The Effects of Benson's Relaxation Response on Fatigue During Pregnancy: A Two-Group Randomized Controlled Field Trial

Gholamhossein Mahmoudirad,[1] Mahdi Hosseini,[2] Manizhe Nasirizade,[2] and Fateme Biabani[2,*]

[1]Associate Professor, Department of Nursing, Birjand University of Medical Sciences, Birjand, IR Iran
[2]Msc Nursing, East Nursing and Midwifery Research Center, Instructor, Faculty of Nursing and Midwifery College, Birjand University of Medical Sciences, Birjand, IR Iran

[*] *Corresponding author*: Fateme Biabani, Msc Nursing, East Nursing and Midwifery Research Center, Instructor, Faculty of Nursing and Midwifery College, Birjand University of Medical Sciences, Birjand, IR Iran. E-mail: arashniya2012@yahoo.com

Abstract

Background and Aim: Pregnancy is associated with different problems and changes in the body. Fatigue is one of the pregnancy-related problems. It negatively effects quality of life and fetal growth and development. This study aimed at investigating the effects of Benson's relaxation response on fatigue during pregnancy.

Methods: This two-group randomized controlled field trial was done on 54 pregnant females, who referred to the only urban health-care center in Nehbandan, Iran, during year 2015. Females were purposively recruited and randomly allocated to control and intervention groups. Benson's relaxation response was taught to the participants individually in the intervention group in 3 sessions and then, they were asked to perform relaxation exercises for 15 to 20 minutes twice daily for one month. Females in the control group received no relaxation training. Fatigue assessment was performed for both groups before and immediately after the intervention. The SPSS software (v. 21.0) was used for data analysis employing the paired-sample t, the independent-sample t, and the Chi-square tests as well as the one-way analysis of variance. The level of significance in all statistical tests was set at below 0.05.

Results: During the study, fatigue significantly increased in the control group (P = 0.013) and significantly decreased in the intervention group (P = 0.035). Before the intervention, there was no significant difference between the groups regarding the mean score of fatigue (P = 0.46), while after the intervention, the mean score of fatigue in the intervention group was significantly lower than the control group (P = 0.001).

Conclusions: Benson's relaxation response is effective in reducing fatigue in the first trimester of pregnancy.

Keywords: Muscular Relaxation, Fatigue, Pregnancy

1. Background

Pregnancy is among the most important stages in a women's life. Women's mental and psychological well-being and comfort during pregnancy can guarantee their own health and their fetuses' healthy growth and development. Comfort is positively affected by adequate sleep and rest (1). In contrary, fatigue and sleep disorders have negative effects on comfort and pregnancy outcomes (2-5). The prevalence of fatigue during pregnancy is as high as 65% to 72% (6, 7). Fatigue is more severe during the first and the third trimesters of pregnancy. Fatigue in the first trimester is mainly due to metabolic, adaptive, and hormonal changes, particularly hormone release from the placenta. On the other hand, fatigue in the third trimester is secondary to nocturia, weight gain, gastrointestinal problems, and sleep disorders, due to fetal movements, uterine contractions, and leg cramps (8).

Pregnancy fatigue is associated with different negative outcomes, such as irritability, decreased ability to perform daily living activities, loss of interest, decreased libido, poor sleep, reduced quality of life, and postnatal emotional and psychological imbalance (9, 10). Moreover, it can negatively affect the pattern of uterine contractions during labor (11).

Fatigue is managed via both pharmacological and non-pharmacological therapies. Non-pharmacological or complementary and alternative medicine therapies have attracted considerable interest in the recent years. Complementary therapies are safer and have fewer complications than pharmacological therapies. The most common complementary therapies are rest, physical exercise, rehabilitation, energy therapy, and relaxation (12). A study showed that relaxation training could help reduce fatigue among pregnant females (13).

One of the most well recognized relaxation techniques was developed and introduced by Benson in 1970. Because of its simplicity, Benson's relaxation response (BRR)

is more popular than other relaxation techniques ([14]). It has positive effects on a wide range of physical and mental problems, such as pain, depression, anxiety, stress, mood disorders, and self-confidence ([15], [16]). Previous studies reported that relaxation could significantly reduce blood pressure during pregnancy ([17]), depression, anxiety, and stress among primigravida females ([18]), and fatigue among patients on hemodialysis ([19]).

