The Reduction of Anxiety and Improved Maternal Attachment to Fetuses and Neonates by Relaxation Training in Primigravida Women

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1. Background

Women experience dramatic changes during pregnancy and delivery, making them highly sensitive to emotional stimuli and sometimes accompanied by psychological problems. Maternal psychological state affects the intrauterine environment and has a great impact on fetal growth and health (1). Thus, pregnant women are more vulnerable to stress compared with non-pregnant women (2). Anxiety disorders are prevalent during pregnancy, playing a large part in the quality of health. Results of studies suggest an increase of anxiety disorders up to 30% and more in pregnancy that may have an adverse impact on the fetus and neonate (3). Anxiety has harmful impacts on pregnancy and childbirth while long term anxiety such as catecholamine and corticotrophin-releasing hormone secretion due to maternal stress if they pass through the placenta and interfere with the development of fetal brain at 22-12 weeks. Also, these hormones cause contractions in the placental arteries and constrain fetal nutrition and oxygen regulation (6) resulting in limited fetal growth and asphyxia which would increase medical interventions such as cesarean section (7). Higher prevalence of respiratory infections and other infections in infants smooth muscles and decreases utero-placental blood flow oxygen supply to the uterus and as a result abnormal fetal heart rate pattern with increasing possibility of preterm delivery (4). Anxiety during pregnancy can cause miscarriage, prematurity, low birth weight and respiratory disease of the fetus (5). It may also affect special mechanisms in the fetus involving adrenal steroid hormone such as catecholamine and corticotrophin-releasing hormone secretion due to maternal stress if they pass through the placenta and interfere with the development of fetal brain at 22-12 weeks. Also, these hormones cause contractions in the placental arteries and constrain fetal nutrition and oxygen regulation (6) resulting in limited fetal growth and asphyxia which would increase medical interventions such as cesarean section (7). Higher prevalence of respiratory infections and other infections in infants.
fants born to anxious women is anticipated since these hormones may hamper fetal immune system development (6). Other side effects of psychiatric disorders and maternal anxiety on neonates included low birth weight, decreased lactation and growth, severe malnutrition, diarrhea and loss of compliance with immunization programs (8). Since women and children are more sensitive to psychological tensions, awareness about tension and its consequences is an important aspect of modern medical practice (9). The main cause of increase in medical intervention is unpreparedness of pregnant women for pregnancy. Preparedness is a method of giving knowledge and awareness to pregnant women (10, 11). In different countries, a variety of methods are used to reduce anxiety, for example, psychological counseling, music, and relaxation exercises (12, 13). To learn the methods of coping with stress and anxiety, through daily exercises such as muscle relaxation, can help prevent fetal and maternal complications (14). Neuromuscular training exercises, proper breathing, relaxation training, concentration exercise and proper-position training can help mothers during labor to pass different stages of labor with minimal complications. In addition, increased positive adjustment is significantly associated with general health of pregnant women, contributing to maternal-fetal attachment. On the other hand, postpartum depression is reduced and the desire to breastfeeding increases by the aforementioned trainings (15, 16). Considering the effect of pregnancy education on maternal anxiety and also the importance of preventing anxiety during pregnancy, this study was conducted to evaluate the effect of relaxation training on maternal anxiety and attachment in primigravida women referring to Shiraz Gynecology & Obstetrics centers.

2. Objectives

The aim of this study was to evaluate the effect of relaxation training on anxiety and maternal attachment to fetus and neonate in primigravida women.

3. Materials and Methods

This was an interventional clinical trial study. The sample size was estimated at 84 participants. This study was conducted during the summer 2010, and included 84 pregnant women referring to Shushtari and Hafez maternity hospitals in Shiraz, and the participants were randomly selected and assigned to relaxation and control groups.

The sampling was purposive, and any woman who did not fulfill the inclusion criteria was excluded from the study and replaced by the next subject. In this context, two participants of the control group and three participants from the experimental group were excluded for various reasons. The randomization was done in the draw. Sample size according to Equation 1.

\[
\eta = \frac{\left(\sigma_1^2+\sigma_2^2\right)(\bar{x}+z\sigma)}{d^2}
\]

The inclusion criteria were primipara with singleton pregnancy, age between 35-18, the minimum education of guidance school (third year of secondary school), gestational age of 35-32 weeks, lack of obstetrical problem, expected pregnancy and having a low to moderate anxiety score based on Spielberger State-Trait Anxiety Inventory. Exclusion criteria were pregnancy complications such as bleeding, diabetes, hypertension, preterm delivery and internal illnesses, non-attendance at training sessions and no exercise at home, getting into major psychological problems, and stress during the intervention period.

