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Original Article

Effect of the BASNEF Model on Maternal-Fetal Attachment in the Pregnant Women Referring to the Prenatal Clinics Affiliated to Shiraz University of Medical Sciences

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ABSTRACT

Background: Prenatal attachment and positive adaptation with the concept of motherhood play a pivotal role in maternal and fetal health. The present study aimed to evaluate the effect of the beliefs, attitudes, subjective norms, and enabling factors (BASNEF) model on maternal fetal attachment in the pregnant women referring to prenatal clinics.

Methods: This quasi-experimental study was conducted on 100 nulliparous women in their third pregnancy trimester (36-41 weeks), who referred to the selected prenatal clinics in Shiraz, Iran during 2011-2012. Intervention was performed based on the BASNEF model in six training sessions for 90 minutes. Data collection tools were the Cranley's maternal-fetal attachment scale and BASNEF model. Data analysis was performed in SPSS version 18 using Pearson's correlation-coefficient, independent t-test, and Chi-square at the significance level of 0.05.

Results: After the intervention, a significant difference was observed in the mean score of maternal-fetal attachment in the intervention group compared to the control group (P<0.001). In addition, there was a significant positive correlation between the score of maternal-fetal attachment and enabling factors one month after the training in the intervention group (P=0.039).

Conclusion: According to the results, training based on the BASNEF model could increase the maternal-fetal attachment in nulliparous pregnant women and improve the psychological health indicators of the neonates.

Keywords: Attachment, BASNEF Model, Fetus, Mothers, Pregnancy

Introduction

Pregnancy is a natural, pleasant process in a woman's life, which is also associated with significant stresses due to the physical and mental changes. Pregnancy helps women to enhance their knowledge of the maternal role (1, 2). Emotional attachment with the infant is considered to be an important aspect in the adaptation process of pregnant women with the concept of motherhood (3). Evidence shows the growing attachment between the mother and fetus during pregnancy, which is reflected in the behaviors of expecting mothers (4).

Maternal-fetal attachment (MFA) is defined as the bond between pregnant women and fetus, which implies their emotional experiences (5, 6). In fact, MFA is described as the cognitive image of the mother toward the infant that potentially presents before birth, depending on the perceived emotional and cognitive abilities of the mother (7). According to John Bowlby's attachment theory, MFA initiates long before birth and gradually proceeds until the end of pregnancy and even during the postpartum period, with the peak speculated to be when the infant is aged three months.

MFA plays a pivotal role in the maternal adaptation with pregnancy (8). Evidence suggests that the emergence of MFA is a predictive factor for the postpartum maternal attitude and function, mother-infant interaction, and attachment styles after birth. Mothers with a higher level of fetal attachment during pregnancy have been shown to have more effective interactions with their infants, which in turn has a substantial impact on the

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growth and emotional, cognitive, and social development of the child (9, 10).

To date, few studies have focused on the association of low MFA scores with poor maternal health practices during pregnancy (11). According to the literature, the most important influential factors in MFA include family relations, acceptance of pregnancy, support from others, self-image of the mother, history of previous pregnancies, pregnancy complications, unintended pregnancy, maternal age, and education level (12, 13). Given the importance of early attachment in infancy and its remarkable effects on the growth and development of the child, some researchers have considered the prenatal period to be a proper opportunity to build a desirable mother-infant bond before birth (14).

Education and consultation are among the main interventions used to increase MFA. Some of the measures in this regard include talking to the embryo, abdominal touching of the fetus, and attention to the movements of the fetus. It seems that such behaviors could significantly promote MFA (15, 16).

Several studies have confirmed the efficacy of maternal education by various methods in the improvement of MFA. On the other hand, health-related programs have implied the importance of applying various models in the health education in this regard (17). In the present study, we used the beliefs, attitudes, subjective norms, and enabling factors (BASNEF) model to enhance MFA. This model was first introduced by John Hubley in 1988 (18). BASNEF is the most comprehensive model for evaluating and identifying behavioral patterns, as well as developing new attitudes and behaviors in the society. The main components of the BASNEF model include behaviors, attitudes, enabling factors, and subjective norms based on the theory of reasoned action (19).

Although the significance of maternal education in promoting MFA has been confirmed by previous research, no studies have applied the current educational theories in this regard. Given the paramount importance of MFA in the physical and mental health of pregnant women and social and cognitive interactions of children, the present study aimed to investigate the effect of the BASNEF model on MFA in the nulliparous women referring to the selected prenatal clinics in Shiraz, Iran.