The author's literature review retrieved no study on the effects of BRR on pregnant women's fatigue. Therefore, the present study was designed and conducted to investigate the effects of BRR on fatigue during pregnancy.

2. Methods

This was a 2-group randomized controlled field trial. The study population comprised of all pregnant females, who referred to the only urban healthcare center in Nehbandan, Iran, during year 2015. Sampling was done purposively based on the following eligibility criteria: a gestational age of 4 to 16 weeks, full consciousness, no known mental disorders, such as anxiety and depression, (based on medical records), no known muscular disorders, and agreement to participate in the study. Exclusion criteria were voluntary withdrawal from the study, absence from BRR training sessions, failure to perform relaxation exercises for 5 sessions, hospitalization, travel, and death. Recruited females were allocated to control and intervention groups through block randomization with a 4-person block size.

Sample size was calculated based on the results of a pilot study (on 10 females) and via the sample size calculation formula for the comparison of 2 means. With an $\overline{X}_1$ of 4.66, an $\overline{X}_1$ of 2.88, an S_1 of 1.64, an S_2 of 1.41, a confidence level of 0.99, and a power of 0.90, sample size for each group was estimated as 22. Considering an attrition rate of 20%, sample size was increased to 27 for each group, i.e. 54 cases in total.

Data collection tools were a demographic questionnaire, a clinical characteristics questionnaire, the fatigue severity scale (FSS), and a relaxation exercise performance checklist. The items of the demographic questionnaire were on participants' age, gender, marital status, educational status, and employment status, while the items of the clinical characteristics questionnaire were related to their history of hypertension and diabetes mellitus, number of children, and number of previous abortions. The FSS included 9 items scored on a Likert-type scale from 1 ("the lowest possible fatigue") to 7 ("the highest possible fatigue"). Therefore, the total score of FSS was 9 to 63 ([13]). The reliability of FSS was confirmed by previous studies with a

Cronbach's alpha value of 0.94, 0.91, and 0.81 ([19]-[21]). Moreover, the scale was reported to have satisfactory face and content validity ([20], [21]).

Participants were primarily asked to complete the demographic questionnaire, the clinical characteristics questionnaire, and FSS. Next, the fourth author personally trained each woman in the intervention group with BRR, in 3 training sessions using a training video clip. The number of training sessions could be increased to achieve participants' complete learning of BRR. After the training sessions, the fourth author asked the intended participant to perform BRR in order to ensure of her ability to independently and accurately perform BRR. Thereafter, each participant was asked to listen to a BRR instruction sound file and perform BRR for 15 to 20 minutes twice daily for 1 month. The instructions were as follows:

- Assume a comfortable position.

- Close your eyes softly.

- Gradually relax all body muscles from the toes to the head. Attempt to keep muscles relaxed.

- Inhale through the nose, be aware of your breathing, and slowly exhale through the mouth. During exhalation, say the word "one". Breathe normally and comfortably.

- Repeat this exercise 15 to 20 minutes while keeping all muscles relaxed. Finally, open your eyes softly and remain in the same position for several minutes.

- Do not feel worried about whether you have reached deep relaxation or not. Just, let relaxation happen at its own pace. In case of disturbing thoughts, attempt to overlook them and to be indifferent towards them ([22]).

In order to remind participants of performing the BRR regularly, both telephone and face-to-face contacts were made with them, and their family members were asked to remind them, and asked them to complete the relaxation exercise performance checklist. Females in the control group did not receive any relaxation-related training. The level of participants' fatigue in both groups was reassessed immediately after the 30-day intervention.

The SPSS software (v. 21.0) was used for data analysis through the paired-sample t, the independent-sample t, and the Chi-square test as well as the one-way analysis of variance. The level of significance in all statistical tests was set at below 0.05.

This study was approved by the Ethics Committee of Gonabad University of Medical Sciences, Gonabad, Iran (with the approval code of GMUFEC1393.10). Necessary permissions for the study were obtained from Gonabad and Birjand Universities of Medical Sciences, Gonabad and Birjand, Iran, as well as healthcare authorities of Nehbandan, Iran. Written informed consent was obtained from all participants.

