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Original Article

Recognition of the efficacy of relaxation program on sleep quality of mothers with premature infants

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ABSTRACT

Background and Aim: The postpartum period is a critical then effects on the structure of the family. Most women in the postpartum period may place at risk of undesirable experiences such as changes in sleep patterns. Therefore, this study aimed to identify the efficacy of the relaxation program on sleep quality of mothers with premature infants. **Materials and Methods:** This study is a clinical trial that 60 mothers with premature infants. The mothers in the intervention group were trained for muscle progressive relaxation by Jacobson method within 24–72 h after delivery. Research tool was the Pittsburgh Sleep Quality Index, which was completed by the mother at the beginning of the study, end of the first and the second 4-week. Data were analyzed using parametric statistics tests by SPSS software version 16. **Results:** No significant difference was observed between two groups in terms of underlying characteristics ($P < 0.05$). The independent *t*-test at the beginning of the study showed that the comparison of the mean scores of mothers' sleep quality has no significant difference between two groups ($P = 0.43$). But, 1-month after the intervention ($P = 0.024$) and 2 months after the intervention ($P > 0.001$), mean sleep quality score in the intervention group was significantly less than the control group. **Conclusion:** Relaxation training can improve mothers' sleep quality at postpartum period.

Key words: Postpartum period, relaxation, sleep quality

INTRODUCTION

Phenomenon of delivery and birth of a neonate is potentially stressful event for mothers, so that women think that a new era of life has been started for them.[1] The postpartum period is a critical step that not only effects on mothers' mental and physical health, but also on the complete structure of the family.[2]

Today, women are discharged from the hospital shortly after delivery and are transferred to the home spending their 1st days and weeks without care. On the other hand, after delivery, notice is transmitted from mother to child.[3] Several studies have shown that most mothers experience some small or big problems such as fatigue, back pain, breast sore, discomfort caused by cesarean wound or episiotomy, and sexual problems in the few postpartum weeks.[4]

Despite all the mentioned problems and stress, the parents with preterm infants experience more stress than parents with term infants that the rate of stress and anxiety among mothers is higher than fathers.[5] Approximately 28–70% of mothers with premature infants have a high degree of

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mental stress.[6] Studies have shown that a feeling of tension is related to decreased tendering and responsible behaviors of the mother and maternal anxiety and disorder in parental behavior.[7]

Damaging effect of child early birth on the mother impairs her ability for thinking; this causes additional stress to be added to the stress of the high-risk infant.[8] On the other hand, care of premature infant, accepting new maternal role and family care will lead to that most women at postpartum period are headed at risk of undesirable experiences such as changes in sleep patterns and insomnia at the top of it.[9]

Insomnia is as one of the most important disorders of sleep and health-threatening phenomenon that occurs in response to internal or external stimuli. This phenomenon can lead to physical and psychological symptoms. Sleep disorders can also cause damage to the person function, mental fatigue, problems in the memory, inability to concentrate, changes in perception and disorder in judgment ability.[10] In fact, sleep is an organized behavior, which is daily repeated as a vital necessity based on biological rhythm. Sleep helps to refresh mental and physiological power and is needed for accepting the new tasks and roles.[11]

Sleep is a necessity that is important in human life. Without enough sleep, ability of concentration, judgment, and daily activities is decreased, and excitability is increased.[12] Women at starting of 12-week of pregnancy up to 2 months after delivery complain from difficulty in falling asleep, frequent waking, nocturnal insomnia and reduced sleep quality.[13] Women who are recently have become the mother, experience 20% increase in nighttime awakening in the postpartum period.[14]

Physical, emotional and affective can disrupt sleep patterns and cause sleep disorders. Hormonal changes such as increased estrogen and progesterone and the increase in plasma cortisol levels can effect on the normal sleep.[15] Women in the postpartum period are facing with a high degree of sleep disorder and deprivation, and many of them suffer from this sleep disruption.[16] There are many pharmacological and nonpharmacological treatments for sleep disorders: Li *et al*. achieved to the positive effects of reflexology on improving mothers' sleep quality.[2]

Lee has reported the effects of aromatherapy on postpartum sleep quality.[17] Other nonpharmacological treatments can be muscle progressive relaxation. Muscle progressive relaxation or active relaxation is a technique in which a person gains a sense of peace in their own by active contracting and then relaxing the specific muscle groups in a progressive mode. In the experience of new authors, complete relaxation will be felt as a result of performing progressive muscle relaxation technique at least within 4 or 5 sessions.

