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Original Article

The effect of home-based phototherapy on parental stress in mothers of infants with neonatal jaundice

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ABSTRACT

Background: Hospitalization of an infant in the first days following birth is one of the most stressful events in the life of the parents of any parent. More than half of the infants suffer from neonatal jaundice, and are referred to health centers by their parents for treatment. In wake of this, the present study aims to examine the effect of home-based phototherapy on parental stress in mothers of infants with neonatal jaundice.

Methods: This is a clinical trial carried out on 64 infants with hyperbilirubinemia referred to health centers of Isfahan in 2017. The samples were randomly divided into two experimental (home-based phototherapy) and control (hospital-based phototherapy) groups. The instruments consisted of the training checklist, demographic characteristics of the mother and the parental stress scale, which was given to the parents at two stages, and the data were recorded on a daily basis and at the end of the intervention.

Results: The results of this study showed that the mean score of maternal stress before intervention was not significantly different between the two groups ($P < 0.008$), but after intervention, the mean score of maternal stress in the home-based phototherapy group (56.51) was significantly lower than that of the hospital-based phototherapy group (65.23) ($P < 0.001$).

Conclusion: According to the findings of this research, home-based phototherapy can be considered as a suitable strategy for treatment and prevention of infant admission by reducing parental stress.

1. Introduction

Neonatal period is uniquely characterized by the inseparable relationship between the mother and her infant (Abuaish et al., 2018). However, the hospitalization of infants and children marks one of the most stressful events in a parent's life, and can considerably affect every aspect of it (Borji et al., 2018a, 2018b; Lan et al., 2018). Hospitalization in the first days following birth for phototherapy can give rise to issues such as hospital infections, separation of the mother from her baby, problems associated with parent's commute to the hospital, high hospitalization costs, hospital bed occupancy and constraintsregarding the time and frequency of breastfeeding due to unsuitable conditions and the partial stay of the mother with her infant (Boskabadi et al., 2015; Motaghi et al., 2017).

Proper management of the diagnosis, treatment and follow-up of jaundice has always been one of the major challenges in neonatal medicine. The importance of neonatal jaundice treatment is not only due to the economic, social and psychological consequences of the infant's hospitalization, but because of permanent complications that kernicterus creates in the nervous system of the infant and its high mortality rate. One of the prevalent neonatal jaundice therapies is phototherapy. Using light energy, insoluble and indirect bilirubin are turned into direct and soluble bilirubin, which can be easily discharged through the liver and urine (Babaei et al., 2011).

Nurses can help improve the health of patients through appropriate nursing interventions (Namnabati et al., 2017). One of the most important of these interventions is provision of nursing care at home (Borji, 2017; Snook, 2017; Waite and Taylor, 2016). Nowadays, home-based phototherapy, due to the importance of non-separation of mother and infant and exorbitant medical costs, has gained increasing popularity. The main feature of home-based phototherapy is that the mother and her infant are not separated (Walls et al., 2004).

The presence of the mother and her active role in taking care of the newborn can reduce anxiety, strengthen parental identity and increase parent's sense of capability. A major source of tension for parents is the undermining of their parental role in taking care of a baby (Kadivar

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et al., 2017). In these cases, parents, especially mothers, may be accused of failure to fulfill their obligations about their baby by the society. Also, following infant's hospitalization, parents usually stay with their baby throughout the treatment, and their natural needs such as eating, resting, hygiene, along with psychological, economic and other factors are often ignored during their stay (Jebrayili and Rasooli, 2009). In home-based phototherapy, the mother should be capable of breastfeeding and taking care of her baby (Maisels and McDonagh, 2008). Home-based phototherapy seems to be especially important in terms of mother's opportunity for breastfeeding, the presence of supporting people to assist the mother in all matters such as infant feeding and care, as well as parental involvement in the care of the baby (Slusher et al., 2017).

