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Website: www.jehp.net
DOI: 10.4103/jehp.jehp_1462_23

# The effect of participation education on maternal role adaptation in mothers with premature infants in the neonatal intensive care unit

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Received: 12-09-2023  
Accepted: 26-12-2023  
Published: 05-07-2024

## Abstract:

**BACKGROUND:** The birth of a premature infant, hospitalization, and separation from the family cause disruption on maternal role adaption. This study was conducted with the aim of investigating the effect of participation education on maternal role adaption in mothers of premature infants hospitalized in the neonatal intensive care unit.

**MATERIALS AND METHODS:** This semiexperimental study was conducted with the participation of 129 eligible mothers with premature infants into three groups of 43 (face-to-face education, virtual education, and control). Data collection was done using a checklist measuring adaptation to the maternal role. Data were analyzed by descriptive statistical and multiple linear regression tests at a significance level of  $P < 0.05$ .

**RESULTS:** The mean age of mothers was 30.8 years, the mean gestational age of infants was 31.7 weeks, the mean birth weight was 1781.4 g, and the most common (84.5%) reason for hospitalization of infants was respiratory distress. Multiple linear regression analysis showed that the total score of maternal role adaptation at the time of discharge was significantly different in the two groups of virtual education ( $134.362 \pm 0.925$ ) ( $P < 0.001$ ) and face-to-face education ( $132.421 \pm 0.928$ ) ( $P = 0.005$ ) with the control group ( $128.286 \pm 0.924$ ).

**CONCLUSION:** The implementation of educational programs is a suitable solution to improve maternal role adaption. Therefore, it is recommended that managers and healthcare planners consider codified and regular educational programs in order to increase the ability of mothers, in order to adapt to the maternal role.

## Keywords:

Education, infant, intensive care units, mothers, premature

## Introduction

The birth of a premature infant requires early separation and long-term hospitalization in the neonatal intensive care unit (NICU).<sup>[1]</sup> This separation leads to a severe emotional crisis, confusion in family life, disturbance in the quality of life, stress, mental disorders, and changes in the parental role of mothers, as well as the lack of mother's orientation and attachment

to the infant and a decrease in loving and responsible maternal behaviors.<sup>[2]</sup>

One of the most important stress factors for parents is the weakening of the parental role.<sup>[3]</sup> The intense psychological pressure caused by pregnancy and childbirth on the mother affects the achievement of the maternal role<sup>[4]</sup> and can disrupt their efficacy in the new role.<sup>[5]</sup> Achieving the maternal role is part of the transition process, and the

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**How to cite this article:** Ghafari\_rad H, Arzani A, Zabihi A, Akbarian\_rad Z, Qanbari Qalehsari M, Jafarian\_amiri SR. The effect of participation education on maternal role adaptation in mothers with premature infants in the neonatal intensive care unit. *J Edu Health Promot* 2024;13:196.

motherhood experience is the promotion of behaviors that lead to proper adaptation to the maternal role and has an impact on the relationship between mother and infant, and this relationship can lead to competence, self-confidence, and make the mother happy.<sup>[6]</sup>

Most of the mothers whose infants are admitted to the NICU have to share their role as mothers with ward nurses and other health workers, and their opportunities to take care of the infant are limited.<sup>[5]</sup> Mothers tend to participate in all aspects of care and often describe it as beneficial for themselves and their infants.<sup>[7]</sup> The results of the study by Ghavami *et al.* showed that educating parents based on their educational needs and emphasizing the parental role reduces parental stress.<sup>[8]</sup> One of the dimensions of family-oriented care is the participation of parents in the care of the infant.<sup>[9]</sup> Mutually beneficial cooperation, unrestricted presence of parents, and free interaction with personnel can provide quality care for the infant.<sup>[10]</sup>

Family-centered care requires parents' participation and their decision-making. In most studies, family-centered care has been emphasized as an important and necessary element in the NICU<sup>[11]</sup> and such interventions should be prioritized in the NICU.<sup>[12]</sup>