Methods

This quasi-experimental study was conducted during January 2011-June 2012 in the prenatal clinics of Shoshtari and Hafez hospitals in Shiraz, Iran. Sample size was determined to be 40

subjects (α=5%; 95% confidence level; test power=0.8; β=0.2) based on the following formula and previous studies in this regard. Final sample size of the study was determined at 50 subjects considering the possible sample loss.

$$N = \frac{S12 + S12 \times (Z\alpha + Z\beta)2}{(X_{1-}X_2)2}$$

Participants were selected via convenience sampling and allocated into two groups of intervention (training based on the BASNEF model) and control. Inclusion criteria were as follows: 1) nulliparous women with uncomplicated pregnancy; 2) gestational age of 28-34 weeks; 3) minimum education of high school diploma; 4) no history of obvious and severe physical/mental illnesses during the study; 5) living in Shiraz city; 6) willingness to participate in the study and 7) providing written informed consent for participation. Exclusion criteria of the study were receiving previous training courses on the improvement of MFA, irregular maternal visits after several follow-ups, and withdrawal from the study.

After obtaining the required permit from the research department and coordination with the selected hospitals, the researchers referred to the pregnancy day care clinics to perform random sampling by obtaining the written informed consent. Women in the intervention group received six weekly training sessions, which were held for 90 minutes based on the BASNEF model to present the educational materials presented in Table 1. On the other hand, participants in the control group received routine training in the prenatal clinics after birth.

Contact number of the researcher was provided for the mothers in the case of need for guidance regarding breastfeeding. In addition, an introductory letter was provided for the participants, so that they would be able to enquire about the pre-educated healthcare providers. In total, three training sessions were held for the mothers (n=20), their spouses (n=19), and the spouses' mothers (n=15) separately. Moreover, a file on the educational contents and a pamphlet on the physical development skills were prepared for the mothers.

Data collection tools were the BASNEF model and Cranley's maternal-fetal attachment scale. BASNEF consists of a demographic information section (eight items), as well as four other sections on knowledge (12 items, two-point Likert scale response anchors [true/false]), attitude (10 items, four-point Likert scale), enabling factors (seven items, two-point Likert scale response anchors

Table 1. Schedule of Training Sessions for Maternal-Fetal Attachment

Session	Title	Educational Contents	Training Practices
First Session	Promoting Breastfeeding	Understanding the importance and reasons for promoting breastfeeding/benefits of breastfeeding in reducing neonatal mortality and morbidity and enhancing their physical and mental health/health benefits in breastfeeding mothers/understanding the social and cultural effects of breastfeeding	Lecture, question-and-answer, group discussion, videos and slides
Second Session	Correct Postures for Breastfeeding/Importance of Being in the Mother's Arms/Proper Weaning	Appropriate postures for breastfeeding mothers/child-appropriate situations in breastfeeding/proper signs and symptoms of breastfeeding in infant/proper signs and symptoms of breast taking/signs of improper breastfeeding status	Lecture, question-and-answer, group discussion, videos and slides, role-play
Third Session	Possible Problems during Lactation/Growth and Development of Infants	Flat and depressed nipple detection and its treatment/detection of breast congestion and its treatment/myths about lack of breastfeeding/effect of breastfeeding on its quantity and quality/techniques of milking and storage of breast milk/recognition of child's growth and influential factors/familiarity with the growth curve/using the national health system	Lecture, question-and-answer, group discussion, videos and slides, role-play
Fourth Session	Maternal-Fetal Attachment (MFA)	Concept of attachment/concept of maternal-fetal attachment/behaviors in maternal attachment with fetus/counting and recording fetus' movements/imagining breastfeeding for at least 10 minutes and expressing the mother's moods/describing the appearance of fetus to speak with him/her/palpation of the abdomen/fetal status in the abdomen	Lecture, question-and-answer, group discussion, videos and slides, role-play
Fifth Session	Formation of MFA/Onset of Attachment Symptoms	Attachment behaviors (talking to the fetus, calling the baby with nickname, looking at the abdomen and attention to fetal movements) and their practice/abdominal palpation by pregnant women to recognize and assume the fetus' position in the abdomen/counting fetal movements on the abdomen/positive image of the fetus's appearance/calming the fetus by touching the abdomen/imagining hugging and breastfeeding the infant	Lecture, question-and-answer, group discussion, videos and slides, role-play
Sixth Session	Father's Role in MFA	Focusing on the fetus and stating the impression on the mental status of parents/parental knowledge and understanding of fetus as an independent creature/parental understanding of fetal sensory ability/familiarity with the labor process and its phases/comparing various modes of delivery (natural vaginal, C-section, painless, physiological)	Lecture, question-and-answer, group discussion, videos and slides, role-play

[true/false]), and cognitive norms (five items).