Data gathering instruments in this study were a questionnaire including demographic and gestational information, Spielberger state-trait Anxiety Inventory, Fetal attachment scale Cranley and mothers-infant attachment behavior checklist (Avant). Spielberger state-trait is composed of two parts of state and trait anxiety status. This is a short questionnaire containing 40 questions based on the Likert scale from really low to very high, where the score is 1,2,3,4. Anxiety score ranges from 20 to 80. Spielberger test has been used in many Western studies (17, 18). Another instrument used as standardized fetal attachment was Cranley scale questionnaire which was originally used by Cranley with confirmed validity and reliability (19). Mother-infant attachment behavior checklist was another tool, originally used by Avant with attested reliability and validity (20).

Having submitted a written informed consent, the participants entered the study if they acquired desired score, so called low and medium anxiety. In order to attend training classes, the mothers were divided into two groups of 21 individuals. Each group received educational program consisting of four 90-minute sessions over four weeks, one session per week on Saturdays in the third trimester of pregnancy. The researcher was in charge of each training session throughout the course of study. The subjects in the experimental group underwent relaxation training at specified times, in addition to receiving the routine prenatal care.

The first session concerned with pregnancy changes in relation to anatomy, physiology, and hormonal aspects alongside their psychological impact on physical and mental status of the pregnant women. The emphasis should be placed on the strategies for compliance with pregnancy changes. These include proper nutrition, personal hygiene, physical and mental health and recogniz-
ing the ways of improving compatibility with pregnancy changes such as relaxation and their impact on pregnancy.

The second session allocated to educating pregnant women on fetal development in different months of pregnancy, the impact of nutrition and health care for mother and fetus, the effect of relaxation on reducing anxiety in pregnancy and its impact on physical and mental health of the mother and fetus.

The third session of the training program was devoted to information on ways of treating threatened signs in pregnancy, the circumstances of forming maternal-fetal attachment, the impact of relaxation on quality of sleep and nutrition of anxious pregnant women, and the effect of relaxation on maternal-fetal attachment.

The fourth session of trainings comprised the impact of relaxation on delivery process and postpartum recovery, lactation and postpartum depression and also familiarization with the process and stages of birth, postpartum care, and breastfeeding.

At the end of all sessions, the Benson Relaxation method was rehearsed. These rehearsals are easy and safe in pregnancy. Its safety in pregnancy has been proved by obstetricians and gynecologists. It was easy to perform for every participant, lasting at least 10-20 minutes and involving the toe to the forehead. In order to ensure that participants practice the relaxation techniques, in addition to relaxation training, they were provided with compact disks (CDs) and were asked to record the daily trainings in a given checklist (21, 22). At the beginning of the next meeting after gathering the checklist, educational materials were reviewed and questions were answered. Practical training, role play, lectures and educational CD were used to teach relaxation. The most important practical training given by Benson method included settling in a quiet environment, mental preparation, passive attitude, and response in a comfortable position, the deep loosening of muscles from foot to the top for 10 to 20 minutes and finally reversing slowly. The control group received only routine prenatal care. At the end of the intervention, mothers in both control and experimental groups completed Spielberger state-trait and Cranley fetal attachment scale questionnaires. After birth, fetal attachment in the first breastfeeding was monitored at the highest, whereas the quality of care was at its lowest levels. Independent T-tests demonstrated significant differences between the two groups in terms of anxiety score before the intervention. But after the intervention the difference was significant. Paired t-test results showed that in spite of a decrease in anxiety after the intervention in the experimental group, the differences were not significant, but a significant increase in anxiety score was found between the control groups before and after the intervention (Table 2).

The mean of both the state and trait anxiety in the experimental group declined, but increased in the control group after the intervention. Independent t-test results showed no significant differences in the two groups in both the state and trait anxiety prior to the intervention, but after the intervention in the two groups both the state and trait anxiety showed significant differences (Table 3).

Independent t-test scores for attachment were significantly different after, but not before the intervention, between the two groups. In fact, relaxation trainings led to an increase in maternal attachment in the experimental group as compared to the control group. The results of paired t-test after the intervention showed a significantly different increase in attachment in the experimental group, but this difference was not significant in the control group (Table 4).

