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The effect of the supportive care program based on Bandura's self-efficacy on stress and participation of the mothers of the neonates admitted to neonatal intensive care unit

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Abstract:

BACKGROUND: Maternal stress can affect both the neonate and the mother and deter them from participating in the care of preterm neonates. The purpose of the study was to determine the effect of the supportive care program (SCP) based on Bandura's self-efficacy on stress and participation of mothers of neonates admitted to the neonatal intensive care unit.

MATERIALS AND METHODS: This quasi-experimental study was performed in 2020 on 90 mothers of premature infants admitted to the NICU of Hajar Hospital in Shahrekord, Iran. First, the control group and then the experimental group were selected and a training package based on Bandura's self-efficacy theory was implemented for the intervention group. The research instruments in this study were the Heidari mothers stress questionnaire and Melnyk mother's participation questionnaire which was completed before and after the intervention. The analysis was performed based on SPSS (version 24) and Chi-square, independent *t*-test, and paired tests.

RESULTS: The results indicated that the demographic variables of mothers and neonatal characteristics of the two groups did not have significant differences except for the history of abortion and infertility in mothers and the weight of preterm neonates ($P < 0.05$). Mothers in the experimental group had less stress (t (88) = 29.50, $P < 0.001$) and more participation than the control group (t (88) = –27.18, $P < 0.001$) after the intervention.

CONCLUSIONS: Using self-efficacy-based SCP for maternal education besides routine education could positively affect the reduction of stress and the increase of maternal participation in caring for preterm neonates during hospitalization. Thus, using this supportive program is suggested for mothers with preterm neonates admitted to NICU.

Keywords:

Mother, NICU, participation, stress, social cognitive theory, training programs

Introduction

Annually, 15 million preterm neonates (before 37 full weeks of gestation) are born in the world, of whom more than 84% are born in 32–-36 weeks of pregnancy, 10% in 32–38 weeks and about 5% in the extremely preterm group (Less than 28 weeks). Six countries namely India, China, Nigeria, Pakistan, Indonesia, and the United States account for 50% of all preterm births throughout the world.[1] Iran has a high prevalence of preterm neonate with a premature birth rate of 12% per year.[2]

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The birth of a baby is a nice event turning into an unexpected event with the preterm birth surprising the parents or in some others makes them hesitant to visit their child at the NICU.[3] Mothers have more communication with premature babies and have more stress than fathers. Stress usually takes place following the mother's lack of awareness of effective care for the development of preterm neonates, lack of adequate knowledge in carrying out the parental role, and lack of adequate interaction with the preterm neonate.[4]

Stress hinders proper maternal functioning and causes them to withdraw from working with the treatment team. Given the effect of maternal role in the present and future lives of the children, ensuring their proper functioning is critical. The condition of the preterm neonate challenges the mother's self-efficacy more than ever.[5] Maternal self-efficacy is the idea of making the mother use her capabilities and skills to organize and perform tasks associated with her motherly role. The mother's belief in her effectiveness of managing the role and performing the parental duties is the key to Bandura's theory of self-efficacy.[6]

Clarification of the role of mothers in the care of preterm neonates is a key and prominent issue of parental involvement so that it causes a major barrier to participation if not explained. Information search is one way for mothers to participate in caring for their neonates. In spite of the interest of parents in NICU in learning about preterm neonate care, there are not enough tools to facilitate their education.[7] The educational concepts that a mother has to know about caring for a preterm neonate are so many. These concepts have to be transferred to them in a short time; hence, all the available facilities and opportunities have to be used to transfer these concepts and their participation. Mothers of preterm neonates need emotional, informational, instrumental, and spiritual support while feeling the greatest deficit in the informational and emotional aspects. However, discerning what kind of support is effective for parents is hard as the needs overlap. Thus, a wide range of maternal needs has to be considered and multidimensional support has to be provided.[8]

