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Effect of Supportive Positioning on COMFORT Scale Scores in Preterm Newborns

Destekleyici Konumlandırmanın Preterm Yenidoğanlarda COMFORT Ölçek Puanlarına Etkisi

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ABSTRACT

Aim: Premature babies are vulnerable to environmental stress factors mostly in the first weeks of life. During this time, supportive positioning, especially used all-around the baby, makes them feel better as if they are in utero. The aim of the study was to evaluate the effect of supportive positioning on weight gain, vital signs, feeding intolerance, duration of ventilation, duration of hospitalization and comfort scale scores of the premature babies in neonatal intensive care unit.

Material and Methods: A total of 50 premature infants were recruited into the study randomly, 25 in the supported group and 25 in the control group. The babies in the supported group were nested with soft blankets and pillows as position material. There was no nesting or swaddling in the control group. Demographic findings, comfort scale scores, heart rate, respiratory rate and oxygen saturation of infants were recorded and compared.

Results: Mean gestational weeks and birth weights of the supported and control groups were 32.9±2.5 (26-36) vs. 32.7±2.8 (26-36) weeks (p=0.791) and 1554±492 (680-2380) vs. 1772±439 (590-2375) g (p=0.105), respectively. Weight gain, ventilator days and days of hospitalization were similar in groups, however mean oxygen saturation and comfort scale scores showing deep sedation were higher in the supported group (p=0,024, p<0,001, respectively) after daily care.

Conclusion: Although supportive positioning does not have an effect on duration of hospitalization, ventilation and weight gain, it has a positive effect on mean oxygen saturation and comfort scale scores of premature infants and recommended in newborn care.

Keywords: Nursing care; intensive care units; neonatal; preterm birth; patient comfort.

ÖZ

Amaç: Prematüre bebekler, çevresel stres faktörlerine karşı özellikle yaşamın ilk haftalarında daha savunmasızdır. Bu süre zarfında, özellikle bebeklerin etrafında kullanılan destekleyici konumlandırma, kendilerini uterus içinde olduğu gibi daha iyi hissetmelerini sağlar. Bu çalışmanın amacı, yenidoğan yoğun bakım ünitesinde destekleyici konumlandırmanın; prematüre bebeklerin kilo alımı, yaşamsal belirtileri, beslenme intoleransları, ventilasyon süreleri, hastanede kalış süreleri ve konfor ölçeği puanları üzerine etkisini değerlendirmektir.

Gereç ve Yöntemler: Çalışmaya rastgele olarak seçilen, 25'i desteklenen grupta ve 25'i kontrol grubunda olmak üzere toplam 50 prematüre bebek dahil edildi. Desteklenen gruptaki bebekler pozisyon malzemesi olarak yumuşak örtüler ve yastıklarla yuvalandı. Kontrol grubunda yuvalama ya da kundaklama yoktu. Bebeklerin demografik özellikleri, konfor ölçeği skorları, kalp hızı, solunum hızı ve oksijen satürasyonu kaydedildi ve karşılaştırıldı.

Bulgular: Desteklenen grup ve kontrol grubunun sırasıyla ortalama gestasyonel haftaları 32,9±2,5 (26-36) ve 32,7±2,8 (26-36) hafta (p=0,791), ortalama doğum ağırlıkları ise 1554±492 (680-2380) ve 1772±439 (590-2375) gramdı (p=0,105). Kilo alımı, ventilatör günleri ve hastanede kalış günleri gruplar arasında benzerdi, ancak ortalama oksijen satürasyonu ve derin sedasyon gösteren konfor ölçeği skorları desteklenen grupta günlük bakım sonrası daha yüksekti (sırasıyla; p=0,024, p<0,001).

Sonuç: Destekleyici konumlandırmanın hastanede kalış süresi, ventilasyon ve kilo alımı üzerine etkisi olmamakla birlikte prematüre bebeklerin ortalama oksijen satürasyonu ve konfor ölçeği puanları üzerinde olumlu etkisi vardır ve yenidoğan bakımında önerilmektedir.