3. Results

The means of female's age in the control and the intervention groups were 28.87 ± 6.07 and 28.70 ± 6.32 years, while the means of their gestational age were 10.33 ± 2.71 and 9.19 ± 2.85 weeks, respectively. The number of previous abortions in these groups was 0.41 ± 0.69 and 0.41 ± 0.57, respectively. Most females in the control and the intervention groups were housewives (66.7% vs. 70.4%) and the rest were employed. The results of the independent-sample t and the Chi-square tests illustrated no significant differences between the groups regarding demographic and clinical characteristics (P > 0.05; Tables 1 and 2).

The independent-sample's t test also showed that the control and the intervention groups did not significantly differ from each other regarding the baseline mean scores of fatigue (P = 0.46). However, this difference was statistically significant after the intervention (P = 0.001). Between-group differences regarding the pretest-posttest mean difference of fatigue was also statistically significant (P = 0.002). The results of the paired-sample t test indicated a significant increase in the mean score of fatigue in the control group (P = 0.013) and a significant decrease in the mean score of fatigue in the intervention group (P = 0.035; Table 3).

Statistical analyses revealed that female's fatigue had no significant relationship with their age (P = 0.331), educational status (P = 0.57), employment status (P = 0.10), history of diabetes mellitus (P = 0.24), and history of hypertension (P = 0.31).

4. Discussion

This study aimed at investigating the effects of BRR on fatigue during the first trimester of pregnancy. Findings revealed a significant increase in the mean score of fatigue in the control group during the study. Pregnancy fatigue is the result of energy imbalance in the body and energy demand-supply mismatch. In other words, a pregnant female needs greater levels of energy in order to cope with pregnancy. Therefore, if she cannot fulfill her need for energy, she will experience fatigue, particularly between the fourth and the sixteenth week of her pregnancy (23). On the other hand, study findings indicated a significant decrease in the mean score of fatigue in the intervention group. Previous studies also showed the effectiveness of relaxation techniques in reducing fatigue among patients receiving hemodialysis (13) and patients with multiple sclerosis (21, 24). The literature search of this study showed that none of the previous studies had assessed BRR effects on pregnancy fatigue.

Relaxation improves the balance between 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 their muscles one by one and therefore, alleviate their anxiety and stress. Relaxation also stops stress response, which has been found to significantly contribute to pregnancy-related problems, such as fatigue (25).

The current study findings also revealed that fatigue had no significant relationship with age, educational status, and employment status. Two earlier studies also reported that pregnancy fatigue was not significantly related to female's employment status (26, 27). However, a study revealed that employed females had higher levels of fatigue in the first trimester of pregnancy (23). Similarly, another study showed that two-thirds of employed pregnant females had moderate to severe fatigue (12). These contradictions may be due to different factors, such as differences in fetal gender and pregnant female's perceived stress, job specifications, demographic characteristics, sleep patterns, nutritional status, physical activity, hemoglobin level, and type of gravidity. Therefore, future studies on pregnancy fatigue are recommended to weigh fatigue based on pregnant female's employment status, daily work hours, stress level, sleep patterns, hemoglobin level, and other demographic characteristics.

The most important limitation of this study was unsupervised performance of BRR by participants at their homes.

4.1. Conclusions

The study findings suggest the effectiveness of BRR in reducing fatigue during the first trimester of pregnancy. This simple, safe, and inexpensive technique can be used for fatigue reduction among pregnant females.

Acknowledgments

References

1. Guardino CM, Schetter CD. Coping during pregnancy: a systematic review and recommendations. *Health Psychol Rev*. 2014;**8**(1):70–94. doi: 10.1080/17437199.2012.752659. [PubMed: 24489596].

Table 1. Between-Group Comparisons Regarding Numerical Demographic and Clinical Characteristics[a]

	Group			P Value (Independent-Sample T Test)
Characteristics	**Control**	**Intervention**	**Total**	
Age, y	28.87 ± 6.07	28.7 ± 6.32	28.74 ± 6.14	0.96
Gestational age, w	10.33 ± 2.71	9.19 ± 2.85	10 ± 2.81	0.13
Number of stillbirths	0.11 ± 0.32	0.07 ± 0.26	0.09 ± 0.29	0.64
Number of abortions	0.41 ± 0.69	0.41 ± 0.57	0.41 ± 0.63	1.00
Number of alive children	2.19 ± 1.57	2.15 ± 1.29	2.17 ± 1.43	0.92

Abbreviation: SD, standard deviation.
[a] Values are expressed as mean ± SD.