Bandura has recommended a number of information sources to promote participation that can help improve many mother-infant outcomes by basing on care program. Functional experience has a key role in adapting to new situations, preparing the ones considering themselves effective in a job to face their challenges. The parents have to feel effective in their ability to be a parent to feel successful and skilled in that roll.[9] Vicarious experiences for instance, seeing similar people with sustained effort could prove effective, but when the people are unsure of their abilities or become more sensitive to them when they have limited previous experience. Many studies using video and image viewing as well as role-playing have enhanced self-efficacy using the substitution experience strategy.[10-12] Verbal persuasion is the most prevalent stimulus. This support from professionals like nurses, medical staff, and other important people can have a key role in re-emphasizing the mother's abilities in promoting self-efficacy in the postpartum period. There is an evidence of a lack of perceived support from the treatment staff in the treatment of mothers during pregnancy and the first year after delivery.[11]

People's understanding of the physiological and emotional responses to a particular behavior is another source of self-efficacy training; so, the perceptions affect their judgment of their abilities. Emotional states and stress levels can all affect a mother's feelings about her personal abilities in a particular situation. Reducing stress by education affects maternal physical and emotional state increasing the maternal ability in dealing with the condition of the preterm neonate.[13,14]

NICU team has the responsibility of providing information to families. NICU nurses devote maximum time to providing care for preterm neonates.[15] The nurses' duty in the ward is to create the right conditions not only for the preterm neonates but also for their parents and help the mothers to accept the preterm neonates. As one of the basic roles of nurses is to provide support, their supportive care could have various advantages like the formation of an appropriate communication structure between the nurse and parents. In Iran, in spite of the high workload of nurses, the lack of forces and the involvement of nurses in routine care of preterm neonates have made the nurses get distanced from supporting mothers with educational programs whereas supporting mothers is like supporting preterm neonates.[16,17]

Materials and Methods

Study design and setting

The study was quasi-experimental (Grand code: 13999) with control and intervention groups and pre-test and post-test design. The purpose of the study was to specify the effect of an educational package based on self-efficacy theory on stress and participation of mothers of preterm neonates admitted to NICU of Hajar Hospital in Shahrekord, Iran in February to august 2020. Ninety mothers with the following criteria were selected using Consecutive sampling method. Based on Heidarzadeh *et al*.,[16] considering $\alpha = 0.05$, $\beta = 90\%$ and $\delta_1 = 14$, δ_2 was considered 41 people for each group and considering the possible drop rate of 10%, it increased to 90 people (45 mother per group).

The inclusion criteria were being the mother of a neonate admitted to the NICU with a fetal age of 28 to 37 (28 days before delivery) week and birth weight less than 2500 grams, being literate, no history of previous neonates admitted to NICU, no congenital neonate anomalies and major physical illnesses, no neurological defects like seizures, no history of psychiatric use or drug use by the mother. The exclusion criteria were neonate death sending the neonate to other centers for further treatment; mothers' unwillingness to continue participating in the study (stating the reason for unwillingness). A questionnaire with three parts (demographic information, maternal stress evaluation and maternal participation) was used to reach the research objectives.

Study participants and sampling

The first part of demographic information was the maternal characteristics: age, education, occupation, type of pregnancy, type of delivery, history of abortion, history of infertility, history of stillbirth, history of pregnancy, gestational age at birth. Infant characteristics were gender, age, weight, height, feeding method, feeding type and children birth order.

The second part of the stress questionnaire of Heidari *et al*. (2015)[17] had 26 questions (11 initial questions to measure stress, 13 questions aggravating factors and 2 final questions stress relieving factors) with seven options of Likert scoring, from zero "I have not experienced at all" to six "I have fully experienced." The first 11 questions of the questionnaire were used to evaluate maternal stress, and the next 15 questions were not used (because the first 11 questions were designed to measure mothers' stress). Parental stress scores were determined as [0–16.1] without stress, [16.1-33.1] low stress, [33.1–50.1] moderate stress and [50.1 or higher] severe stress. The Cronbach's alpha of the parental stress of preterm neonates by Heidari *et al*.[17] in Iran was 0.904. The Cronbach's alpha obtained in the study was 0.874.