The mean of maternal-infant attachment behaviors during the first breastfeeding in the experimental group was higher than the control group. In addition, comparison between different aspects of behavior in the two groups showed that sustained intimacy in the both groups was at the highest, whereas the quality of care was at its lowest levels. Independent T-tests demonstrated significant differences in the affectionate behavior (aspect 1), the intimacy behavior (aspect 2), caring behaviors (aspect 3), and mother attention to the baby (aspect 4) between the two groups. Also, statistically significant differences in the mean of all mother-infant attachment behaviors were found between the two groups (P < 0.001). Attachment scores were significantly higher in the experimental group than in the control group (Table 4).
### Table 1. The Demographic and Obstetric Characteristics of the Women under Study

| Characteristic                  | Case, No. (%) | Control, No. (%) | P value |
|---------------------------------|---------------|-----------------|---------|
| **Employment status**           |               |                 |         |
| Employed                        | 5 (11.9)      | 2 (4.8)         | 0.248   |
| Unemployed                      | 37 (88.1)     | 40 (98.2)       | 0.248   |
| **Education**                   |               |                 |         |
| Junior high-school graduate     | 6 (14.3)      | 18 (42.9)       | 0.078   |
| High-school graduate            | 26 (61.9)     | 21 (50.0)       | 0.078   |
| College graduate                | 10 (23.8)     | 3 (7.1)         | 0.078   |
| **Marital satisfaction**        |               |                 |         |
| Satisfied                       | 37 (88.1)     | 37 (88.1)       | 1.000   |
| Dissatisfied                    | 5 (11.9)      | 5 (11.9)        | 1.000   |
| **Family income, per month**    |               |                 |         |
| ≥ USD284                        | 18 (42.8)     | 15 (35.8)       | 0.372   |
| < USD284                        | 24 (57.2)     | 27 (64.2)       | 0.372   |
| **Sex of fetus (echography)**   |               |                 |         |
| Girl                            | 13 (31.0)     | 20 (47.6)       | 0.869   |
| Boy                             | 22 (52.4)     | 18 (42.9)       | 0.869   |
| Unknown                         | 7 (16.6)      | 4 (9.5)         | 0.869   |
| **Age, years**                  |               |                 |         |
| 18-25                           | 24 (57.3)     | 32 (76.4)       | 0.097   |
| 25-35                           | 18 (42.7)     | 10 (23.6)       | 0.097   |

*Three million Iranian Rials converted to US dollars on May 29, 2011

### Table 2. Comparison of Scores for Anxiety in Pregnant Women in the Experimental and Control Groups

|                          | Before Intervention, Mean ± SD | After Intervention, Mean ± SD | Difference between before and after intervention, Mean ± SD | P Value (paired T-test) |
|--------------------------|--------------------------------|-------------------------------|----------------------------------------------------------|-------------------------|
| **Case group**           |                                |                               |                                                          |                         |
|                          | 44.9 ± 4.7                     | 44.2 ± 5.6                    | 0.8 ± 0.5                                                | 0.309, (Not significant) |
| **Control group**        |                                |                               |                                                          |                         |
|                          | 45.4 ± 4.0                     | 47.4 ± 4.9                    | 2.0 ± 4.0                                                | 0.002, (Significant)    |
| P Value, (Independent T-test) | 0.618, Not Significant | 0.005, Significant | 0.006, Significant                                      |                         |

### Table 3. Comparison of Scores for Anxiety Trait and Anxiety State between Pregnant Women in the Experimental and Control Groups

|                          | Case Group, Mean ± SD | Control Group, Mean ± SD | P Value, (Independent T-test) |
|--------------------------|-----------------------|--------------------------|------------------------------|
| **Anxiety trait**        |                        |                          |                              |
| Before Intervention      | 22.0 ± 2.8             | 22.0 ± 2.4               | 0.920                        |
| After Intervention       | 21.8 ± 3.1             | 23.3 ± 3.2               | 0.034                        |
| **Anxiety state**        |                        |                          |                              |
| Before intervention      | 22.9 ± 2.5             | 23.5 ± 2.3               | 0.308                        |
| After Intervention       | 22.3 ± 2.9             | 24.1 ± 2.9               | 0.005                        |
improved sleep status and reduced anxiety and physical stress, on the other hand, relaxation and Morawez who demonstrated that relaxation training contact (29). This was shown by the studies of Viens et al., for prenatal education through midwives’ support and al., showed that most women demonstrated the need on maternal fetal attachment (28). The study of Price et l., proving childbirth, delivery status and the maternal–fetal attachment (24). Prenatal education is a dynamic process in which parents acquire information about physical and emotional changes in pregnancy, childbirth and parental behaviors. These trainings diminish stress and increase the mothers’ knowledge about pregnancy, childbirth, child care and communication, and skills for coping with anxiety and labor pain through physical preparedness such as relaxation and breathing techniques (25).