Nursing home care is one of the most important roles of nurses (Unroe et al., 2018; Onder et al., 2018; Dale and Helton, 2018). By informing parents and raising their level of awareness about home-based phototherapy, this method could be considered as an alternative to hospital interventions. Home-based phototherapy is commonly practiced in Iran, though in some cases, it is not even recommended by physicians, especially in educational and academic centers, and they have a preference for infant hospitalization. It seems that their concerns are motivated by the lack of appropriate and necessary training in the society (Hemati et al., 2016), so that some people without any expertise in this field, including receptionists at doctor offices or salespeople at medical supply stores, do not adhere tothe basics of training, therefore raising the level of parental stress and the possibility of phototherapy complications. Therefore, it is necessary to provide suitable training and supervision by a specialist on how to perform home-based phototherapy for eligible infants. Accordingly, the present study was undertaken to investigate the effect of home-based phototherapy on parental stress in mothers of infants with neonatal jaundice.

2. Materials

In this clinical trial, which was undertaken in 2017, the subjects were randomly assigned to experimental and control groups. The inclusion criteria of the study were based on the standards of the American Academy of Pediatrics (e.g. mature infants, physician's confirmation of phototherapy, indirect bilirubin greater than 14 and less than 18 mg/day, more than 3 days of age, over 2500 g weight, negative Coombs test, no increase in direct bilirubin and the absence of risk factors like lethargy, rejection of breastfeeding, fever, blood type incompatibility of the mother and baby, polycythemia, favism, anemia, and history of severe newborn jaundice in the family).

The exclusion criteria were the parent's unwillingness to continue the study and occurrence of a stressful event during the study for parents. For the purpose of the study, after obtaining permission from Isfahan University of Medical Sciences, the research objectives were explained to parents and informed consents were obtained. Then, by referring to health centers, the subjects were identified and randomly assigned to experimental (home phototherapy) and control (hospital-based phototherapy) groups.

To do so, odd and even cards were presented to parents. If a mother chose an odd card, she was assigned to the experimental group and if an even card was selected, she was allocated to the control group.

In this study, research instruments included maternal demographics, parental stress scale, and self-administered checklist for training phototherapy care. Parental Stress Scale consisted of 17 items, adapted by Heidari, Hassanpour and Fouladifrom scales such as PSS NICU and Daily Hassles Scale and DOSS-21 with a Cronbach's alpha of 0.87 on a 7-point Likert scale (from 0 to 6). The total score of the scale was calculated by aggregating the score of each item so that the total score range was between 0 and 120.

A score in the range of 0–34 suggests that parents have experienced a low level of stress. A score of 35–68 indicates a moderate level of parental stress and a score of 69–102 reveals high level of parental stress (Heidari and Hasanpour, 2014). This 18-itemchecklist of phototherapy was designed using valid scientific resources and websites related to neonatal jaundice, the possible treatments of neonatal jaundice and consultations with several faculty members of nursing and neonatal specialty.

In this study, standard phototherapy device was used. For this purpose, a conventional phototherapy device was transferred to the infant's home and installed in a proper place. The total bilirubin of the infant was measured on a daily basis and decision about the continuation/cessation of treatment or hospitalization of infant was made based on the examination and results of bilirubin test.

The researcher was in direct contact with the parents, and information about the demographics of infants and mothers, as well as the parental stress scale was collected for further analysis.

For each parent, a nursing care session of about 45–60 min was held at home, during which training about how to perform phototherapy and important caring points to observe were given to parents. More sessions were organized upon the parent's request. It should be noted that for follow-up, parents were contacted and their questions were answered. After the intervention, the questionnaires were completed by mothers and the results were compared with the baseline. The collected data were entered in SPSS 21 software and analyzed using descriptive statistics (mean and standard deviation) and inferential statistical tests (independent t and ANOVA).