Despite more than four decades of efforts to implement family-centered care, there has been no collective agreement in practice.<sup>[13]</sup> and some NICUs greatly limit access to infants.<sup>[14]</sup> According to a study in Iran, mothers experienced a lack of control and alienation toward their infants due to the lack of a caring role in the NICU, and their nonparticipation in caring for their infants caused them to feel unpleasant.<sup>[15]</sup> Currently, the performance of nurses in the NICU is mainly focused on the survival of infants and attention to their growth and development needs, and the family is not considered.<sup>[16]</sup> Comprehensive planning is necessary to strengthen the parental role of the parents of infants hospitalized in the NICU.<sup>[17]</sup>

The postpartum period is the golden time for healthcare education for interested mothers. The implementation of family-oriented educational programs with the participation of parents in care and understanding the needs of the infant is associated with an increase in the self-efficacy scores of the mother and leads to a decrease in the rehospitalization of the infant and a decrease in treatment costs.<sup>[18]</sup> Also, this has led to an increase in their sense of self-sufficiency and self-confidence and reduces their stress.<sup>[19]</sup>

Although verbal and face-to-face education is considered as the gold standard of patient education,<sup>[20]</sup> due to the lack of permanent presence of the mother, the busyness

of the nurses, and the lack of the necessary opportunity for face-to-face training with the mothers and gaining their satisfaction, other methods of training such as virtual training can be used.<sup>[21]</sup> The element of interaction is considered not only as a powerful communication tool but also as the main part of learning. For this reason, Phillips believes that the lack of social communication skills is the cause of e-learning failures. Therefore, this issue has made electronic education completely unable to take the place of formal and face-to-face education.<sup>[22]</sup>

Since the mother's participation program is the main foundation of modern pediatric nursing and is considered an important part of family-oriented care, it is necessary for managers to use this strategy by providing suitable context in the clinical environment.<sup>[23]</sup> Despite the relative familiarity of nurses and doctors, the principles of care philosophy are not fully implemented.<sup>[24]</sup> Therefore, considering these limitations and the positive effects of the implementation of the maternal role on mothers and infants, this study was conducted with the aim of investigating the effect of participation education on maternal role adaptation in mothers with premature infants in NICU.

## Materials and Methods

### Study design and setting

This research was semiexperimental in Rouhni Hospital of Babol-Iran.

### Study participants and sampling

This semiexperimental study was conducted with the participation of 129 eligible mothers with premature infants hospitalized in the NICU Department of Rouhani Hospital of Babol in 2022. By referring to the NICU and after giving the necessary explanations about the objectives of the research and how to conduct the study, the researcher obtained informed consent from the mothers who had the entry criteria and were willing to participate in the study. The required sample size with an effect size of 0.6 between face-to-face education, virtual education, and control groups was estimated at a confidence level of 0.95 and a test power of 0.80 equal to 43 cases for each group. Mothers were placed in three groups of 43 (face-to-face education, virtual education, and control) using a nonrandom sampling method.

### Inclusion and exclusion criteria

The inclusion criteria of mothers included: age over 18 years, ability to read and write, no history of premature delivery, having an infant hospitalized in the NICU, being married and living with a spouse, willingness to participate in the study, desired pregnancy, and the mother's lack of chronic physical and mental problems based on the medical record.

The infants' inclusion criteria included gestational age less than 37 weeks and weight less than 2500 g, absence of chromosomal abnormalities and mechanical ventilation, and Apgar score greater than 7.

Mother exclusion criteria included leaving the mother at any stage of the study, failure to answer more than 20% of the questions in the questionnaire, care by other family members other than the mother, and mother's nonparticipation in educational sessions. The infant exclusion included performing surgery, having an incurable disease, and severe critical conditions such as intraventricular bleeding and cardio-respiratory arrest at birth, sending the infant to other centers for treatment, and infants who have been hospitalized for less than a week.