Anahtar kelimeler: Hemşirelik bakımı; yoğun bakım üniteleri; yenidoğan; erken doğum; hasta konforu.

INTRODUCTION

High level of comfort in premature babies include that they are exposed to less stress and means that they are more stable in terms of behavioral (agitation, alertness, crying, facial expression, and muscle tone) and physiological (heart ratio) situations (1). Especially in premature babies younger than 32 weeks, the organization of sleep and wakefulness is limited since the central nervous system is not yet mature. For this reason, it is very important to provide and maintain their comfort (2,3).

As premature babies are more hypotonic compared to term babies, they do not have adequate muscle strength and tone at birth. This often causes them to maintain their bodies in extended positions. Neonatal intensive care unit (NICU) professionals attempt to encourage flexed position using various methods. Care positioning such as swaddling the infant in a blanket, as well as using blankets and cloth rolls to create boundaries or a nest around the infant, facilitated tucking or regular changes in positioning have been shown to positively impact neuromuscular development, improve motor performance and postural development and improve movement across midline (4). Swaddling/tucking was found to be effective in reducing pain in premature infants (5).

In recent years, a series of observational tools have been developed to measure stress and pain (6,7). The comfort scale which is well-known multidimensional tool, is originally developed as a continuous measure of distress, sedation and pain in nonverbal pediatric patients aged from birth to 18 years (8,9).

In the present study we investigated the effect of supportive positions swaddling and nesting on weight gain, oxygen saturation, comfort scale scores, days of ventilation and days of hospitalization in preterm babies in NICU.

MATERIAL AND METHODS

This study was conducted in NICU of Çukurova University, Balcali Research and Training Hospital. The sample size per group to find two unit difference between groups was calculated based on information on the comfort scale scores of the newborns in the standard position found in the literature were found as 13.73±2.77 (10). At standard settings, α=0.05, β=0.20 (power=80%) and assuming the standard deviation=3, the sample size was calculated as 22 observations per group. We expected 20 percent loss of follow due to any reason and decided to randomize 54 infants. Small envelopes with information on group were placed in a box and randomization was done for every new infant, which met the inclusion criteria. At the end of study, we included one more infant to the supported group and closed our randomization (28 cases in supported group and 27 cases in control group). Premature babies (gestational age ≤36 weeks 6 days) who did not take analgesic, muscle relaxant or inotropic medications, did not have a serious neurological disease, had spontaneous breathing, were born in our hospital, and whose parents gave their consent to participate voluntarily were included in the study. Infants with TORCH infections, chromosomal abnormalities, major congenital abnormalities and cardiac defects, metabolic diseases, hydropic babies, outborn babies, and infants without parent consent were excluded. The babies in supportive group had nest around them. Soft blankets and pillows were used as position materials. These babies were also loosely swaddled with a blanket stimulating natural fetal position that facilitates flexion, hand-to-mouth positions, and containment of extremities. Body temperature was followed in incubators at baby mode in both groups. The control group had no nest or swaddling. All of the babies in this study had rolling pillow under shoulders to keep semi-extension of the head and were supported in left, right, prone or supine positions. Positions of the babies have been changed every 3 hour and the head side of the incubator was kept at 30°.

Demographic findings, surfactant use, ventilator use, oxygen use, comfort scale scores, weight gain, nosocomial infection rate, feeding intolerance, heart and respiratory rate and oxygen saturations were recorded. Comfort scale scores, heart rate, respiratory rate and oxygen saturation of infants were recorded half an hour after the routine daily care at 10.00 a.m. until discharge. Comfort scale score was not performed in infants who were getting sedation or analgesic drugs. 8-16 points indicate deep sedation, 17-26 points indicate adequate sedation, 27-40 points indicate inadequate sedation in comfort scale.