There is growing evidence that shows that relaxation training can have significant physiological and psychological benefits.[18] Relaxation methods have been recognized effective in many situations such as pain, neonate's birth, anxiety, and insomnia and cause a person to gain the control of his emotions and behaviors.[19] Chuang *et al*. found that a program of relaxation training can improve the stress response in women with preterm labor.[20] Masoudi *et al*. found the positive effect of progressive muscle relaxation technique on pain in patients with multiple sclerosis.[21]

Hashemzadeh *et al*. confirmed that training of relaxation techniques is effective on reducing anxiety in cardiac patients.[22] Mousavi Asl *et al*. reported that training of relaxation during pregnancy improves anthropometric indices of newborn babies.[23] It should be noted that this method does not impose any cost and financial burden to the patient and do not have the amount, time, and side effects. Due to the limited studies performed on mothers' sleep quality and that the insomnia-related problems are more felt in mothers with premature infants, the researchers decided to study the effect of relaxation training on sleep quality of mothers with premature infants.

MATERIALS AND METHODS

This study is a clinical trial with the control group. The study population was the mothers of preterm infants with gestational age 32–36 weeks at one of the education, research and treatment centers of Ghaem, Imam Reza, and Omolbanin in Mashhad. The sample size was calculated as 33 patients in each group based on the pilot study and regarding to 30% loss. From 66 mothers who were enrolled in the study, four mothers because of lack of desire to continue to participation in the study and two patients because their baby died were excluded. Totally, 60 patients were successful to continue participation in the study. The sampling method was as randomly in two blocks of 2 months. So that the first toss will determine which group is sampled. Based on this method, sampling was performed at first in the case group and then in the control group.

Pittsburgh Sleep Quality Index (PSQI), demographic information and relaxation self-reporting checklist were used as research tools. Content validity method was used for the validity of self-report and demographic information form and self-reporting checklist and Persian version of the standard questionnaire of the Pittsburgh Sleep Quality, which has been used in various studies. Pittsburgh questionnaire is composed of 19 self-report questions plus five questions to be reported by the participants (only applications of the mentioned questions were calculated in scoring). Of the 19 questions, 15 are multiple choices, discussing frequency of sleep problems and subjective sleep quality and four items discuss the in-bed time, waking time, dream incubation period, and sleep duration. Five multiple-choice questions are answered by the patient's partner. This questionnaire has seven domains that are discussed respectively. Each component is scored from 0 (no difficulty) to 3 (severe problem). Points for each question are aggregated to obtain an overall score; the total

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range is from 0 to 21. Total score of 5 or greater is indicative of significant sleep disturbance. In this questionnaire, question 9 is related to quality of sleep, questions 2 and 5a tolong incubation period of sleep, question 4 to sleep duration, questions 5b-5j to sleep disorders, question 6 to sedatives usage, and questions 7 and 8 to daily dysfunction.[24]

To test the reliability, Cronbach's alpha test with half method was used that $r = 0.87$ was for the Pittsburgh questionnaire.

Inclusion criteria of mothers were having at least elementary literacy, age over 18 and under 40 years, lack of proper sleep and get a score of 5 or more in the PSQI, lack of opiate drugs and lack of drugs abuse, having admitted premature infants with gestational age 32–36 weeks. The participants were aware of the purpose and importance of the research and informed written consents were obtained. In addition, the patients were assured that participation was voluntarily, and they may quit at any time.

Mothers in the case group received training of progressive muscle relaxation according to Jacobson approach as a solo in the break room of mothers by the researcher during a session that lasted 30–45 min as follows:

At first, the muscle groups and the steps of implementation of the technique were trained to the mothers as practical by the researcher. The mother was asked to perform this procedure in a quiet room with soft light to be seated or in the supine position and if possible to wear a comfortable dress and to exit out his watch and bracelet. The method of this program was causing contraction in distinct muscles for 5 s and then to relax the muscles for 10 s. The method of expansion and contraction of the 16 parts of the body was according to Jacobson procedure during which was practically conducted for the mothers during 30–45 min by the researcher.

After ensuring about the learning of mother, Audio CD containing training of muscle progressive relaxation and a written guide for performing relaxation along with self-reporting checklist which the cell-number of the researcher was recorded at the end of it, were given to the mother and she was asked to perform this procedure at least once daily, and record in the checklist with date and time of performing the program. Finally, the mothers were referred to the centers at 4 and 8 postpartum weeks to fill out the Pittsburgh Sleep Index questionnaire.