### Data collection

A two-part questionnaire was used to collect data:

The first part, the demographic profile included information on the characteristics of the mother and the infant, such as the gestational age of the infant, birth weight, birth rank, type of delivery, sex of the infant, history of premature birth, gender of the infant, age of the mother, number of children, etc., which were completed by the mother and if the mother did not know about some data, it was collected from medical records. The second part, the Maternal Role Adaptation Scale in mothers of premature infants hospitalized in NICU (MRAS: NICU) was used in order to check the level of adaptation of maternal role in three groups.

The MRAS: NICU was prepared by Heydarpour *et al.* which contains 32 questions that are graded from 1 to 5 using a Likert scale (strongly agree, agree, no comment, disagree, strongly disagree) with a minimum score of 32 and a maximum score of 160. The questions are in six dimensions: 14 questions in the field of participation in care, 6 questions in the field of self-efficacy, 3 questions in the field of distance from motherhood (when the mother is not present in the hospital), 4 questions in the field of uncertainty, 3 questions in the field of interaction, and 2 questions in the field of growth and maturity. The validity and reliability of the questionnaire was confirmed in the study of Heydarpour *et al.*<sup>[25]</sup> The reliability of the questionnaire was confirmed by conducting a test-retest for the entire questionnaire with Cronbach's alpha coefficient of 0.77 and for different dimensions of the questionnaire it was between 0.61 and 0.92.

### Intervention

Mothers participating in the study were divided into 3 groups of 43.

### Face-to-face education group

In order to implement the intervention, while consulting with the mother, the time of the first meeting was determined and the meeting place was also introduced to her. Up to 48 h after the mother's entry to the ward, face-to-face education sessions were held individually for three sessions, once a day for 30–45 min each time, based on the mother's tolerance, in the breastfeeding room or the infant's bedside. Mothers were present at all hours of the day and night, except during shift handover, doctor's examination, and cardiopulmonary resuscitation. During the study period, the researcher was available to this group and the mothers could have telephone or face-to-face counseling if needed. At the end of each educational session, a question and answer session was held and education booklets were given to them.

### Virtual education group

The virtual education included the presentation of videos and images that after obtaining consent from the ward nurses were prepared step by step from their activities in the department, which were among the activities needed by mothers and in line with the educational topics of the research. Also, a booklet prepared based on the contents of authentic books and articles was presented to mothers individually, and these educations were provided to mothers through WhatsApp, Telegram, or Bluetooth.

### Control group

No intervention was performed other than the routine ward care in the control group.

In all three groups, first, the demographic questionnaire and adaptation with the maternal role were completed by mothers, when the mother entered the ward or at most 48 h later. The second questionnaire on adaptation to the maternal role was filled after the first hug care and the final questionnaire 1–2 days before the possible discharge of the infant completed by mothers. In order to prevent the exchange of information between the three groups, first sampling of the control group, then the face-to-face education group, and then the virtual education group was done. The educational materials presented to the two intervention groups were also presented to the mothers of the control group after the end of the study.

### Ethical considerations

This study was conducted after being approved by the ethics committee of Babol University of Medical Sciences with code IR.MUBABOL.REC.1400.057. In addition, after giving the necessary explanations about the objectives of the research and how to work and implement the study to the mothers, informed consent was obtained from them. It should be noted that after the end of the

study, the educational materials presented to the two intervention groups were also presented to the mothers of the control group.

### Statistical analysis

In order to analyze the data, SPSS24 statistical software was used at a significance level of less than 0.05. Descriptive statistical tests were used to describe the demographic characteristics, as well as multiple linear regression tests were used to investigate the relationship between the maternal role adaptation score and education.

## Results

One hundred twenty-nine mothers with premature infants participated in this study. In total, 37.2% of mothers had a diploma level of education, 86% were housewives, and 60.5% of them had a good economic status. Total 86% of the deliveries were by cesarean section, 84.5% of the infants were admitted due to respiratory distress, and 85.3% of the pregnancies were desired. The mean age of mothers and some other demographic characteristics of mothers and infants are shown in Table 1.