Table 2. Between-Group Comparisons Regarding Categorical Demographic and Clinical Characteristics[a]

	Group		P Value (Chi-Square Test)
Characteristics	**Control**	**Intervention**	
Educational status			0.16
Illiterate	6 (22.2)	2 (7.4)	
Primary	3 (11.11)	4 (14.8)	
Guidance school	11 (40.7)	8 (29.6)	
High school	3 (11.1)	10 (37)	
University	4 (14.8)	3 (11.1)	
Employment status			0.77
Employed	9 (33.3)	8 (29.6)	
Housewife	18 (66.7)	19 (7.04)	
History of hypertension			0.21
Yes	5 (18.5)	9 (33.3)	
No	22 (81.5)	18 (66.7)	
History of gestational diabetes mellitus			0.71
Yes	4 (14.8)	5 (18.5)	
No	23 (82.5)	22 (81.5)	

[a] Values are expressed as No. (%).

Table 3. Between-Group Comparisons Regarding Fatigue Mean Scores[a]

	Group		P Value (Independent-Sample T Test)
Time	**Control**	**Intervention**	
Before	41.33 ± 12.08	45.56 ± 13.7	0.46
After	45.56 ± 13.17	33.11 ± 12.86	0.001
Pretest-posttest mean difference	4.22 ± 8.22	5.96 ± 14.9	0.002
P Value (Paired-sample t test)	0.013	0.033	

Abbreviation: SD, standard deviation.
[a] Values are expressed as mean ± SD.

2. Mindell JA, Jacobson BJ. Sleep disturbances during pregnancy. *J Obstet Gynecol Neonatal Nurs*. 2000;**29**(6):590–7. [PubMed: 11110329].

3. Naud K, Ouellet A, Brown C, Pasquier JC, Moutquin JM. Is sleep disturbed in pregnancy?. *J Obstet Gynaecol Can*. 2010;**32**(1):28–34. doi: 10.1016/S1701-2163(16)34400-0. [PubMed: 20370977].

4. Heo YS, Chang SJ, Park SG, Leem JH, Jeon SH, Lee BJ, et al. Association between Workplace Risk Factor Exposure and Sleep Disturbance: Analysis of the 2nd Korean Working Conditions Survey. *Ann Occup Environ Med*. 2013;**25**(1):41. doi: 10.1186/2052-4374-25-41. [PubMed: 24472113].

5. Luke B, Avni M, Min L, Misiunas R. Work and pregnancy: the role of fatigue and the "second shift" on antenatal morbidity. *Am J Obstet Gynecol*. 1999;**181**(5 Pt 1):1172–9. [PubMed: 10561640].

6. Tsai SY, Lin JW, Kuo LT, Thomas KA. Daily sleep and fatigue characteristics in nulliparous women during the third trimester of pregnancy. *Sleep*. 2012;**35**(2):257–62. doi: 10.5665/sleep.1634. [PubMed: 22294816].

7. Lee KA, Zaffke ME. Longitudinal changes in fatigue and energy during pregnancy and the postpartum period. *J Obstet Gynecol Neonatal Nurs*. 1999;**28**(2):183–91. [PubMed: 10102546].

8. Cherry SH. *Complications of pregnancy: medical, surgical, gynecologic, psychosocial, and perinatal*. William Wilkins; 1991.

9. Chien LY, Ko YL. Fatigue during pregnancy predicts caesarean deliveries. *J Adv Nurs*. 2004;**45**(5):487–94. [PubMed: 15009351].

10. Puetz TW, O'Connor PJ, Dishman RK. Effects of chronic exercise on feelings of energy and fatigue: a quantitative synthesis. *Psychol Bull*. 2006;**132**(6):866–76. doi: 10.1037/0033-2909.132.6.866. [PubMed: 17073524].