The third part for the evaluation that was the maternal participation of neonates was carried out using a questionnaire with 25 items designed by Melnyk *et al*.[10] The two-option question score was from zero as the lowest and 25 as the highest score. The Cronbach's alpha of the questionnaire parental participation of the parents with hospitalized preterm neonates was obtained by Korahroudi *et al*. (2018)[18] in Iran as 0.90. The Cronbach's alpha obtained in the study was 0.846.

Procedure

In this study, first, the mothers of the control group and then the experimental group were selected. After 24 hours from the neonatal hospitalization in NICU, demographic information, stress, and participation questionnaires were obtained with the consent of mothers and on the seventh day of the intervention, the stress and participation questionnaire completed by someone other than the researcher. Pre-intervention questionnaires were filled in by mothers one hour prior to the mother was placed in the NICU ward. Both groups received routine training (i.e., breastfeeding training, kangaroo mother care, and eye screening training after discharge) and the following intervention was performed based on Bandura's theory of self-efficacy for the experimental group by the researcher after completing the questionnaires. Intervention training sessions were held 24 hours after hospitalization of the preterm neonates for 4 consecutive days for a maximum of 2 hours[19] based on the four stages of Bandura's self-efficacy theory in 4 sessions [Table 1]:

Functional experience (instrumental support): The first session was held 24 hours after the neonate admission

Table 1: Training sessions

Sessions	Educational contents	Educational method	Duration of training
First session (Functional stage)	Familiarity with the ward, adherence to maternal hygiene, characteristics of premature neonate and neonate needs of parents and teaching an understanding of neonate behavior to mothers and care and proximity behavior, and giving an educational booklet	Person-to-person training	Maximum 2 hours
Second session (Succession experience stage)	1. Caring behavior like training in positioning, neonate feeding, changing diapers 2. Behavioral care like kissing, looking, cuddling, neonate touch, and massage 3. Proximity care like hug care and close contact with the neonate	Face-to-face training and Q&A and simulation with replicas and using educational images	Maximum 2 hours
Third session (Verbal persuasion)	Continuing the training in a practical way to gain experience and use verbal persuasion	One-on-one instruction on neonate bedding and verbal encouragement	Maximum 2 hours
Fourth session (Attention to physiological and emotional reactions)	Expressing the feelings and questions about following the training	Person-to-person training and attention to the mother's reaction	Maximum 2 hours

to the NICU for a maximum of two hours of face-to-face training for each mother to reach performance gains. The session was carried out to get acquainted with the ward, characteristics and needs of preterm neonates, adherence to hygiene by mothers, training in understanding neonate behavior, caring behavior and cuddling care to mothers and providing an educational booklet at the end of the session. The educational booklet was collected using a review paper by Heidary *et al*.[19]

Succession (information support): The second session was to realize the experience of succession the day after the first session for a maximum of 2 hours using educational booklet images and replicas to teach the correct position of the preterm neonate, feeding the preterm neonate, changing diapers, behavioral care like kissing, looking, stroking, touching, and massaging the preterm neonate and close contact with it.

Verbal persuasion (emotional support): The third session was carried out to realize the verbal persuasion stage the day after the second session for a maximum of two hours of face-to-face training. At this stage, any activity performed correctly by the mother was encouraged by the researcher and corrective actions were taken if incorrect. The cause of anxiety was identified and, if possible, a solution was provided to the mothers to reduce anxiety.

Physiological and affective states: The fourth session was devoted to realizing the stage of attention to the emotional and physiological reactions of the day after the third session to the mother's worries and stress about the adequacy of nutrition, proper neonate touch, cuddling care and asking questions about adherence to education. On the seventh day of the intervention, the questionnaires were returned to the mothers.