Postnatal first 10 days were neglected while calculating the daily weight gain as most of the preterm infants reach their birth weight approximately in the second week of life. Gastric residual ≥1/3 of each feeding was accepted as feeding intolerance. Ethical Approval was given by the Çukurova University Ethical Board Committee (14.02.2013 and 16/56). Information and explanation were provided to the parents, and written informed consent was obtained from those who agreed to participate in the study.

Statistical Analysis

The data were analyzed using SPSS v.21.0. In the comparison of groups in terms of categorical data, Pearson chi-square, Fisher's exact and Fisher-Freeman-Halton tests were used, as appropriate. In comparison of the continuous variables, normality assumption was tested with Kolmogorov-Smirnov test on a group basis. The t-test was used for variables with normal distribution, and the Mann-Whitney U test was used when the normality assumption could not be achieved. Mean±standard deviation and/or median (min-max) values were used in summarizing the continuous variables. Categorical variables were summarized using count and percentage. $p \leq 0.05$ was accepted as statistically significant.

RESULTS

There were 28 and 27 newborns in supported and control groups respectively, however 2 patients died in the first week of life and 3 parents refused to participate and were excluded. There were 25 infants in both groups. All infants survived and discharged from the unit. The gestational ages of the patients in the supported and control groups were 32.9±2.5 and 32.7±2.8 weeks, respectively; birth weights were 1554±492 g and 1772±439 g, respectively, and there was no statistically significant difference between the groups in these respects (p=0.791, p=0.105, respectively). Also, there were no statistically significant difference between groups in terms of gender, ventilator use, surfactant treatment, nosocomial infection rate, feeding intolerance and duration of hospitalization. Characteristics and comparisons of the patients according

to their groups are shown in Table 1. When the saturation value of all 25 patients (100%) in the supported group was 93% and above; the saturation value of 4 patients (16%) in the control group was below 93%, and when the mean oxygen saturation values were compared, a statistically significant difference was found between the two groups in this respect (p=0.024). The comfort scale scores of 17 (68%) patients in the supported group were between 8-16, while 13 (52%) patients in the control group had comfort scale scores between 17-26, and when the groups were compared in this respect, the comfort scale scores of the supported group were found to be statistically lower (p<0.001). The vital signs and comfort scale scores of both groups were shown in Table 2.

DISCUSSION

Preterm babies show signs of physiological or behavioral stress and pain symptoms. To manage these situations, non-pharmacological and pharmacological methods can be used. Appropriate supportive positioning method is considered an important non-pharmacological intervention for reducing pain responses (11). Nesting positioning is a key factor for the neonate to maintain the appropriate position, making the babies to feel safer and physiologically more stable as they often get used to this position in-utero. Also, they feel comfortable by sucking their fingers and grasping their hands together (12). In a meta-analysis, combined use of a postural support roll and support nappy was shown to improve hip and shoulder position in premature babies, reduce energy expenditures and conserve effort for maximum development and growth (13).

Minimizing energy expenditure while promoting a balance between flexion and extension of any infant are goals of the developmentally supportive care giving practices. In this study we aimed to evaluate the effect of nesting technique and swaddling on comfort scale score and physiological functions of premature infants. We obtained significantly higher oxygen saturation and lower comfort scale scores in nested and swaddled babies. As comfort scale scores increased, we would expect more weight gain in the supported group. Similarly Cole and Gavey (14) emphasized that the effect of the practice of nesting position helps to increase calm and comfort of babies so that they can maintain weight gain. However there were no differences in terms of ventilator use, weight gain and hospitalization days between the groups in the present study.

Developmentally supportive care procedures reduces especially the iatrogenic complications of newborn intensive care for infants and provide the infant's competence, the staff's role satisfaction and the parents' confidence. In addition, many studies reported that all available practices of various developmental supportive care procedures showed positive results for babies such as improved lung function, reduced hospital stay, feeding behavior and growth, improved neurobehavioral, neurophysiological and neurostructural functioning (15,16). El Nagger and Bayoumi (17) reported more normal heart rates in the nested group in supine positions; and more normal respiratory rate during supine, side-lying and prone positions. On the other hand, different studies on this subject have shown that positioning has no effect on the heart rate or respiratory rate in preterm babies (18-20). The results of the current study showed no statistically significant difference regarding the mean respiratory rate and heart rate between supported and control groups. As prone position enables better saturation, it would be better to compare respiratory rates in different positions.

