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Designing dress (Sarbebe) for kangaroo care, the effect of kangaroo care provided with this dress on mother and newborn's comfort†

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ABSTRACT

The aims of the researchers were to design the clothes to be worn by the mothers in kangaroo care (KC) and to determine the effect of the KC provided with these clothes on the comfort of the mother and infant. This study was experimentally carried out as a methodological, randomized controlled trial for the designing of clothes for KC. Data were collected using the "Parent and Newborn Information Form", "KC Comfort Scale" and "Newborn Comfort Behavior Scale (Comfort-Neo)". The body temperature, heart rate, oxygen saturation, respiration rate parameters of the newborns were evaluated. The data were transferred to the IBM SPSS Statistics 23 program and evaluated. Our results showed that the KC Comfort Scale total score was 71.1 ± 14.8 in the control group and 84.0 ± 1.5 in the intervention group and "Newborn Comfort Behavior Scale" total scores were found to be 12.47 ± 6.90 in the control group and 8.67 ± 3.46 in the intervention group. It was determined that the KC Comfort Scale (z: −4.785 p: 0.000) in the intervention group were significantly higher compared to the control group ($p < 0.05$). Pain (z: −4.439 p: 0.000) and distress (z: −4.601 p: 0.000) levels of the control group were found to be significantly higher compared to the intervention group. Sarbebe is recommended to be used in KC practices since it was concluded that maternal comfort and satisfaction was high and the pain and distress scores of the newborn were low after KC provided with Sarbebe.

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KEYWORDS
Kangaroo care; premature newborn; mothers; neonatal intensive care unit; comfort

Kangaroo Care (KC) is the skin-to-skin contact of the infant, who has a diaper only, with the parent which enables interaction between the parent and infant, and the placement of the infant in the upright position, facing the parent, on the parent's chest (Conde-Agudelo et al., 2011; Conde-Agudelo & Díaz-Rossello, 2014; Peker, 2015). In the infant in whom skin-to-skin contact is ensured with the parent, relaxation, soothing and fast

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sleep and long-term sleeping occur with the parents' heart sounds. During KC, the parent keeps the baby in her clothes to ensure the baby's thermoregulation, so the mother feels that her pregnancy is over and starts to be engaged in the motherhood-fatherhood role early. KC shortens the duration of stay in the hospital by ensuring that the infant's vital signs are stable and reducing the negative effects of NICU on the infant. It is a practice that facilitates breastfeeding and has positive effects on the growth and development of the infant (Carbasse et al., 2013; Charpak et al., 2005; Conde-Agudelo, et al., 2011; Conde-Agudelo & Díaz-Rossello, 2014; Gupta et al., 2007; Karimi et al., 2014; 2016; 2019; 2020; Khadivzadeh et al., 2016; Yıldırım, 2009). It was revealed that the KC decreased the mortality rate, provided physiological benefits and was an economical method and started to be supported by the United Nations International Children's Fund ([Uu]nited[Nn]ations[Cc]hildren's[Ff]und (UNICEF)) in 1984 (Charpak et al., 2005; Peker, 2015; Venancio & Almeida, 2004; Yıldırım, 2009).

What does this study add?

Kangaroo care cannot be used at the desired level in practice in Turkey despite its positive effects, and when it is used, the absence of standard clothes for the care makes the care difficult. Based on current studies, our professional experiences and clinical observations, special clothes to be designed for KC, that would make the procedure easier and also help to increase parent-infant satisfaction was considered to be necessary.

Methods

Aim and type of the study

The aims of the researchers were to design the clothes to be worn by mothers during kangaroo care and to determine the effect of kangaroo care, which is provided in the neonatal intensive care unit, on the comfort of the mother and infant.

While the design of the clothes was performed for kangaroo care in the first stage of the study, the second stage was carried out experimentally with randomized control.

Permission for the study

The ethical approval of the Sakarya University Faculty of Medicine Non-Pharmaceutical Clinical Research Ethics Committee (07.09.2017-E.13098 16214662/050.01.04/67) and the written permissions of the hospitals where the study was conducted were obtained. Permission was obtained for the use of the

Newborn Comfort Behavior Scale (Comfort-Neo). After the participants were informed about the aim of the study, the confidentiality of the answers, and where and how the data would be used, mothers who volunteered and whose written consents were received and their infants were included in the sample.

Place and time of the study

Authors collected data between December 2018-April 2019 in the Level I and II NICUs of two training and research hospitals located in two different provinces (Amasya and Afyonkarahısar).

Population and sample of the study

All preterm infants who stayed in the NICUs of the hospitals where the study was conducted between December 2018-April 2019 and their mothers constituted the population of the study. The power of the study was calculated based on the differences in the KC Comfort Scale, Maternal Satisfaction Form and Newborn Comfort Behavior Scale (Comfort-Neo) scores between the control and intervention groups and was found to be 96.1%. Power analysis was performed using G*Power 3.1.9.2 package program, and it was concluded that there was a control group (30 preterm infants and their mothers) and an intervention group (30 preterm infants and their mothers).

In the study, the randomization was determined by entering the total number of cases through the program with the URL address https://www.randomizer.org. It was assumed that set 1 would represent the control group and set 2 would represent the intervention group before the data on the number of samples were entered into the program. In accordance with the program, the order of the patients who constituted the sample group was determined by randomized method.