The mothers in control group, in addition to receiving usual care in the section, received the training of the relaxation breathing and they were asked to use these methods as nonstructured depending on the situation within 8 postpartum weeks. Then, sleep quality was compared in control and case groups and paired *t*-test and Chi-square, ANOVA with repeated observations, and Mann–Whitney tests were used for data analyzing by SPSS software version 16 (SPSS Inc. Chicago, Ill).

RESULTS

The mean age of subjects in the case group was 28.2 ± 6.7 and in the control group 27.8 ± 5.5 years. Preterm delivery due to preterm premature rupture of membrane occurred in 53.3% of the intervention group and 56.7% of the control group. About 80% of the intervention group and 66.7% of the control group had a cesarean section. About 52.5% of the mothers had secondary or higher education, and 78.7% were housewives. Also, 52% of participants in the study had a weak level of income.

The experimental and control groups were similar in terms of age, reason of preterm labor, mode of delivery, education level, occupation and income level according to performed tests of t-independent, Chi-square and Mann–Whitney ($P < 0.005$) [Tables 1 and 2].

Independent *t*-test showed that before the intervention, the mean score of sleep quality in mothers was not significantly different in two groups ($P = 0.43$), but 1-month after the intervention ($P = 0.024$) and 2 months after the intervention ($P > 0.001$), mean score of sleep quality was significantly higher in the intervention group than the control group. ANOVA tests with repeated measurements also showed that the mean score of sleep quality at different times (before, 1-month and 2 months after the intervention) was not significantly different in the control group ($P = 0.64$). But this test showed a significant difference in mean score of sleep quality in the intervention group at different times ($P > 0.001$).

Table 1: Comparison of demographic characteristics in experimental and control groups

Variables	Groups (n=30)		Test result P
	Case	Control	
Age (mean±SD)	28.2±6.7	27.8±5.5	0.85*
Reason of preterm delivery *n* (%)			
PROM	16 (53.3)	17 (56.7)	0.66**
Preeclampsia	8 (26.7)	7 (23.3)	
Bit	3 (10)	5 (16.7)	
Beginning of pain	3 (10)	1 (3.3)	
Mother educational level *n* (%)			
Elementary	7 (23.7)	6 (19.4)	0.94***
Secondary	6 (20)	9 (23.3)	
High school	13 (43.3)	8 (25.8)	
College	4 (13.3)	6 (22.6)	
Delivery mode *n* (%)			
Vaginal	6 (20)	10 (33.3)	0.24**
CS	24 (80)	20 (66.7)	
Income level *n* (%)			
Poor	16 (53.3)	15 (50)	0.94**
Good	10 (33.3)	11 (36.7)	
Excellent	4 (13.3)	4 (13.3)	

***Mann-Whitney test, *Independent-Sample *t*-test, **Chi-square test. SD=Standard deviation, PROM=Premature rupture of membranes, CS=Cesarean section

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Table 2: Comparison of mean score of Pittsburgh sleeps quality before the intervention, 1-month and 2 months after the intervention in case *n* and control groups

Variables	Time	Mean±SD		Independent *t*-test
		Case group	Control group	
Sleep quality	Before intervention	0.74±11.82	0.56±11.11	0.43
	1-month after intervention	0.59±9.83	0.52±11.67	0.024
	2 months after intervention	0.51±7.36	0.53±11.26	<0.001
	ANOVA tests with repeated measurement	<0.001	0.64	

SD=Standard deviation

DISCUSSION

Based on the results of this study, relaxation training was effective on sleep quality of mothers with premature infants in the postpartum period ($P > 0.001$), and decreased the mean score of sleep quality in the intervention group than control group, so that the mean score of sleep quality in the group receiving relaxation from 11.82 ± 0.74 at the beginning of the study reached to 9.83 ± 0.59 at the end of 1-month and to 7.36 ± 0.51 at the end of 2 months after delivery, while this process was not sensible in the control group and from 11.11 ± 0.56 at the beginning of the study reached to 11.67 ± 0.52 at the end of 1-month and to 11.26 ± 0.53 at the end of 2 months after delivery.