The results of our study showed that premature infants in the supported group had better SpO_2 levels compared to the control group. These results were in agreement with the studies which showed positive effects for the newborns through improving lungs and neurophysiological functioning (15). In painful and stressful procedures, oxygen consumption increases and oxygen saturation decreases, also an increase in heart rate may be expected. While nesting positions increased the oxygenation, it did not affect heart rate and respiratory rate in our study similar to the studies (15).

Developmental care positioning provides normal musculoskeletal and postural development, protects patients' airway and supports their thermal regulation.

Table 1. The characteristics of the groups

	Supported (n=25)	Control (n=25)	
	Mean±SD	**Mean±SD**	**p**
Gestational age (weeks)	32.9±2.5	32.7±2.8	0.791[a]
Birth weight (g)	1554±492	1772±439	0.105[a]
Daily weight gain (g)	15.5±7.5	14.8±6.1	0.719[a]
Hospitalization (days), median (min-max)	20.6±13.9 14 (4-57)	15.5±11.9 12 (3-48)	0.216[b]
	n (%)	**n (%)**	**p**
Gender			
Male	10 (40)	11 (44)	0.774[c]
Female	15 (60)	14 (56)	
Surfactant use	5 (20)	6 (24)	0.733[c]
Ventilator use (invasive)	6 (24)	8 (32)	0.529[c]
NCPAP use	10 (40)	13 (52)	0.395[c]
Hood use	12 (48)	12 (48)	-
Nosocomial infection rate	10 (40)	7 (28)	0.370[c]
Feeding intolerance	12 (48)	8 (32)	0.248[c]

SD: standard deviation; [a]: t test, [b]: Mann-Whitney U test, [c]: Pearson's chi-square test

Table 2. Vital signs and comfort scale scores of groups

	Supported (n=25)	Control (n=25)	p
Heart rate			
100-160/min	24 (96)	23 (92)	0.999[a]
≥161/min	1 (4)	2 (8)	
Mean respiratory rate			
40-60/min	24 (96)	22 (88)	0.609[a]
≥61/min	1 (4)	3 (12)	
Mean SpO_2			
88-92%	0 (0)	4 (16)	
93-96%	7 (28)	11 (44)	0.024[b]
97-100%	18 (72)	10 (40)	
Comfort scale score*			
8-16 points	17 (68)	3 (12)	
17-26 points	7 (28)	13 (52)	<0.001[b]
27-40 points	1 (4)	9 (36)	

[a]: Fischer's exact test, [b]: Fischer-Freeman-Halton test, *: 8-16 points indicate deep sedation, 17-26 points indicate adequate sedation, 27-40 points indicate inadequate sedation

Premature infants who have developmentally positioning cry less, have less flailing of their extremities, have low pain scores and improved physiologic outcomes and sleep states (21). Swaddling is effective also in pain relief (5,22,23). Comaru and Miura (24) reported significantly less pain scores and less distress for babies nested compared to non-nested ones. Loose swaddling of newborns during interventional procedures was found to be effective on physiological and behavioral pain responses (25,26). In their study in 2020, Özdel and Sarı (27) found that the mean comfort scores and the mean distress scores were lower in the supported position (such as kangaroo care position) than in the prone position. We have also showed better comfort scale scores in the supported group.

CONCLUSION

In our study we reported that swaddling and nesting do not have any influence on weight gain, feeding tolerance and ventilator support duration. However applying nesting technique as a developmental care has a positive effect on oxygen saturation and comfort scale scores of premature infants. Supportive positions have benefits for providing sedation for the babies in neonatal intensive care units and are suggested for better oxygenation.

Ethics Committee Approval: The study was approved by the Ethics Committee of Çukurova University Faculty of Medicine (14.02.2013, 16/56).

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