete and perform the intervention were excluded. Based on the results of the study of Hanifi et al.[30] considering α 0.05 and β 80%, the sample size was estimated 31 women in each group. After obtaining permission from the relevant officials in the university and hospital, the main researcher went to the selected hospitals to conduct sampling. The participants were selected by convenience sampling method and entered the study after explaining the research method and obtaining informed consent. Then the participants were divided into two intervention and control groups using four random blocks.

In this way, based on the random pattern of blocks of four, the allocation of people to each group and its order was determined, and the type of allocation was placed in separate sealed envelopes. On each envelope, the number and order of the study participants entering was specified. Then the participants were selected in the order of entry into the study of the respective envelopes and based on the group assigned to that person, they were placed in the case and control groups. A total of 108 pregnant women were included in the study, of which 54 were assigned to the intervention and 54 to the control group.

The demographic data questionnaire, vital sing checklist, and Hospital Anxiety and Depression Scale were used.

In this questionnaire, information related to age, number of normal deliveries, history and number of abortions, type of anesthesia, history of underlying diseases, and routine use of sedation is registered.

Hemodynamic Parameters checklist: The checklist included information on blood pressure (BP), heart rate (HR), and respiratory rate (RR). The researchers completed the checklist before and after the intervention. The patient's RR and HR were counted in one full minute. In addition, the patient's BP was checked using a digital device in a set position 3 to 5 hours before cesarean section where women's Hemodynamic Parameters were recorded in the checklist. After the intervention (one hour before the cesarean section), the Hemodynamic Parameters of the patients were controlled again in the women's surgical ward.

Hospital Anxiety and Depression Scale: It contains 7 items that are scored using a four-point Likert scale ranging

from 0 “not at all” to 3 “very much” with a maximum score equal to 21. A score of zero to seven is interpreted as “no anxiety”, eight to ten as intermediate anxiety disorder, and eleven or higher as a suspected anxiety disorder. The Cronbach’s alpha coefficient and test-retest reliability of the Persian version were 0.78 for the anxiety sub-scale[31].

3 to 5 hours before cesarean section, women's anxiety was checked using the questionnaire. After the intervention (one hour before the cesarean section), the anxiety of the patients was checked again in the women’s surgical ward.

In the intervention group, 3 to 5 hours before cesarean section, each of the pregnant women was trained and practiced the Benson sedation technique face to face with the researchers. Also, the audio file containing the Benson relaxation technique was given to the women, and they were asked to listen to the file on the MP3 device and perform the technique at least three times before the cesarean section.

The steps of the Benson relaxation technique are as follows:

1. Gently relax in a comfortable position.

2. Gently close your eyes.

3. Loosen all the muscles of the body deeply; start at the toes of your feet and gradually move to the face, maintaining a relaxed status.

4. Breathe through your nose consciously. While you exhale from the mouth, whisper soothing words (such as God, love, rain, and rainbow) and begin to breathe deeply and regularly. Inhale through the nose and then exhale through the mouth and repeat the words in your mind.

5. Continue the procedure for 15 to 20 minutes. Try to loosen all the muscles. Then open your eyes gently, and do not leave your position for a few minutes.

6. Do not worry if you are relaxed deeply or not. Let the relaxation happen by its trend. If disturbing thoughts come to you, try to ignore them[32,33].

In the control group, women received the usual ward care. It should be noted that the patients and the researchers of data collection and statistics were not aware of how to allocate the samples.

The ethical approval was granted by the ethics committee of Shahroud University of Medical Sciences (IR.SHMU.REC.1395.101). Also, the research protocol was registered at the Iranian Registry of Clinical Trials (IRCT) (IRCT20200718048128N1). Author permission to enter the hospitals was obtained from the relevant authorities. The participants were informed about their right to leave the study at any time without any consequences on their care. They were also assured of data confidentiality and their anonymity. The written consent form was signed by the participants before the study. Blinding of the researcher and the participants was impossible due to the nature of the interventions. However, the statistical specialist was blind to the group assignments to avoid bias during the data analysis.

