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Comparing the Effect of Face-to-Face and App-Based Education on Mothers with Infants in Neonatal Intensive Care Unit

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ABSTRACT

Aims Supporting the family and educating the parents helps them in taking care of their infants. Recent developments in mobile technology have created many opportunities to enhance people's health and welfare. this study aimed to compare the educating effect of Nonahal application and face-to-face method on mothers with infants in Neonatal Intensive Care Unit.

Materials & Methods This quasi-experimental study with comparison group was done in the mothers of premature infants hospitalized at Neonatal Intensive Care Unit of Hajar Hospital in Shahrekord city, Iran, in 2020. The sample size was calculated 35 individuals in each group. Data collection tools were demographic information checklist, Avant questionnaire and weighing scale. Independent T, paired T, Fisher's exact, Chi-Square, and Pearson correlation coefficient tests were used to analyze the data in SPSS 18 software.

Findings There was no significant difference between the two groups of application and face-to-face training after the intervention in weight gain and attachment between mother and newborn and its subscales. Infants' weight increased significantly in both groups compare to before after intervention ($p<0.001$). However, attachment score and care subscale improved in app group ($p<0.05$).

Conclusion Using the Nonahal application can increase the mother-infant attachment score and with the increase in newborn weight, the total attachment score in the app-based education group increase. healthcare staff are the most frequent reason for not being vaccinated.

Keywords Mobile Applications; Attachment; Weight Gain; Intensive Care Units, Neonatal; Education

CITATION LINKS

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Introduction

Annually, about 13 million preterm births take place in the world [1]. In Iran, 5,000 infants are born every day, 12% of whom are premature [2]. When a premature infant is born, some hurdles including anxiety and uncertainty prevent developmental behavior [3]. Parents of premature infants experience a lot of stress and anxiety that has negative effects on infant parent attachment [4]. Wolke found that premature infants are at greater risk for weaker and more insecure attachments than full-term infants [5]. Attachment is a warm relationship between the mothers and infant that is satisfactory for both and facilitates mother-infant interaction [6]. Problems in mother-child interaction increase the risk of cognitive-psychological disorders in the child [7]. Nurses have to implement strategies to support maternal attachment while providing intensive care in wards [8].

Weight gain is one of the important issues in the growth and development of premature infants because lack of weight gain increases the mortality of premature infants [9]. Based on the statistics of premature infants and Neonatal Intensive Care Unit (NICU) admission [1, 2], premature mothers experience a lot of stress and anxiety, so it is necessary to design an appropriate intervention to reduce maternal stress and promote mother-infant interaction [10]. One of the ways to increase the baby's weight is to provide suitable strategies for mother-infant attachment [11].

Various strategies have been used such as kangaroo care; mother's participation and training in care to improve weight gain and promote attachment [12]. Education methods are divided into two categories, direct and indirect, which are indirect methods such as the use of technology and mobile phones, which are a cost-effective way to reduce personnel, but face-to-face education is one of the direct methods that require sufficient personnel [13].

The face-to-face teaching method is a traditional teaching method that has advantages and disadvantages, including its advantages, such as the interaction between the learner and the instructor, and its disadvantages, such as the continuous presence of the instructor [14].

Mobile Health [MHealth] is one of the key components of the national e-health system [15]. Using mobile in the provision of care is not only effective in reducing costs and easy access to care and its different aspects [16]. Nonahal application is a suitable educational platform for training parents of premature infants. It contains educational materials needed by parents to take care of infants. This software can be downloaded for free [17].

Weight gain and attachment of mother and infant are key indices of maternal and infant health and most of the studies carried out in Iran are concentrated on therapeutic problems of this group of infants or nursing of the premature infant itself [18]. According one study, the emphasis of the most public hospitals is on treating the infant's acute condition [19]. There are many applications used in the field of treatment and health promotion in developed countries [20]. Existing studies on the use of face-to-face teaching methods and e-health are contradictory [20-22].

Therefore, this study aimed to compare the educating effect of Nonahal application and face-to-face method on mothers with infants in NICU.