Validity and reliability of the BASNEF model have been previously confirmed by Sharifirad et al., at the Cronbach's alpha of 0.81, 0.9, 0.78, 0.82, and 0.91 for the sections of knowledge, attitude, function, enabling factor, and cognitive norms, respectively (20). In this study, the BASNEF model was applied before and immediately one and three months after the intervention.

Cranely's scale was used to assess the MFA and applied before and in the last session of the training intervention. This questionnaire was first developed in 1981 with 24 items in five subscales of interaction with the fetus, differentiation of the fetus and self, acceptance of the maternal role, assigning certain properties to the fetus, and devotion (21, 22). Items in Cranely's scale are scored based on a five-point Likert scale (range: 24-120). Additionally, validity and reliability of this scale have been confirmed by Taavoni at the Cronbach's alpha of 0.83 (23).

Questionnaires and educational contents of the present study were approved by the Research Committee of Shiraz University of Medical Sciences (grant number: 42-4605). Ethical considerations included obtaining written informed consent, explaining the study objectives, methods, and duration, and ensuring the terms of confidentiality for the participants.

Data analysis was performed in SPSS version 18 using descriptive statistics, Pearson's correlation-coefficient, independent t-test, and Chi-square, at the significance level of 0.05.

Results

In this study, mean age of the participants was 23.86±4.30 and 24.4±4.18 years in the intervention and control groups, respectively. According to the

Table 2. Comparison of Mean MFA Score in Intervention and Control Groups before and after Training

	Before Intervention (Mean±SD)**	P-value*	After Intervention (Mean±SD)**	P-value*
Intervention Group	3.01±21.20	0.74	4.63±30.75	0.001<
Control Group	2.40±21.38		3.19±22.20	

*Independent t-test,**standard deviation

Table 3. Association of MFA with Scores of Knowledge, Behavior, Attitude, and Enabling Factors before and after Intervention at Different Times

		Before Intervention P-value*	Intermediately P-value*	After One Month P-value*	After Three Months P-value*
Association of MFA with Score of Knowledge	BASNEF Group	0.07	0.76	0.48	0.20
	Control Group	0.55	0.94	0.75	0.96
Association of MFA with Score of Behavior	BASNEF Group	0.29	0.90	0.20	0.98
	Control Group	0.40	0.64	0.27	0.07
Association of MFA with Score of Attitude	BASNEF Group	0.07	0.33	0.93	0.87
	Control Group	0.61	0.67	0.54	0.82
Association of MFA with Score of Enabling Factors	BASNEF group	0.85	0.49	0.03	0.10
	Control group	0.93	0.63	0.47	0.52

*Pearson's correlation-coefficient

independent t-test and Chi-square, there were no significant differences in terms of the age (P=0.78), education level (P=0.85), and occupation status (P>0.05) between the intervention and control groups. Mean age of the spouses was 28.16±5.24 and 28.96±2.89 years in the intervention and control groups, respectively. According to the Chi-square test, there were no significant differences in terms of the spouse's age (P=0.617), education level (P=0.801), and occupation status (P≥0.05) between the intervention and control groups. According to the information in Table 2, mean score of MFA after the intervention had a significant difference between the intervention and control groups (P<0.001).

No significant correlations were observed in the demographic characteristics and MFA before and after the BASNEF training between the intervention and control groups (P>0.05). Moreover, Pearson's correlation-coefficient (0.299) showed a significant positive correlation between the enabling factor and MFA one month after the BASNEF training in the intervention group. However, MFA had no significant correlation with the other subscales of BASNEF before and after the training intervention (Table 3).

Discussion

Pregnancy is a proper time for assessing and improving MFA by the related interventions. The present study aimed to evaluate the effect of the BASNEF model on MFA in the pregnant women referring to prenatal clinics. According to the results, training based on the BASNEF model could promote MFA through the educational contents, group relations, cognitive imagery of the fetus, increased interaction with the fetus, and social support in the intervention group. Studies

in this regard (typically focusing on MFA) have also implied that training, pregnancy group courses, and social and family support could significantly influence the maternal and fetal health during pregnancy and postpartum (6).