Descriptive statistics including mean, standard deviation, frequency, and percentage were used for summarizing the data via SPSS software v23. The Shapiro–Wilk test is used for testing normality. A comparison of demographic characteristics between intervention and control groups was conducted using the Mann-Whitney and Fisher exact test. The Mann-Whitney Test was used to compare mean scores of anxiety and hemodynamic parameters between intervention and control groups. The significance level was set at P-value< 0.05.

Results

The eligibility of 68 women was assessed, of which 2 women did not meet the criteria, and 4 women declined to participate. Therefore, 62 women were randomly assigned to the intervention (n=31) and control (n=31) groups. During the interventions, no sample dropping out was observed and data collected from all participants were used for the data analysis (Figure 1.)

The mean (SD) age of the participants in the intervention and control groups were 28.86 years (0.64) and 28.25 (1.01) years, respectively. Most of the participants in both groups were without experience of natural delivery and general anesthesia. Other demographic characteristics have been listed in Table 1. No significant differences in the demographic characteristics between the groups were reported (P-value>0.05).

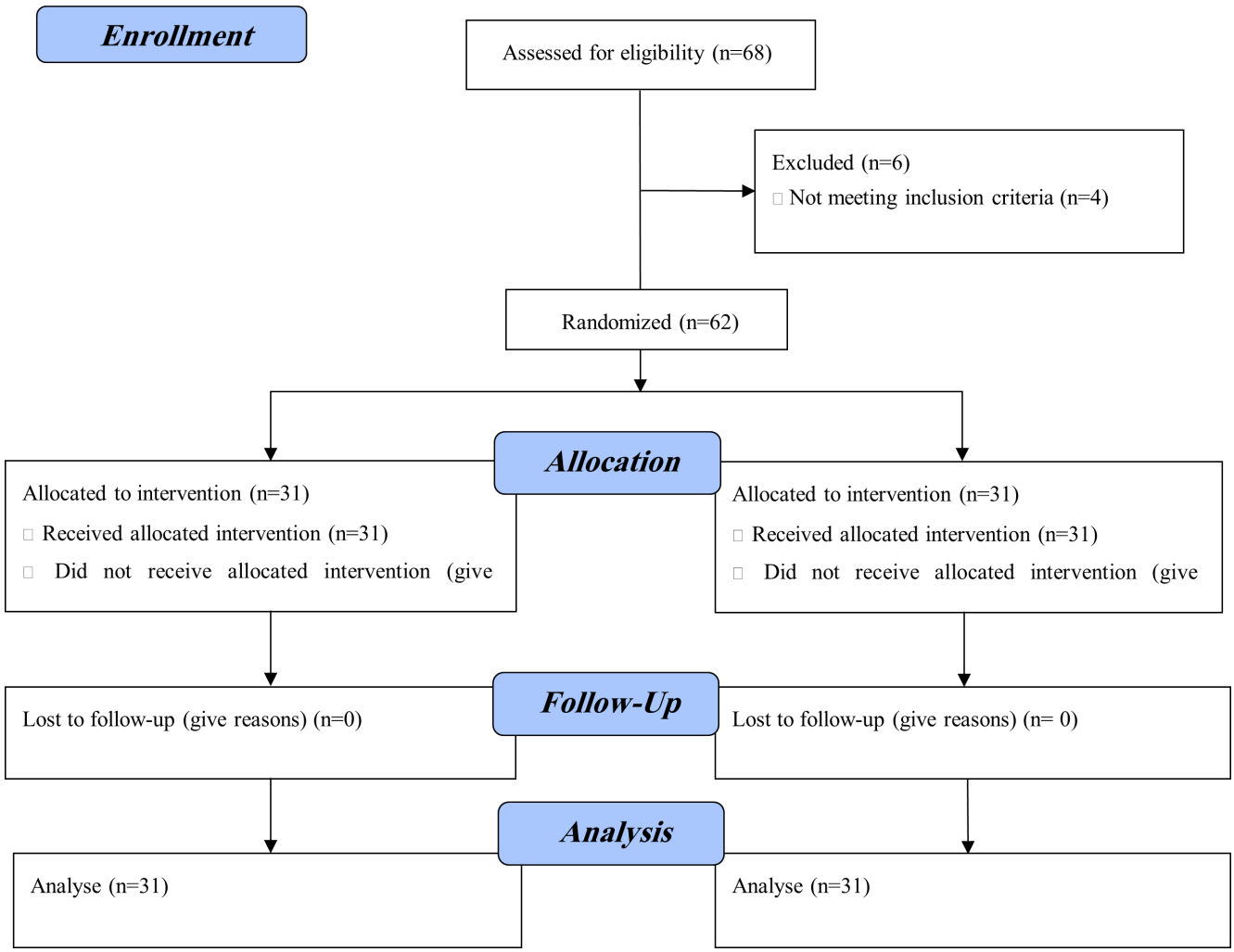

Figure1. Schematic presentation of the research design

Table1. The demographic characteristics of the participants in the groups

Variables	Groups N (%)		P-value
	Control	Intervention	
Age; mean (SD), year	28.25 (1.01)	28.86 (0.64)	0.613[a]
Natural delivery			
Yes	6 (19.4)	2 (6.7)	0.255[b]
No	25 (80.6)	28 (93.3)	
Number of the abortion			
No	14 (45.2)	21 (70)	0.095[b]
One time	13 (41.9)	5 (16.7)	
Two time	4 (12.9)	4 (13.3)	
Type of the anesthesia			
Spinal	1 (3.2)	2 (6.7)	0.612[b]
General	30 (96.8)	28 (93.3)	
Underlying disease			
Yes	29 (93.5)	28 (93.3)	>0.999[b]
No	2 (6.5)	2 (6.7)	

[a] Mann-Whitney Test, [b] Fisher exact

The between-group comparison revealed no statistically significant difference in anxiety between the intervention and control groups before the interventions (P-value=0.64). However, a statistically significant difference was observed in anxiety between the groups after the interventions (P-value<0.001) (Table 2).