Statistical analysis

The methods used in teaching and presenting booklets to mothers to promote information and knowledge, including face-to-face teaching, role-playing, indirect methods using pictures, lectures, questions and answers, conversation and to enhance mothers' skills, use repetition, and practice. Simple and clear expression was used to present the content to enhance verbal and written communication, so that it would be easier for mothers to understand. The mothers were asked to express their feelings to their husbands and nurses during the training by creating a warm and intimate environment as well as eye contact to enhance the support system for mothers. The data were entered into SPSS 24 after collection and then analyzed using central and dispersion indices, independent *t*-test, paired *t*-test and Chi-square. The significance level in the study was considered $P < 0.05$ for demographic information and $P < 0.001$ for other data.

Ethical statements

Informed consent was obtained from all mothers to participate in the study. The study was carried out as part of the master's thesis in pediatric nursing with the code of ethics (IR.SKUMS.REC.1398.233).

Results

The control and intervention groups each had 45 mothers of preterm neonates [Table 2]. All the mothers were housewives. 81 mothers with 90% difference with no significant history of infertility (X^2 (1) = 6.04, $P = 0.014$). There was a significant difference of 76 mothers with 84.4% no history of abortion (X^2 (1) =8.45, $P = 0.004$). 40 neonates (44.4%) the second child, and 30% the first child of the family. With a significant difference, the weight of 47 neonates (52.2%) was in the range from 2000 to 2500 g (X^2 (2) =12.67, $P = 0.002$). The finding revealed the emphasis on exclusive breastfeeding in Iranian hospitals. Not all mothers had a history of hospitalization in the intensive care unit.

The mean pre-test stress score of mothers in the control group was -0.55 ± 4.61 and decreased significantly −30.73 ± 5.07 in the intervention group [Table 3].

The mean score of the changes in maternal participation in the control group was 3.31 ± 2.78 and in the experimental 17.46 ± 2.10. However, the increase in participation in the experimental group was much greater compared to the control group [Table 4].

Discussion

Stress

The aim of this study was to investigate the effect of supportive care programs on stress and participation of mothers of premature infants admitted to the NICU. Maternal stress is high upon entering NICU making psychological support essential for NICU mothers, and the present study focused on the emotional support of preterm neonates in NICU too. In meta-analysis studies as a global perspective on parental stress in NICUstress that parental stress regarding neonate admission to the NICU is a worldwide health care issue.[20] Immediate and proper parental support after the birth of a high-risk baby has to be prioritized to reduce the parental stress. The results of the study aimed at determining the effect of educational package based on self-efficacy theory on stress and participation of mothers of preterm neonates and showed no significant differences between the control and intervention groups in pre-test, but the stress reduction rate in the intervention group was more that the control group in the post-test. Regarding this, in a study to examine the effect of maternal empowerment

Table 2: The characteristics of the mother and neonate (Chi-square test)

The characteristics of the mother	*n* (%)		*P**
	Control	Experimental	
The age of the mothers (years)			
15–25	5 (38.5)	8 (61.5)	0.32
26–35	29 (48.3)	31 (51.7)	
36–45	11 (64.7)	6 (35.3)	
The disposable income of the mothers (dollar)			
Less than 40	10 (55.6)	8 (44.4)	0.85
40 to 80	26 (51)	25 (49)	
80 to 120	7 (41.2)	10 (58.8)	
More than 120	2 (50)	2 (50)	
Educational status			
Elementary school	5 (55.6)	4 (44.4)	0.51
Middle school	6 (60)	4 (40)	
High-school diploma	22 (43.1)	29 (56.9)	
University (master's degree or higher)	12 (60)	8 (40)	
Pregnancy			
Unintended	9 (40.9)	14 (59.1)	0.35
Intended	36 (53.7)	31 (46.3)	
Route of delivery			
Normal delivery	8 (44.4)	10 (55.6)	0.59
Cesarean	37 (51.4)	35 (48.6)	
Gestational age (week)			
Less than 28	0	2 (100)	0.5
28-32	13 (38.2)	21 (61.8)	
32-37	32 (59.3)	22 (40.7)	
Stillbirth			
Yes	0	0	0.15
No	45	45	
History of pregnancy			
Yes	35 (53.8)	30 (46.2)	0.23
No	10 (40)	15 (60)	
Abortion			
Yes	12 (25.7)	2 (14.3)	0.04
No	33 (43.4)	43 (56.6)	
Infertility			
Yes	8 (8.89)	1 (11.1)	0.01
No	37 (45.7)	44 (54.3)	
The characteristics of the neonates			
Birth weight (kg)			
1000–1500	1 (10)	9 (90)	0.02
1500–2000	13 (39.4)	20 (60.6)	
2000–2500	31 (66)	16 (34)	
Infant gender			
Boy	30 (57.7)	22 (42.3)	0.08
Girl	15 (39.5)	23 (60.5)	
Feeding Type			
Breastfeeding	40 (50)	40 (50)	0.99
Formula	5 (50)	5 (50)	
Feeding method			
Oral	36 (55.4)	29 (44.6)	0.11
NGT (nasogastric tube)	9 (44.6)	16 (66.7)	