Materials and Methods

This quasi-experimental study with comparison group was done in the mothers of premature infants hospitalized at NICU of Hajar Hospital in Shahrekord city, Iran, in 2020.

Sampling

The sample size was calculated 35 individuals in each group based on the following formula (d=0.47):

$$n = \left(\frac{z_{1-\alpha/2} + z_{1-\beta}}{d}\right)^2$$

Totally 70 mothers with literacy and having a mobile phone with Android system whose infant had been hospitalized in NICU at least for 24 hours were selected. The mothers who had chronic mental or physical illnesses (having to be taken care of by a third party), participating in other educational programs at the same time, illness threatening their infant life, and with history of studying medicine and paramedical were excluded. The sampling of eligible mothers continued until the number of 35 people in two face-to-face training groups and 35 people in the application group was completed.

Data gathering

Data collection tools were demographic information checklist, Avant questionnaire and weighing scale.

Avant's attachment behavior checklist has 3 subscales [1-3]; emotional behaviors (staring, cuddling, kissing, talking, laughing, rocking), proximity behaviors (hugging without contact with the mother's torso, hugging when the mother is in close contact with the baby, and hugging when the arms are wrapped around the baby's body) and caring behaviors (patting the infant on its back to expel stomach air and changing diapers and infant clothes). The Avant scale included 14 observable attachment behaviors scored in 15 parts (15 one-minute columns) that were studied in two 30-second parts. In the former 30 seconds, the investigator observed mother's behaviors and in the latter part, the researcher documented each of attachment behaviors. Each assessed behavior was scored 0 or 1. Finally, the total score of the documented behaviors in 15 minutes was calculated. The maximum score was 15 for each behavior and 210 for the scale. The reliability of the scale was calculated 0.76 [23] and reported 0 .75 in our study.

Intervention

Free Nonahal application was developed by the Ministry of Health, Treatment and Medical Education [16] and due to the lack of shared of the application, the face-to-face education group was selected first. At first, 35 eligible mothers were selected in the face-to-face education group. Prior to the intervention with minimal clothing, the infant's weight was measured and recorded by the researcher. The study instruments were completed by the researcher with a question from the mother and the Avant checklist was completed imperceptibly by researcher observation during 15 minutes of mother-infant interaction before intervention. Then the same educations in Nonahal application (education the mother on feeding the premature infant, care in the ward and home and common infant problems, and dealing with stress) was performed in a 30-45-minute session by the researcher [23]. The application had the ability to show the number of hours used by the participant, and this showed that the participants used the application for an average of 3 hours. Desktop digital scale (SECA) was used for weighing neonates. Also, for the reliability of the scale, a neonate was weighed 5 times. Also, after every 10 times of weighing, the scale was re-evaluated with a weight of 100 grams. After one week of this intervention [22], the infants were weighed and the checklist for them was filed out again.

Data analysis

Data was entered into SPSS 18 software and the normality was checked with the Kolmogorov-Smirnov test. Independent T, paired T, Fisher's exact, Chi-Square, and Pearson correlation coefficient tests were used to analyze the data.

Findings

The age of the mothers in the face-to-face group was 28.89±5.87 years and in the app-based group was 31.34±6.50 years (p=0.102). The mean age (years) of the baby in the face-to-face group (7.89±6.35 years) was significantly lower (p=0.029) than the app-based group (11.37±6.73 years). The newborn weight in the face-to-face group was 702.94±88.22 grams and in the app-based group was 725.23±57.21 grams (p=0.401; Table 1).

In the app-based group, the mean score of the care subscales and the total score after the intervention were significantly higher than before the intervention (p<0.001). However, the difference before and after in the emotional and proximity subscales were not significant (p>0.05). In both groups, the mean score of weight of the infants were significantly higher than before the intervention (p<0.001). Although this difference in face-to-face training group was more than the application group, however, the difference between groups in before and after intervention was not significant (Table 2).