The between-group comparison revealed no statistically significant difference in hemodynamic parameters between the intervention and control groups before the interventions (P-value<0.05). (Table 3)

Table 2. Mean scores of anxiety before and after the interventions in the groups

Variables	Time	Intervention Mean (SD)	Control Mean (SD)	P-value[a]
Anxiety	Before	10 (2.43)	10 (3.08)	0.641
	After	6.86 (1.45)	10.19 (3.19)	0.000
	The difference before and after	3.13 (1.85)	-0.19 (0.79)	0.000

[a] Mann-Whitney Test

Table 3. Mean scores of hemodynamic parameters before and after the interventions in the group

Variables	Time	Intervention Mean (SD)	Control Mean (SD)	P-value[a]
SBP	Before	123.36 (7.42)	120.64 (9.72)	0.172
	After	121.06 (3.60)	120.48 (8.30)	0.412
	The difference before and after	2.30 (7.25)	0.161 (3.76)	0.021
DBP	Before	81.86 (8.75)	80.96 (8.002)	0.497
	After	79.16 (6.83)	80.80 (7.31)	0.144
	The difference before and after	2.70 (8.77)	0.161 (2.40)	0.010
HR	Before	83.50 (9.98)	79.29 (3.44)	0.160
	After	81.56(7.71)	79.41(3.87)	0.592
	The difference before and after	1.93(6.62)	-0.12 (2.06)	0.042
RR	Before	17.40 (1.90)	16.93 (1.18)	0.204
	After	16.83 (1.93)	17.00(1.48)	0.736
	The difference before and after	0. 56 (1.38)	-0.06 (0.96)	0.037

SBP: Systolic blood pressure, DBP: Diastolic blood pressure, HR: Heart rate, RR: Respiratory rate, [a] Mann-Whitney Test

Discussion

This study aimed to investigate and compare the effects of BRT on anxiety and hemodynamic parameters among women before cesarean section. The results showed that the women's anxiety was significantly relieved after intervention and hemodynamic parameters decreased.

The results showed no significant difference between the control and intervention groups in terms of the mean score of anxiety before the intervention and both groups experienced moderate levels of anxiety before cesarean section. The mean score of anxiety in the intervention group after the relaxation intervention was significantly lower than control group.