*P**<0.05

program on maternal stress in preterm neonates in NICU, Shin *et al*.[21] showed that the mean post-test scores in the intervention group were significantly lower than the control group. Similar to the present study, the booklet was used to educate mothers, but only two training sessions were held for mothers, follow-up after discharge was another intervention in this study.

In a study to examine the effectiveness of integrated family care in NICU using information provided on the Internet, O'Brien *et al*.[22] found that mothers in the experimental group experienced had less stress. However, in the present study, given the lack of access of all mothers to the necessary facilities, the educational materials were provided using booklets and oral explanations. One can state that trainings, both online and in writing, have had an effect on maternal stress-reducing its rate. In a study aimed at evaluating the effectiveness of structured nursing intervention program on maternal stress and maternal ability after admission of preterm neonates in NICU, Ong *et al*.[23] indicated that maternal stress in the control group before and after the test was insignificant. However, a significant difference was observed in the experimental group after the intervention. Additionally, a significant difference was found between the groups after the test. Stress can be influenced by different cultures. The mothers examined by Ong were similar to the present study and from the Muslim society, so one can state that the nature of the Malay Muslim community like the Iranians, have an appreciative attitude towards life and accept hardships as a blessing from God. This belief usually reduces stress and makes one happier in life. The proposed studies support our results in spite of using various intervention tools and methods. It seems that measuring stress in different contexts needs further study.

In contrast to the present study, in a study entitled feasibility of a guided participation discharge program for very preterm neonates in NICU, Lee *et al*.[24] found that the stress scores of the experimental group improved more than the control group although these differences were insignificant. The intervention was performed in three sessions in the NICU and follow-up phone calls within 72 hours after hospital discharge; with the difference that in the present study, four sessions were performed without follow-up. In a study entitled Parental Perception of Neonates, Parental Stress and Parental Education at the NICU, Ahn *et al*.[25] in America showed that in spite of the results of the present study, maternal stress did not decrease at the end. Kim *et al*. performed family-based interventions and stated that mothers of preterm neonates showed high stress after receiving educational materials.[26] The effectiveness of these studies may be enhanced by various teaching methods or by prolonging the intervention time. In this study, we tried to influence maternal stress by increasing NICU training sessions for mothers as well as the participation of other family members (fathers, grandmothers, etc.) as support.