Multiple linear regression analysis showed that there was no significant difference in the total score of maternal role adaptation immediately after the first hug care of mothers for whom the intervention of virtual education has been performed compared to the control group ( $P = 0.075$ ). Also, the total score of maternal role adaptation immediately after the first hug care of the people who received face-to-face education intervention was not significantly different compared to the control group ( $P = 0.444$ ). However, the comparison of the total score of adaptation of the maternal role at the time of discharge in the studied groups shows that this score in mothers for whom the virtual intervention was performed was six points higher compared to the control group, and this difference was significant ( $P = 0.000$ ). Also, this score in mothers for whom the face-to-face intervention was performed was about four points higher compared to the control group, and this difference was also significant ( $P = 0.005$ ) [Table 2].

## Discussion

The aim of this study was to investigate the effect of participation education on the adaptation of the maternal role in mothers with premature infants in NICU. This study showed that the adaptation score to the maternal role immediately after the first hug care in both intervention groups compared to the control group was not significantly different, but the comparison of the adaptation score to the maternal role had a significant difference in virtual and face-to-face education group compared to the control group at the time of the discharge of the infant. The absence of a significant difference in the maternal role adaptation score immediately after the first hug care of mothers in this study may be due to the fatigue of mothers after childbirth and their other unfavorable conditions. Similar to our study, Sohrabi *et al.*'s<sup>[26]</sup> study showed that there was a significant difference in the maternal role adaptation scores after the educational intervention between the control and intervention groups, and they suggested that the implementation of educational programs is a suitable solution to improve mothers' adaptation to the maternal role. According to Khalesi *et al.*,<sup>[27]</sup> motherhood is an innate process and is not unique to a certain culture, and it is a pleasant experience but sometimes, in premature births, there are problems in taking care of the infant and it is associated with challenges to adapt to maternal role. According to Heydarpour *et al.*'s<sup>[28]</sup> study, mothers' insufficient information about what happens after childbirth makes premature birth confusing for them. Lee *et al.*'s<sup>[29]</sup> study also showed that the lack of awareness of infant's care is the most important challenge for mothers. Therefore, in order to improve the adaptation of mothers to the maternal role, proper planning should be done through the implementation of educational interventions.

It should be noted that in our study, out of the six subscales of maternal role adaptation, only the growth subscale score was not significantly different before and after the educational intervention, but in the other five subscales including participation in care, self-efficacy, distant motherhood, uncertainty and interaction, and the scores before and after education had a significant difference.

**Table 1: Comparison of mean and standard deviation of demographic variables of the studied population by groups**

Groups Variables	Face to Face (n=43) Mean±S	Virtual (n=43) Mean±SD	Control (n=43) Mean±SD
Mother's age (y)	30.418±5.611	30.000±6.350	32.023±4.506
Gestational age (week)	31.348±2.869	30.697±3.136	32.930±1.638
Birth weight (g)	1684.186±471.715	1450.116±436.403	2210.000±2279.331
Weight at the time of discharge (g)	1777.093±313.184	1638.604±194.444	2155.581±2084.054
Number of children	1.604±0.728	1.790±0.638	1.860±0.804

**Table 2: The comparison of effect of virtual and face-to-face education group on dimensions of Maternal Role Adaptation Scale (Multiple linear Regression model)**