11. Ebrahimzadeh S, Golmakani N, Kabirian M, Shakeri MT. Study of correlation between maternal fatigue and uterine contraction pattern in the active phase of labour. *J Clin Nurs*. 2012;**21**(11-12):1563–9. doi: 10.1111/j.1365-2702.2012.04084.x. [PubMed: 22519453].

12. O'sullivan D, McCarthy G. An exploration of the relationship between fatigue and physical functioning in patients with end stage renal disease receiving haemodialysis. *J Clin Nurs*. 2007;**16**(11c):276–84.

13. Sadeghi A, Sirati-Nir M, Ebadi A, Aliasgari M, Hajiamini Z. The effect of progressive muscle relaxation on pregnant women's general health. *Iran J Nurs Midwifery Res*. 2015;**20**(6):655–60. doi: 10.4103/1735-9066.170005. [PubMed: 26793248].

14. Buttle H. Measuring a Journey without Goal: Meditation, Spirituality, and Physiology. *BioMed Res Int*. 2015;**2015**:1–8. doi: 10.1155/2015/891671.

15. Manzoni GM, Pagnini F, Castelnuovo G, Molinari E. Relaxation training for anxiety: a ten-years systematic review with meta-analysis. *BMC Psychiatry*. 2008;**8**:41. doi: 10.1186/1471-244X-8-41. [PubMed: 18518981].

16. Hinkle JL, Cheever KH. *Brunner Suddarth's textbook of medical-surgical nursing*. Lippincott Williams Wilkins; 2013.

17. Aalami M, Jafarnejad F, ModarresGharavi M. The effects of progressive muscular relaxation and breathing control technique on blood pressure during pregnancy. *Iran J Nurs Midwifery Res*. 2016;**21**(3):331–6. doi: 10.4103/1735-9066.180382. [PubMed: 27186213].

18. Rasouli N, Ahmadi F, Nabavi SM, Haji-Zadeh E. Effect of energy saving technique on the rate of Multiple Sclerotic fatigue. *Arch Rehabil*. 2006;**7**(1):43–8.

19. Mohammadpour A. Effect of progressive muscle relaxation technique on fatigue inpatients undergoing hemodialysis. *Prevent Care Nurs Midwifery J*. 2014;**3**(2):24–32.

20. Zakeri Moghaddam M, Shaban M, Kazemnezhad A, Tavassoli K. Effect of exercise utilizing the rate of respiratory on fatigue in patient with chronic obstructive pulmonary disease. *Hayat*. 2006;**3**(30):17–25.

21. Ghafari S, Ahmadi F, Nabavi SM. Effects of applying hydrotherapy on fatigue in multiple sclerosis patients. *J Mazandaran Univ Med Sci*. 2008;**18**(66):71–81.

22. Dumitrescu AL, Garneata L, Guzun OLGA. Anxiety, stress, depression, oral health status and behaviours in Romanian hemodialysis patients. *Rom J Intern Med*. 2009;**47**(2):161–8.

23. Cahill CA. Differential diagnosis of fatigue in women. *J Obstet Gynecol Neonatal Nurs*. 1999;**28**(1):81–6. [PubMed: 9924868].

24. Jalalmanesh SH, Zargarani F. Effects of progressive muscle relaxation technique on fatigue and sleep quality in patients with multiple sclerosis. *Sci J Hamadan Nurs Midwifery Fac*. 2015;**23**(3):5–14.

25. Kinsella MT, Monk C. Impact of maternal stress, depression and anxiety on fetal neurobehavioral development. *Clin Obstet Gynecol*. 2009;**52**(3):425–40. doi: 10.1097/GRF.0b013e3181b52df1. [PubMed: 19661759].

26. Hickey CA, Cilver S, Mulvihill FX. Employment-related stress and examination. *Public-Health Rep*. 1995;**110**(4):410–8.

27. Shobeiri F, Manoucheri B, Parsa P, Roshanaei G. Effects of Counselling and Sole Reflexology on Fatigue in Pregnant Women: A Randomized Clinical Trial. *J Clin Diagn Res*. 2017;**11**(6):QC01–4. doi: 10.7860/JCDR/2017/22681.9972. [PubMed: 28764252].