Table 3: Mean stress score of mothers of preterm neonates in control and intervention groups in pre-and post-tests (paired *t*-test)

Group	Pre-test		Post-test		*t*	df	*P****
	M*	SD**	M	SD			
Control	46.93	7.73	46.38	7.81	-0.80	44	0.424
Intervention	54.47	1.42	23.73	4.59	-40.36	44	>0.001

M* mean. SD** standard deviation. ***P<0.001

Table 4: Mean score of participation of mothers of preterm neonates in the control and intervention groups in pre-and post-tests (paired *t*-test)

Group	Pre-test		Post-test		*t*	df	*P****
	M	SD	M*	SD**			
Control	6.24	2.94	9.56	2.12	7.97	44	>0.001
Intervention	3.64	1.55	21.11	1.21	55.62	44	>0.001

Participation

The study results indicated that the participation of mothers did not significantly differ prior to the intervention, but the rate of participation after the test increased in both groups. The difference was that the participation of the intervention group was higher than the control group. In a study entitled "Parental involvement in neonatal intensive care: prediction and its relationship with neurological behavior and developmental outcomes", Pineda *et al*.[27] showed that maternal involvement increased. In a study aimed at supporting and enhancing sensory experiences to encourage parental participation and satisfaction by Macedo, and in another aimed at determining maternal involvement in the care of preterm neonates by Zabihi *et al*., it was revealed that mothers want to participate in the care of their neonates. Nurses' support for mothers has increased their satisfaction with the participation in preterm neonates. In the present study, the role of nurses in supporting mothers was discussed in all stages of the intervention.[28,29]

In a study entitled, "Promoting family-centered care for neonates admitted to the NICU based on the health belief model," Estiri[30] in Iran showed that the mean score of mothers' participation before and after the test significantly differed. In a study aimed at determining the effect of empowerment program on the participation of preterm neonates admitted to the NICU, Sajadi *et al*.[31] showed no significant differences in maternal participation between the two groups before the intervention, but the participation of mothers in the experimental group was higher than the control group after the empowerment training program. In a study aimed at evaluating the effects of an empowerment program on the knowledge, self-efficacy, self-esteem, and attitude of mothers of preterm neonates, Parhiz *et al*.[32] in Iran showed that maternal participation had increased. Mothers were a source of information about caring for a person and knew who to consult in the event of a problem. This issue was also achieved in the present study by preparing an educational booklet, telephone counseling, and providing the researcher with a telephone number.

Studies show that when mothers are involved in the care of a preterm neonate,[33] and their sense of participation is strengthened and ability to care during hospitalization and after discharge increases resulting in weight gain, improved cognitive and behavioral status, improved respiratory function of preterm neonates, increased breastfeeding, and reduced maternal stress. Moreover, it reduces the length of hospital stay of preterm neonates, reducing the likelihood of acquiring nosocomial infections and the cost of caring.[34]

These results showed the significance of designing and implementing appropriate interventions for preterm neonates and their families. The nurses can have a significant role in relieving the maternal stress by establishing an individual relationship, and caring and active alongside a respectful relationship.[20]

The combination of four sources of information brings about the potential for self-efficacy to produce more desirable results. The individuals could lighten information from different sources and enhance their performance by seeing, hearing, and enhancing their emotions. Indeed, self-efficacy intervention is a multidimensional study that involves providing training, support, and persuasion.[9,34]

Limitation and recommendation

Among the notable limitations of this study, the data was collected from one center using convenience sampling, which may restrict generalizability. For this reason, first, the control group and then the intervention group were selected. One factor that should be addressed in future studies is the sample size.

It is suggested to conduct a clinical trial on mothers' stress levels after the intervention for a longer time. Educating both parents of premature babies and checking their stress levels and self-efficacy can be our suggestions for future studies.

The results of the study can be used as a practical plan to support mothers of premature babies, continuous training of nurses in the intensive care unit, and nursing and midwifery students. It is suggested that in future studies, the educational method based on self-efficacy should be used in the larger society, and the self-efficacy of mothers of premature babies should also be investigated.

Conclusion

This study demonstrated a positive effect in reducing overall maternal stress and improving NICU-related maternal abilities through educational and psychological approaches. This positive effect indicated the need of assigning a nurse specifically to assist with mothers' psychological needs during their premature infants' stay in the NICU. The purpose is to help mothers to accept their condition and increase their involvement in the care of premature infants.

Patient consent for publication

Not required.

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Conflicts of interest

There are no conflicts of interest.

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