Table 1. Comparison of the frequency (the numbers in parentheses are percentage) of demographic characteristics between two groups before the intervention

Parameter	Face-to-face	App-based	p-value
Education			
Under high scholl diploma	2 (5.7)	7 (20)	0.088
High school diploma	31 (88.6)	28 (80)	Fisher's exact
Academic education	2 (5.7)	0 (0)	
Child gender			
Girl	19 (54.3)	15 (49.2)	0.339
Boy	16 (45.7)	20 (57.1)	Chi-square
Feeding method			
Gavage	13 (37.1)	23 (65.7)	0.05
Brest Feeding	16 (45.7)	10 (28.6)	Chi-square
Cap	6 (17.1)	2 (5.7)	
Hospitalization history			
Yes	4 (11.4)	14 (40)	0.006
No	31 (88.6)	21 (60)	Chi-square
Desire to pregnancy			
Wanted	25 (71.4)	18 (4.51)	0.086
Unwanted	10 (28.6)	17 (48.6)	Chi-square
Infertility			
Yes	9 (25.7)	12 (34.3)	0.434
No	26 (74.3)	23 (65.7)	Chi-square

Table 2. Comparison of the mean weight and attachment score and its subscales in two groups

Parameter	Face-to-face	App-based	p-Value**
Emotional subscale			
Before	14.63±8.78	14.97±11.81	0.891
After	15.83±6.16	17.26±6.42	0.345
Changes	-1.20±8.24	-2.29±12.69	0.672
p-Value*	0.395	0.294	
Proximity subscale			
Before	19.91±12.11	19.80±10.88	0.967
After	20.83±7.82	21.83±10.53	0.653
Changes	-0.91±14.28	-2.03±11.06	0.716
p-Value*	0.707	0.286	
Care subscale			
Before	17.49±11.25	10.46±9.48	0.006
After	20.71±8.49	18.37±7.05	0.213
Changes	-3.23±13.82	-7.91±10.94	0.120
p-Value*	0.176	≤0.001	
Attachment score			
Before	52.03±15.90	45.23±19.02	0.109
After	57.37±13.86	57.46±14.68	0.980
Changes	-5.34±20.95	-12.23±18.37	0.148
p-Value*	0.141	≤0.001	
Weight			
Before	2242.86±702.94	2098.57±725.23	0.401
After	2568.86±722.52	2232±724.72	0.446
Changes	-326.00±74.33	-134.00±82.11	0.670
p-Value*	≤0.001	≤0.001	

*Paired T-test; **Independent T-test

There was no significant relationship between weight and attachment scores in the face-to-face group (p>0.05). In the app-based group, a significant positive relationship was observed between weight and total attachment score (p<0.01). With increasing weight in the infant, the total attachment score increased (Table 3).

Table 3. The correlation (Pearson coefficient) between infant weight and attachment score and its subscale in the study groups after the intervention

Parameters	Face-to-face	App-based
Emotional subscale	r=0.71; p=0.685	r=0.305; p=0.075
Proximity subscale	r=-0.005; p=0.976	r=-0.261; p=0.129
Care subscale	r=0.024; p=0.893	r=0.233; p=0.179
Attachment subscale	r=0.043; p=0.806	r=0.432; p=0.009

Discussion

The present study was conducted with the aim of comparing the effect of Nonahal application on newborn weight gain and mother-infant attachment with face-to-face education at NICU. The results of the present study indicated that the application intervention improved attachment total score and caring subscale attachment. Meanwhile, there was a significant relationship between weight gain and total attachment score in the application group. However, after interventions, there were no significant differences between groups in all study variables including Attachment of the parents with newborn and their subscales and weight gain.