Dimensions of Maternal Role Adaptation Scale			$\beta^*$	P	Lower CI**	Upper CI
Participation in care	After intervention	Control		Reference Group (active control)		
		Virtual education	0.911	0.181	-0.43	2.253
		Face-to-face education	-0.968	0.156	-2.31	0.374
	Before discharge	Control		Reference Group (active control)		
		Virtual education	4.26	0.000	2.368	6.151
		Face-to-face education	3.054	0.002	1.161	4.947
Self-efficacy	After intervention	Control		Reference Group (active control)		
		Virtual education	0.062	0.866	-0.789	0.664
		Face-to-face education	0.848	0.024	-1.582	-0115
	Before discharge	Control		Reference Group (active control)		
		Virtual education	1.467	0.004	0.466	2.468
		Face-to-face education	0.876	0.089	-0.135	1.887
Distance mothering	After intervention	Control		Reference Group (active control)		
		Virtual education	0.617	0.011	0.142	1.091
		Face to face education	0.4	-0.096	-0.072	0.872
	Before discharge	Control		Reference Group (active control)		
		Virtual education	0.746	0.031	0.069	1.424
		Face-to-face education	0.867	0.012	0.192	1.542
Uncertainty	After intervention	Control		Reference Group (active control)		
		Virtual education	0.083	0.819	-0.633	0.798
		Face-to-face education	0.459	0.207	-2.58	1.176
	Before discharge	Control		Reference Group (active control)		
		Virtual education	-1.248	0.018	-2.274	-0.222
		Face-to-face education	-1.581	0.003	-2.609	-0.553
Interaction	After intervention	Control		Reference Group (active control)		
		Virtual education	0.095	0.636	-0.302	0.492
		Face-to-face education	-0.150	0.463	-0.552	0.253
	Before discharge	Control		Reference Group (active control)		
		Virtual education	0.676	0.04	0.033	1.32
		Face-to-face education	0.287	0.386	-0.366	0.94
Total (maternal role adaptation score)	After Intervention	Control		Reference Group (active control)		
		Virtual education	1.839	0.075	-0.19	3.868
		Face-to-face education	-0.791	0.444	-2.833	1.25
	Before discharge	Control		Reference Group (active control)		
		Virtual education	6.357	< 0.001	3.503	9.212
		Face-to-face education	4.176	0.005	1.303	7.049

\*Beta coefficients from multiple linear regression; \*\*Confidence Interval. \*\*Adjusted for total p1 gestational age, birth weight, economic status. CI (95% confidence interval)

The results of this study showed that face-to-face and virtual education had a significant effect on mothers' participation in infant care. Mother's participation in infant care, breastfeeding, or massage can reduce feelings of insecurity and guilt and increase attachment.<sup>[30]</sup> Breastfeeding establishes a close relationship between mother and infant and increases the attachment of mothers. Physical contact during breastfeeding increases the level of beta-endorphins of mother and infant and, thus, strengthens the interaction between mother and infant. Therefore, by encouraging and supporting mothers to breastfeed their infants, mothers experience the feeling of being important, which is effective in achieving the role of the mother and increases attachment.<sup>[31]</sup> Educational interventions for mothers with premature infants are effective on the

level of awareness of their performance in caring for these infants, so it is necessary to teach them some daily and necessary care at least during the time that mothers are at the bedside of their infants in NICU, so that by repeating these skills in the presence of ward nurses, mothers' performance will improve and their anxiety will decrease.<sup>[32]</sup>

The present study showed that the implementation of the educational program improves self-efficacy in mothers. Sohrabi *et al.*'s<sup>[26]</sup> study showed that providing education on how to take care of an infant increases the mother's self-esteem. On the other hand, Arzani *et al.*<sup>[33]</sup> showed that the education of mothers about infant care had no effect on the self-esteem of mothers of premature infants, but it increased the feeling of independence

and self-confidence and more satisfaction of mothers in fulfilling their maternal role. Seyed Fatemi *et al.* stated that family-oriented support leads to the improvement of mothers' self-efficacy and ultimately has a positive effect on mothers' mental health in the postpartum period. Also, the social support of the family and the healthcare team improves the self-efficacy of mothers; therefore, nurses who are in direct contact with mothers should identify mothers who are at risk and have maternal grief and prevent irreparable complications by strengthening their self-efficacy and providing them with support resources. High self-efficacy is very important for primiparous mothers because mothers who have more parental self-efficacy at the time of childbirth and in the early stages after it will have the ability to increase parenting skills and improve mental health for the first year after the birth of the infant.<sup>[34]</sup>