Means *et al*. in a study entitled "Effect of relaxation on sleep disturbance in students" found the similar results.[25] Morawetz expressed that 87% of patients with sleep disorders reported significant improvement after relaxation ($P > 0.001$). In the present study, mean sleep disorder was decreased in mothers of the case group.[26] The results of this study are consistent with the results of studies of Hunter *et al*. that have reported postpartum sleep disturbance in 66% of nulliparous women.[27]

Malekzadegan *et al*. recommended relaxation as a good method to gain relaxation and improve sleep disorders in pregnant women.[28] Li *et al*. achieved to positive effect of reflexology on improving sleep quality of mothers in the postpartum period.[2] Furthermore, Lee (2003) reported the positive effects of aromatherapy on postpartum sleep quality.[17]

Pawlow and Jones (2005) performed research on the effects of progressive muscle relaxation on salivary cortisol. The purpose of their study was whether the rapid relaxation training in two separate sessions could reduce the mental and physiological indices of stress? In this study, 46 patients in the case group underwent progressive muscle relaxation training (summarized method) in two sessions as 1-week interval. There were 15 patients in the control group that they also sit in a chair with an equal relaxation time in two sessions without anything performed.

Before the intervention, saliva samples were taken for controlling the cortisol of the subjects. Also, the questionnaire of Perceived stress scale and Cognitive Somotic Anxiety Questionnaire were completed by the subjects. Situational anxiety questionnaire was also answered by them. After the intervention, the re-evaluation was performed. During the intervention, pulse rate was controlled by special sensors. After data analysis, the results showed that pulse rate, situational anxiety, perceived stress and cortisol were decreased in the experimental group than the control group. The results of this study can be effective in the use of relaxation to enhance immune function.[29] Considering to the fact that one of the causes of mothers sleep disorder is anxiety, the studies of Pawlow and Jones along with the studies of Viens *et al*. and Morawetz in their research using relaxation exercises had found that relaxation reduces anxiety and stress leading to insomnia and facilitates sleeping and reduces physical and emotional tension;[26,30] it can be proved that the relaxation in the present study has improved the mothers quality of sleep in this way.

Schaffer *et al*. conducted a study aimed: (1) To describe the maternal and fetal factors affecting on sleep quality, (2) to examine the relationship between reported sleep quality and maternal mental stress (mental stress, symptoms of depression and the status of anxiety), and (3) to evaluate the relationship between 8-week of relaxation guided imagery and sleep quality in mothers with preterm infants; they concluded that maternal mental distress has negative effect on sleep quality of mothers with preterm and may be improved by interventions guided imagery[31] that this study is consistent with our study in terms of positive effect of relaxation techniques on sleep quality of mothers with preterm infants.

Based on the obtained results, it was found that relaxation training by Jacobson method like as other relaxation techniques such as aromatherapy and reflexology is effective on mothers sleep quality in the postpartum period. And since this method is easily performed by the mothers and unlike the reflexology or other relaxation technique does not require to training or continuous participation by others, it can be proposed as an effective, nondrug and low-cost method.

Mirmohammadalii also proposed pilates exercise as an effective method to improve maternal postpartum sleep quality.[32] On the other hand, relaxation techniques are known effective in many situations such as pain, neonate birth and anxiety are birth and causes a person to gain the control of his emotions and behavior.[19] Relaxation training is of great importance as education and skill intervention that the mother can use it lifelong to improve her quality of life.[33]

Learning and performing of this technique is very easy and has been considered as one of the best complement treatments regarding to the comfortable training, saving costs, not requiring to special equipment and easy performing by the patients.[34] Regarding to the effect of relaxation training on sleep quality in mothers with premature infants in the

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postpartum period, doing these exercises is recommended as an effective nonpharmacological approach to improve maternal health.

From the limitations of this study can note the individual differences and psychological conditions of mothers in response to intervention, the effect of environmental and cultural factors on their level of understanding the effect of muscle progressive relaxation technique, and the effect of learning rate and the lack of mental conflict on the effect of muscle progressive relaxation technique. In this regard, it is recommended that studies be performed in this field with larger sample size and to identify factors that influence and predict the mothers sleep quality.

CONCLUSION

Relaxation training can improve maternal postpartum sleep quality and considering the advantages of relaxation and low cost to learn and use it, and that training is one of the nursing tasks, we recommend this approach be used as a complementary nursing, effective, noninvasive, low-cost intervention in reducing mothers postpartum problems.

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Conflicts of interest

There are no conflicts of interest.

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