Although, the weight gain improved in the face-to-face group more than application group, however, there was no significant difference between two groups. Moreover, the weight gain increased after intervention compare to before in two groups significantly. Regarding this, in his review paper, Fadden states that educational strategies that rely mainly on face-to-face support will be more successful for the women using exclusive breastfeeding [24]. However, Ke *et al.* indicated that family support in the face-to-face education group up to 6 months after birth was significantly higher than the control group, bringing about an increase in exclusive breastfeeding [25]. The reason for the effectiveness of face-to-face teaching method could be the presence of the educator and his interaction with mothers. Overall, educational methods where the mothers are in direct and constant contact with health care providers and mothers themselves are more involved in the education process have a greater effect on successful breastfeeding [9]. However, in the present study only weight gain improved in the face-to-face group.

The study results indicated that using the app and face to face education can increase mother-infant attachment, although this increasement in face-to-face education group was not significant compare to before intervention and app intervention. Litterbach indicated that the mobile-based app increases confidence in nutrition decisions. For breastfeeding mothers, this is reached by helping them overcome doubts about the breast milk value. The participants argued that the app is readily available on a 24-hour basis, which helps reinforce information received from health professionals, or encourage them to look for more help if needed without judging infant nutrition [26].

The results of our study showed that the app intervention improved the attachment between mother and newborn and the caring subscale of attachment. It can be used to teach care to mothers of premature infants. In the present study, there was the relationship between weight gain and mother-infant attachment score in the app group, and the total attachment score increased with increase in infant weight. Similar to the present study, Franck *et al.* in America found that using the app could help parents participate in the NICU [27]. Concerning this, a study in Australia revealed that combining two methods of face-to-face education and application can be effective in physiotherapy of preterm infant [28]. Although, in the present study, there were no significance difference in weight gain, attachment between mother and infant and attachments' subscales between groups, however, app intervention improved attachment and caring subscale while there was no improvement in these indicators in the face-to-face intervention. Moreover, in the application group, a significant correlation was observed between weight and total attachment score. The findings of a study in Turkey indicated that most mothers using this app fed their infants only with breast milk and felt adequate to breastfeed, and the symptoms of depression in mothers using the telephone support app was less than the control group mothers. Nonetheless, it was found that the program alone is not enough to reduce anxiety and depressive symptoms [29]. The results of a study in Sweden showed that the application is used to transport the infant from the hospital to the home in the neonatal intensive care unit, but the researchers said that mothers should play a role in designing the application [30].

Because of non-permanent presence of the mother in the NICU and the busy schedule of nurses in these units to provide face-to-face education with mothers and meet various levels of mothers' expectations and their satisfaction, providing information and education based on cyberspace without any time limit and place can be helpful here [31]. Belonging to a virtual community, beyond the hospital reassure parents that they are not alone and that they are supported by other parents and health care professionals. The developments in technology and using social networks are an incentive for health care and investment in information technology development to provide accessible and efficient care [32]. Using tele-care is suggested for care teams in countries with limited resources [33]. However, a researcher stated that the implementation of tele-health services calls for different economic, organizational and technological resources [34].

Although the results of our study showed that face-to-face training has a greater effect on weight gain, however, this difference was not significant and there was no significant correlation between weight and total attachment score. However, this increase in weight gain in preterm infants with face-to-face education intervention is valuable.

According to our results and the advantages of the two methods, it is recommended that managers and nurses use both methods to promote the weight gain of infants and mother-infant attachment.

One of the limitations of the study was the existence

of one NICU where the researcher first completed the face-to-face intervention group and then the app intervention group. Of course, due to the fact that the present study did not have a control group, and on the other hand, due to the presence of a NICU for newborns, the randomization was not done in the face-to-face and application group. It is suggested that more studies should be done with a control group and random allocation of subjects in study groups in longer period.

Conclusion

Using the Nonahal application can increase the mother-infant attachment score and with the increase in newborn weight, the total attachment score in the app-based education group increase.

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Ethical Permissions: The study has been approved by the ethics committee of Shahrekord University of Medical Sciences (Code: IR.SKUMS.REC.1399.090). All participants were reassured that their participation in the study was optional and that they could leave the study at any time. Participants were also assured that all their information would remain confidential. Before the beginning of the study, informed written consent was obtained from the participants.

Conflicts of Interests: There was no conflicts of interest.

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