Ethical considerations in this research involved obtaining informed consent from the subjects, assigning subjects randomly tothe experimental and control groups, not charging the patient, observing subjects' right of withdrawal from the study at any time and obtaining the code of ethics (No. 396706) from Isfahan University of Medical Sciences.

3. Results

A total of 64 full term and healthy infants and their parents were enrolled in this study and were randomly assigned to experimental (home-based phototherapy) and control (hospital-based phototherapy) groups. Statistical tests showed that the mean age of mothers, frequency distribution of professions, blood type, type of infant birth, infant's nutrition, mother's education level, infant's birth rate and parent's attitude towards treatment at hospital or home were not significantly different between the two groups ($p > 0.05$). Independent *t*-test revealed that there was no significant difference in the mean total bilirubin of infants between the two groups in any of the three times ($P < 0.05$) (Table 1).

Also, independent *t*-test showed that the mean score of maternal stress before treatment was no significantly different between the two groups ($P > 0.05$) (Table 2).

After intervention, it was significantly lower in the home-based phototherapy group ($P < 0.05$) (Table 3).

Moreover, covariance analysis showed that after moderating the maternal stress score before treatment in the two groups, the mean post-treatment stress score in the home-based group of phototherapy was significantly lower than that of the hospital-based phototherapy group ($P < 0.05$). Frequency distribution of maternal stress before and after treatment in both home-based and hospital-based phototherapy

Table 1
The mean total bilirubin of infants (mg) in two groups at different times.

Time	Place					
	Home		Hospital		Independent *t*-test	
	Mean	SD	Mean	SD	t	P
Day 1 (admission)	16.02	1.18	16.64	1.47	1.31	0.19
Day 2	12.24	1.67	12.43	2.48	0.37	0.71
Day 3	10.25	0.40	10.08	1.07	0.64	0.53

Table 2
Mean score of maternal stress before and after treatment in two groups.

Time	Place						
	Home		Hospital		Independent *t*-test		Covariance analysis
	Mean	SD	Mean	SD	t	P	p-value
Before intervention	71.50	15.57	75.47	12.30	1.13	0.26	–
After intervention	56.51	11.69	65.23	13.90	2.72	0.009	0.008

Table 3
Mean score of maternal stress in each of the two groups before and after treatment.

Group	Before treatment		After treatment		Paired *t*-test	
	Mean	SD	Mean	SD	t	P
Day 1 (admission) home	71.50	15.57	56.51	11.69	9.80	> 0.001
Day 2 hospital	75.47	12.30	65.23	13.90	5.30	0.001

Table 4
Frequency distribution of maternal stress before and after treatment in two groups.

Time	Place						
		Home		Hospital		Independent *t*-test	
		No	%	No	%	Z	P
Before intervention	Low	1	3.1	0	0	0.73	0.35
	Moderate	11	34.4	11	34.4		
	High	20	62.5	21	65.6		
After intervention	Low	1	3.1	0	0	0.006	2.75
	Moderate	28	87.5	20	62.5		
	High	3	9.4	12	37.5		

groups is shown in Table 4.

4. Discussion

Infant health is very important (Tarjoman et al., 2018). In this study, the effect of home-based and hospital-based phototherapy on parental stress among mothers of infants with neonatal jaundice was studied.

Based on the results, the mean total bilirubin in both groups had dropped significantly and this reduction was similar in the two groups. Thus, it could be concluded that these two methods had a similar effect on lowering bilirubin level. In the same vein, Snook et al. showed that home-based therapy could effectively reduce bilirubin levels, although further studies are required to determine the optimal conditions for reducing bilirubin in home-based phototherapy (Snook, 2017). In the study of Khatami, the rate of daily reduction of total bilirubin in both groups of infants was the same (Khatami and Soltani, 2007). In this study, the daily reduction of daily bilirubin was 3.78 mg/dl in both groups and there was no statistically significant difference in reduction of total serum bilirubin between the two groups. In addition, studies on the effect of home-based phototherapy have suggested that it can be considered as a good alternative to interventions in hospitals (Eggert et al., 1985; Slater and Brewer, 1984; Jackson, 2000; Rogerson et al., 1986).