Findings of Parsa (17) and Likis (24) are consistent with the results of the present study regarding the effect of prenatal attachment behavior training on improving MFA. Furthermore, another research by Hosseiniyan confirmed the efficacy of educational interventions based on performing MFA behaviors in increasing MFA, decreasing anxiety, enhancing the mental health of mothers, and reducing postpartum pain to promote the relationship between the mother and infant (25); this is in congruence with the results of the present study.

According to the studies by Abbasi and Tafazoli (26) and Akbarzadeh (27), educational intervene-tions that are based on talking with the fetus and counting fetal movements by the mother are effective in improving MFA, while an opposing concept was reported in the study performed by Saastad (28). This discrepancy could be due to the time of the interventions (last weeks of pregnancy) and lack of proper cooperation of the participants due to fear and anxiety. In this regard, Ruland investigated the effect of touching the abdomen on maternal attachment behaviors. After the intervention, no significant difference was observed in the attachment level between the groups, which could be due to the variable intervention types (17). In addition, results of the Cranley's scale showed no association between MFA and maternal emotions within the first three days of birth, which could be due to the differences in the research instruments (12).

Variable results have been reported regarding

the effects of education and different methods of intervention on MFA. According to Salisbury, level of MFA varies based on the type of training interventions due to the differences in counseling, education, location, duration, or initiation time of training during pregnancy (17).

To date, few studies have applied the BASNEF model to enhance MFA, while this model has been widely used for the planning of health education interventions in various studies, indicating the positive impact of the training based on this model; such examples are the studies conducted by Mehrabian (29) and Akbarzade (30). In general, using a theoretical framework is useful in research-based health interventions since it has greater efficacy in interventions as an organized approach (31).

In the present study, no significant associations were observed between demographic characteristics and MFA before and after BASNEF-based training in the intervention and control groups. According to the findings of Baghdari, there was no correlation between the education level of the couples and maternal occupation status (32). Results of the study by Abbasi are consistent with our findings (26). However, the findings reported by Kwon and Bang (33) and Tafazoli (34) suggested that lower education level reduces the MFA, which could be attributed to the variable features of the study population. On the same note, Ustunsoz proposed different results regarding the association between the education level of the couples and MFA, which could be due to the cultural and social differences compared to the present study (4).

According to the study by Baghdari, there is an inverse association between age and attachment score, while other studies have denoted no association between these variables (32). According to the results of Pearson's correlation-coefficient in the current research, there was a significant positive correlation between the enabling factors and MFA one month after the BASNEF-based training in the intervention group since these factors can facilitate achieving the related behavioral goals (30). However, lack of a significant association in this regard three months after the intervention could be due to the approach of maternal response and required time for acquiring the necessary attachment skills, as well as no access to further educational classes in this regard. Availability of the enabling factors could be a contributing factor to implementing the desired attachment behaviors, which is consistent with the results obtained by Sharifirad (22) and

contrary to the findings of Charkazi. Of note, lack of significant correlations between the enabling factors and mean score of the desired MFA behaviors in the mentioned studies could be due to the quality and type of the implemented training interventions (35).

One of the limitations of the present study was the lack of three-dimensional ultrasound and fetal examination due to financial restrictions. Another limitation was the possibility of no cooperation in the training sessions, which included sufficient explanations about the goals and benefits of breastfeeding self-efficacy. Moreover, direct education of the spouses was not possible despite their presence in the study setting.

Conclusion

According to the results of the present study, BASNEF-based training is an effective method to enhance MFA. In addition, we have proposed a significant implication for healthcare professionals, especially midwives and nurses, to fulfill their educational mission in the promotion of MFA. Stabilization of effective MFA behaviors is expected to improve the mental and physical health of the next generation in our society. Therefore, it is recommended that theory-based educational interventions (e.g., BASNEF) be applied to improve MFA in the healthcare system. Such programs involve easy, pleasant and inexpensive approaches for prenatal care education to promote the maternal and infant health. It is also noteworthy that the training of fathers can increase the efficacy of these educational interventions. Considering the effectiveness of the BASNEF model in health promotion, it is suggested that this model be used in various regions of the country and for other disorders through preplanned educational methods with the active participation of the subjects.

Acknowledgments

Conflicts of interests

None declared.

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