There are three basic principles in obstetrics for reducing pain and anxiety. These include simplicity, safety and maintaining fetal homeostasis. Among non-pharmacological methods, relaxation is more effective (26). Relaxation training as an educational intervention is cost-effective and safe has been suggested to reduce anxiety, especially during pregnancy. This method is not only effective in the context of comfort or relaxation but also has positive outcomes such as reduction in oxygen consumption and metabolism, decreased breathing and reduced heart rate and systolic and diastolic blood pressure (27). Also, focusing on relaxation techniques including breathing, allows the woman to stay calm during labor and save the energy for childbirth. However, relaxation trainings and midwife’s support can decrease labor pain and delivery time and have a positive effect on maternal fetal attachment (28). The study of Price et al., showed that most women demonstrated the need for prenatal education through midwives’ support and contact (29). This was shown by the studies of Viens et al., and Morawez who demonstrated that relaxation training reduced anxiety and stress, on the other hand, relaxation improved sleep status and reduced anxiety and physical and mental stress (30, 31).

The study of Ost and colleague showed that relaxation was effective on various aspects of stress (32). Also, the findings of present study was consistent with those of Deckro et al., who showed the impact of relaxation on reducing anxiety and perceived stress (33). The study also revealed that relaxation caused an increase in maternal-fetal attachment, which is clearly a promising non-pharmacological method in pregnancy. Prenatal care through intervention provides a good opportunity to improve and evaluate maternal-fetal attachment (34). In the current study, attachment level after the intervention was significantly different between the two groups. Also, the mean difference of attachment before and after the intervention was significantly different between the two groups. Similarly, Chang et al., found that prenatal classes can increase maternal-fetal attachment (35). On the other hand, beneficial mental and social effects of group working and supportive, intimate and friendly atmosphere of group training may supplement the educational intervention beside the effects of relaxation exercises (36, 37). In addition, the relaxation exercises practiced at home by the participants involved mental and self-reporting which were uncontrollable and considered as the limitations of the present study. Another limitation of the study, beside others, was the lack of long-term follow-up of the educational impact of this method, which can be resolved by further research. The positive effect of non-pharmacological methods such as relaxation on pain relief and reducing anxiety has been established among people in general and pregnant women in particular. Therefore, the midwives, as the first group from the health team, have an important role in learning and applying these methods in order to combat maternal anxiety.

The results of this study showed that relaxation training, as one of the new midwifery training, can reduce anxiety and increase maternal-fetal attachment. Given that anxiety has harmful effects on pregnancy and is detrimental to physical and mental health of pregnant women and maternal-fetal attachment, the use of relaxation training, without medication, is recommended as an effective method to reduce anxiety in clinical care for pregnant women.

5. Discussion

The findings of this study showed that the anxiety level decreased after relaxation trainings in the experimental group whereas it increased in the control group. Also, the results showed a significant difference in the mean of attachment behaviors of mothers before childbirth and at the first mother-newborn encounter compared to the control group. So, mothers in the experimental group were more caring and attentive to their babies. The overall mean of mother-infant attachment behaviors showed a statistically significant difference between the two groups.

The prenatal education focused on physical fitness, emotional and mental health, health promotion and improving attachment behaviors. These courses can improve childbirth, delivery status and the maternal–fetal attachment (24). Prenatal education is a dynamic process in which parents acquire information about physical and emotional changes in pregnancy, childbirth and parental behaviors. These trainings diminish stress and increase the mothers’ knowledge about pregnancy, childbirth, child care and communication, and skills for coping with anxiety and labor pain through physical preparedness such as relaxation and breathing techniques (25).

| Before intervention, Mean ± SD | After Intervention, Mean ± SD | Difference between Before and After, Mean ± SD | P value, (paired T-test) |
|-------------------------------|-------------------------------|---------------------------------------------|------------------------|
| Case group                    |                               |                                             |                        |
| 60.1 ± 4.7                    | 61.6 ± 4.3                    | 2.4 ± 3.3                                   | P < 0.001              |
| Control group                 |                               |                                             |                        |
| 60.2 ± 4.5                    | 61.1 ± 5.1                    | 0.8 ± 7.0                                   | P = 0.444              |
| P value, (Independent t-test) | 0.897                         | 0.017                                       | 0.048                  |
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Authors’ Contribution

Mrs. Toosi: Design, literature search, definition of intellectual content, data acquisition, experimental studies, manuscript preparation. Mrs. Akbarzadeh: Concepts design, literature search, Definition of intellectual content, Manuscript preparation, review and corresponding. Mrs. Sharif: Design, definition of intellectual content. Mr. Zare: Design, statistical analysis.

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