Consistent with our findings, several recent studies from Iran, Egypt, and India reported that BRT reduced women's anxiety during the cesarean section period. This finding was in similar line with those of a study performed by Abd Elaziz Elshora et al.[34] assessed the effect of Benson relaxation therapy on pre-cesarean section fear and anxiety in Egypt, and it has a significant beneficial effect on alleviating fear and anxiety among nulliparous women who go through cesarean sections. Similarly, Harichandana and Anju Philip[35] assessed the role of Benson's therapy on antenatal anxiety in India and clarified that the level of antenatal anxiety among women who practiced Benson's therapy was significantly lower than the women in the control group. Additionally, Zenouzi et al.[36] performed a randomized clinical trial on the effect of Benson relaxation technique on stress, anxiety, and depression in pregnant women. They demonstrated that the Mean and SD of anxiety scores after the Benson's relaxation showed a decline in anxiety levels in the intervention group.

Anxiety, as an unpleasant mental feeling, is a natural response to potential dangers that stimulate the autonomic nervous system and trigger hormonal changes[11].

Mohammadi et al.[37] found that the mean score of the negative psychological symptoms (stress, anxiety, and depression) among pregnant women in the intervention group decreased significantly after using a combination of the Benson relaxation technique and short psychological intervention, while no significant difference was observed in the control group. Salmanzadeh et al.[13] determined the effects of Benson relaxation on pre-operative CS anxiety in nulliparous women and showed that the intervention reduced pre-operative anxiety in women. On the other hand, Nuri Kurniasari et al.[28] showed that the Benson relaxation had no effect on the anxiety of the hemodialysis patients.

Salmanzadeh et al.[13] showed that the level of anxiety before the CS in nulliparous women was moderate to high. However, Eng et al.[38] showed that the mean and standard deviation of the anxiety score of cardiac patients was 4.25±4.27, which is much less than the present study. The difference between the results of the present study and other studies may be due to no history of CS in the participants and their unfamiliarity with CS. In general, the pre-operative stages, the concern about the consequences, the concern about the lack of control, the risk of death, the unfamiliar conditions, unpleasantness, and prediction of the adverse outcomes all may contribute to patients' anxiety[13].

Pre-operative anxiety has been found to lead to a number of problems such as nausea, vomiting, cardiovascular disturbances such as tachycardia and hypertension, and increased the risk of infection[39]. Preoperative anxiety has a number of postoperative complications in the patient, and one of these complications is pain. Pain is the common complaint of post-operative patients which mostly occurs due to preoperative anxiety as a common factor[40]. Benson's relaxation method is more common compared with other methods due to the simple education and training and its effectiveness in different scopes of symptoms including pain, anxiety, depression, self-stem, self-efficacy, and quality of life[41-43].

A study by Yekta Parsa et al.[44] showed that total anxiety and cognitive anxiety in the patients in intervention and control groups decreased. However, the Benson relaxation method significantly reduced patients' social anxiety compared to progressive muscle relaxation. They recommended using this method by nurses as a complementary and non-pharmacological method to reduce anxiety in candidate patients' for open-heart surgery.

These results state that the stress response is lowered when the person relaxes all of their body muscles in the Benson relaxation state and lowers the activity of the sympathetic nervous system and the secretion of catecholamines by balancing the posterior and anterior hypothalamus. These changes regulate breathing and cause a reduction in muscle tension, physiological adverse effects, blood pressure, heartbeat rate, muscle spasm, and ultimately anxiety[45, 46].