Another dimension of adapting to the maternal role is the distancing of mothers from their premature infants. This study showed that face-to-face and virtual educational measures had a significant effect on the distant motherhood dimension of compatibility with the maternal role. When an infant is hospitalized in the NICU away from the mother, in fact, this causes a lack of interaction between the mother and the infant and a feeling of alienation in the mother, and this has a negative effect on the mother's feelings.<sup>[35]</sup> There is also a significant relationship between how parents are present at the bedside of a hospitalized infant and the stress factors related to the appearance and behavior of the infant, and the amount of stress related to the appearance and behavior of the infant in parents who stay in the nursery room is more than those who interact with their infants.<sup>[36]</sup> In a study, it has been reported that the separation of the mother from the infant and being forced to spend the night at home causes a feeling of guilt and failure in performing the maternal role.<sup>[37]</sup> Usually, mothers want to be with their infants and have the possibility of direct care and contact with the infant at any time. According to Van Rooyen, accurate and understandable information to parents is necessary to overcome negative feelings of parents.<sup>[38]</sup> On the other hand, if the mother's confidence in infant care decreases, it will become a challenging stress to fulfill the maternal role.<sup>[39]</sup> Therefore, nursing managers should always try to employ interested and experienced nurses who have high clinical skills in the neonatal wards.

Our study showed that there is a significant difference in the uncertainty score of mothers after the implementation of the face-to-face and virtual educational intervention at the time of the infant's discharge compared to before the educational intervention. The concept of parental uncertainty is dynamic and cyclical in nature. Perhaps

the unique experience of parental uncertainty about the infant's illness starts from the birth of a premature infant and continues for months to years depending on the infant's health path, and may cause a disturbance in the development of the parental role. Nurses should try to understand parents' uncertainty. The transition to parenthood is an important developmental stage that may change as a result of uncertainty. Providing a healing environment, involving parents as partners in infant care, facilitating education, and providing therapeutic communication all help parents feel comfortable in their role as parents.<sup>[40]</sup> Empowering parents, providing real and targeted information along with training and practicing activities related to the maternal role, can reduce anxiety and increase confidence in the mother, as well as improve the level of interaction between the mother and the infant.<sup>[41]</sup> Therefore, in order to improve the participation of mothers in taking care of their infants, it is necessary to prepare training and empowerment programs.

Another result of this study was the positive effect of the implementation of the virtual education program on mother–infant interaction in adapting to the maternal role.<sup>[42]</sup> In Negarandeh *et al.*, mothers of infants hospitalized in the NICU talked about the impact of accepting the maternal role, changing their expectations and views about the maternal role and their relationship with their infant. Also, mothers emphasized the importance of interaction with nurses, especially the basic nature of communication, the importance of informing nurses in empowering mothers to take care of infants, and increasing their security in the role of parents.<sup>[43]</sup> According to Einion's statements, hug care and breastfeeding mother to infant increase the level of beta-endorphins of mother and infant and, thus, strengthens the interaction between mother and infant.<sup>[31]</sup> Therefore, it is necessary to consider educational programs in order to strengthen adaptation to the maternal role and improve the interaction between mother and infant.

### Limitation and recommendation

One of the strengths of this study was to investigate the effect of educational intervention on all aspects of the scale of adaptation to the maternal role for the first time. In the previous studies, all the dimensions of the maternal role adaptation scale were not examined at the same time. Also, in this study, the effect of different face-to-face and virtual education methods was compared. There are a few limitations to the study. First, the sample size was small, which limits the generalizability of the findings. Second, the study did not control for confounding variables, such as maternal age or income, which could potentially bias the results. Third, the study only assessed the effects of the educational intervention at the time of

discharge, so it is not clear whether the effects persisted over time.

## Conclusion

Based on the results of this study, the implementation of educational programs is a suitable solution to improve the adaptation of mothers to the maternal role. It is recommended to provide comprehensive educational programs to improve mothers' participation in infant care, self-efficacy, distance motherhood, confidence, and mother-infant interaction. Also, healthcare managers and planners should consider codified and regular educational programs to increase the ability of mothers, especially mothers of infants hospitalized in NICU, in order to adapt to the maternal role. Due to the lack of research in this field, in order to achieve more reliable and accurate results, there is a need for more research in this field.

## Acknowledgment

We thank the Vice-Chancellor for research and technology of Babol University of Medical Sciences for sponsoring this study, as well as the mothers participating in this study.

## Financial support and sponsorship

This work was funded by the research and technology Deputy of Babol University of Medical Sciences.

## Conflicts of interest

There are no conflicts of interest.

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