In studies over the past decades, it has been reported that despite the guidelines provided by the American Academy of Pediatrics for neonatal phototherapy, only half of infants whose level of hyperbilirubinemia is in the danger zone and are in need of phototherapy are treated.

In this study, a main reason for the untimely treatment of neonatal hyperbilirubinemia was the parental fear of infant's hospitalization (Atkinson et al., 2003), as hospitalization is usually associated with parental stress and constraintsregarding the time and frequency of breastfeeding by the mother due to the unsuitable conditions (Boskabadi et al., 2015). This is while home-based phototherapy, in addition to fostering the attachment of mother and baby, does not interfere with the treatment.

The results of this study revealed that most of the mothers in both groups had a high level of stress before the treatment, but after the intervention, the stress of mothers in the home-based phototherapy group had dropped from high to moderate level.

In the study of Hannon on the mothers of infant with neonatal jaundice who underwent phototherapy in the hospital, it was found that mothers experienced considerable stress about the hospitalization of their baby and inability to stay with and breastfeed their baby (Hannon et al., 2001).

In this study, mothers in the experimental group experienced a high level of stress. However, after the intervention, the mean stress of mothers in the experimental group was significantly decreased, which could be due to the comfort induced as a result of mother's peace of mind and presence of supporting people at home.

In another study by Adhikari, it was reported that parental training based on their needs and underlining the parental role reduced stress in parents of infants admitted to the neonatal intensive care unit (Adhikari et al., 2017).

In the present study, the researcher, after providing parents with the phototherapy care-training checklist, was available to answer the parents' questions 24 h a day. The sense of comfort induced by access to a counselor, who was available to answer all questions and address the concerns of parents, was effective in lowering the level of parental stress, especially in mothers.

The crisis resulting from infant's hospitalization can cause intense stress in parents, and considering the close relationship between nurses and the infant's mothers, they can play a crucial role in reducing maternal stress (Mohammadi et al., 2013). During the course of the infant's treatment, parents need full support from the caregivers (Bouet et al., 2012). Preparing a mother for this situation can help empower the mother and reinforce her self-esteem, enabling her to take care of the baby at home and provide the optimal conditions for the growth and development of the baby (Namnabati et al., 2012).

In a study by Jebreeli, it was concluded that the constant presence of parents and their active role in childcare could reduce anxiety, strengthen parental identity and increase their sense of ability (Jebrayili and Rasooli, 2009). In Eggert and Khatami's study, 94% of parents were satisfied with the results of phototherapy at home (Khatami and Soltani, 2007; Eggert et al., 1985). Also, in Jackson's study on home-based baby care programs, although parents had to bear numerous responsibilities, they reported high satisfaction with these programs (Jackson, 2000). In this study, 93.7% of the cases were able to successfully complete phototherapy at home.

One of the limitations of this study was that physicians, especially in academic circles, were unwilling to recommend home-based phototherapy despite the guidelines of the American Academy of Pediatrics. Therefore, it was difficult to win their cooperation for this research, but

after explaining the research goals and the benefits of home care, this problem was largely resolved. One of the main contributions of this research lies in its presentation of a new attitude towards nursing care at home and its importance in promoting the health of the mother and the baby.

5. Conclusion

Given the similar effect of the two methods on reducing total bilirubin and greater parental satisfaction, it can be contended that home-based phototherapy, if accompanied by home-based care training, could be used as a suitable therapeutic procedure for full-term and healthy infants. Furthermore, in this type of treatment, parents endure a lower level of stress due to greater satisfaction. As such, it is recommended that Iranian Academy of Pediatrics draft coherent guidelines about home-based phototherapy and related training to be observed by health centers.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jnn.2018.09.001.

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