The results showed a significant statistical difference between the mean and standard deviation of the hemodynamic parameters scores (systolic blood pressure, respiratory rate, and heartbeat rate index) before and after the intervention in the intervention group. So in the intervention group, the scores of the hemodynamic parameters had a significant decrease after the intervention. In a study by Orbach-Zinger et al.[47], the mean of the basal systolic blood pressure in patients with varying degrees of anxiety was not significantly changed; however, after the spinal anesthesia, a further decrease in systolic blood pressure was observed in the group with severe anxiety. Cho Yeon et al.[48] showed that aromatherapy had a positive effect on anxiety, hemodynamic parameters, and sleep quality in cardiac patients in the ICU, so that the systolic and diastolic blood pressure before and after the intervention were significantly different in the intervention group. In a study by Vahedparast et al.[49] after intervention, in most measurement times, respiratory rate and pulse rate decreased in the two intervention groups compared to the control group, and arterial oxygen saturation and systolic blood pressure increased. Kim et al.[50] examined pre-operation anxiety as a predictor of the hemodynamic changes during anesthesia in 120 patients undergoing surgery. It was reported that the anxiety scores in 45 years old and older patients were significantly associated with changes in blood pressure and heart rate; however, no significant relationship was observed in patients under 45 years. After aromatherapy, Hu PH et al.[51] reported a significant decrease in systolic blood pressure, anxiety, and pain in the intervention group, which was consistent with the present study. In addition, diastolic blood pressure before and after the intervention was not significantly different. Tahmasbi reported a significant difference in the systolic blood pressure, respiratory rate, and heartbeat parameters between the study groups, which is consistent with the results of our study. Benson relaxation technique is known for positive effects on the prognosis and outcome in patients while decreasing physiological parameters such as pulse rate and blood pressure before and during invasive operations[52]. The results of the studies mentioned indicate that the Benson relaxation method can reduce anxiety and hemodynamic parameters in patients. So, when patients are faced with a stressful situation and the number of hemodynamic parameters increases due to the effect of the sympathetic system, they can benefit from relaxation effects that counteract the effects of the sympathetic system[53].

Fayazi et al.[54] showed that Benson relaxation practice after coronary artery bypass graft surgery resulted in a significant reduction in respiratory rate, heartbeat rate, and diastolic blood pressure, which was consistent with our study. However, it did not affect diastolic blood pressure, which was not consistent with our study. In addition, Torabi et al.[55] reported that only the variable of the diastolic blood pressure changed significantly. In a study by Hanifi[30], only the diastolic blood pressure and respiratory rate changed significantly, which is not consistent with our study. The reasons for the contradictory results can be the different research populations and the different physical and mental conditions of the patients. Relaxation improves the balance between the anterior and posterior hypothalamus, reduces sympathetic activity and catecholamine release, relieves muscular tension, decreases blood pressure and heart rate, and regulates breathing. Through BRR, individuals can relax all muscles one by one and therefore, alleviate their anxiety and stress. Relaxation also stops stress response[56].

One of the main strengths of this study was that all the principles related to clinical trial studies, such as one-sided blindness, random allocation, and concealment of allocation were observed. Among the limitations of the study, unrecognizable emotional and mental conditions not expressed by the participants, the emotional status of the patients, and the probability of incomplete implementation of the relaxation method by the participants (due to environmental noises which were minimized in this study) are notable. These issues are beyond the control of researchers and may have influenced the results of the study. Further studies with larger participant sizes are recommended to take other factors affecting the hemodynamic index and the use of other anxiety scales into account. On the other hand, considering that the present study

was performed only on one type of surgery and on a limited number of patients in teaching hospitals, therefore, these results cannot be generalized to all patients in the country. Conducting research on various types of surgery in different medical centers would improve data reliability and reduce interfering factors.

The results of the present study showed that Benson relaxation can reduce patients' anxiety before CS and improve the hemodynamic parameters. It can also be used as a part of patient care protocol or part of routine non-pharmacological nursing care. Moreover, due to its uncomplicated nature, patients can use this non-pharmacological and inexpensive method in stressful conditions in the future.

Ethical Considerations

The ethical principles observed by the researchers included obtaining permission from the Ethics Committee of Shahroud University of Medical Sciences with the code: IR.SHMU.REC.1395.101, This study was registered in the Iranian Clinical Trial Registration Center under the number IRCT20200718048128N1. Obtaining written informed consent from all participants, granting participants the right to withdraw from the study at any, applying the principles of anonymity and confidentiality, and providing participants with the results upon their request. Consent for publication not applicable Availability of data and materials Data would be available by contacting the corresponding author.

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Conflict of Interest

The authors declare no competing interests regarding the present study.

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