Inclusion criteria for the study

For Newborns

The inclusion criteria for newborns were the hospitalization of the newborn in the Level I and II NICUs, preterm infant born at 24–37 weeks of gestation, newborns without suspected sepsis or sepsis, nonuse of analgesic, sedative or muscle relaxant medication that may affect the infant's behavior, the absence of congenital anomaly, the absence of neurological diseases, having no surgical operation, having a weight over 1500 gr, having stable general medical condition (without mechanical ventilation support, without nasal continuous positive airway pressure (CPAP)), having stable vital signs (Fever, Heart Rate (HR), Respiration, SpO_2), having no chest tube, presence

of a safe navel catheter, and the fact that the infant was considered to be stable by a neonatologist

For mothers

The inclusion criteria for mothers were volunteering to participate in the study, being at least primary school graduate, being nonsmoking of parents, having no communication problems, having no psychiatric disorders, having no auditory problems, having no open wound in the mouth, hand, upper body, and having no acute infectious disease.

Exclusion criteria from the sample in the study

The exclusion criteria from the sample were major life-threatening malformation in the newborn infant, the presence of serious perinatal complications, twin/triplet newborns born as a result of multiple pregnancy and staying simultaneously in the NICU, and parents' non-continuation of the study.

Data collection tools and their features

Parent information form

This form consisted of the questions to determine mother's age, educational status, employment status in an income-generating job, mother and father's professions, social security status, perception of economic status, husband's age, husband's educational status, mother's marriage age, receiving support for infant care, the total number of pregnancies of the mother, delivery method, gender of the infant, whether pregnancy occurred spontaneously or through assisted reproductive techniques, and whether mother and infant had problems during and after the birth.

Newborn information form

This form consisted of the questions examining the gender, delivery method, gestation age, birth weight, height, head circumference, apgar score, health conditions and interventions in the postpartum period of the infants in the study and control groups.

Kangaroo Care Comfort Scale

KC Comfort Scale developed by Zengin & Çınar (2019) consisted of seventeen items (13 positive, 4 reverse coded items) and two sub-dimensions. The scale is a 5-point Likert type, each item is scored from 1 to 5, and the scores vary according to the responses of the items. While thirteen positive statements (Items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 16, 17) are scored as (Strongly agree 5, Agree 4, Neither Agree nor Disagree 3, Disagree 2, Strongly disagree 1), 4 reverse coded items (Items 12, 13, 14 and 15) are

scored as (Strongly agree 1, Agree 2, Neither Agree nor Disagree 3, Disagree 4, Strongly disagree 5). The total score of the scale is minimum 17 and maximum 85. While the comfort is considered to be high as the score obtained from the scale increases, comfort is considered to be low as the score decreases. While the Cronbach Alpha coefficient (α) of Kangaroo Care Comfort Scale consisting of 17 items was found to be 0.872, the Cronbach Alpha coefficients of the "Increase in Comfort" sub-dimension consisting of 13 items and the “Discomfort” sub-dimension consisting of 4 items were found to be 0.901 and 0.791, respectively.

With respect to the evaluation of scale scores;

17–39 points: indicates that comfort is low during KC

40–62 points: indicates that comfort is moderate during KC

63–85 points: indicates that comfort is high and at the desired level during KC (Zengin & Çı nar, 2019). We analyzed data and found that the Cronbach Alpha coefficient was 0.969 for the entire scale.

Newborn Comfort Behavior Scale (COMFORTneo)

The Newborn comfort behavior scale (COMFORTneo) is a Likert type scale consisting of 6 items developed by van Dijk *et al.* (2009) to be used in the assessment of sedation and comfort requirement, pain and distress of the newborns monitored in intensive care unit. Its Turkısh validity and reliability study was conducted by Kahraman *et al.* In their study, they reported that the Cronbach Alpha coefficient was between 0.85 and 0.92 (Kahraman et al., 2014). COMFORTneo consists of six parameters including alertness, calmness/agitation, respiratory response, crying, body movements, facial tension, and muscle tone. It is a tool including numerical rating scales that provide the opportunity to evaluate the pain and distress of the infant as well as determining the comfort. A minimum of 6 points and a maximum of 30 points (6–13 points high comfort; 14–30 points low comfort) are obtained from COMFORTneo. High scores indicate that the infant is not comfortable and needs interventions that will provide comfort. Furthermore, while getting 4–6 points from the numerical rating scales indicates moderate pain and distress, getting 7–10 points indicates severe pain and distress (Kahraman et al., 2014). We analyzed data and found that the Cronbach Alpha coefficient was 0.927 for the entire scale.

Kangaroo care researcher observation form

It was the form in which the features for the KC practice during the stay of the infant in NICU were recorded in the intervention and control groups in the study.

Maternal satisfaction form

It is a scale in which the level of satisfaction of the mother with her infant during the KC practice is shown with a smiling face, and it is rated between 1 and 5 points (1: I am not satisfied at all, 5: I am very satisfied).

Pulse oximetry device

plusMED plus-50DL Finger Type Pulse Oximeter (Made in P.R.C/China) model, calibrated pulse oximetry device was used to measure the oxygen saturation and heart rate of the newborns in both groups before and after the KC.

Infrared non-contact thermometer

RC Brand RC DT-8806H model calibrated, Non-Contact Infrared Forehead Thermometer (Made in P.R.C/China) was used. It was preferred because it is fast, easy, reliable to use, easy to carry, wireless, unaffected by the air conditioner, not sensitive to the surrounding air flow and reusable from all angles and because it can measure within 2 s.

Room thermometer measuring room temperature/humidity

LCD Digital Temperature & Humidity Meter HTC-1 H596 model (Made in P.R.C/China), calibrated, thermometer measuring temperature and humidity was used. The ambient temperature is recommended to be between 22 and 24 °C during KC practice (WHO, 2003). In this study, the ambient temperature was provided in the control and intervention group as recommended by the WHO.

Watch

For the determination of the total duration of the KC practice, the start time of KC was determined by placing the infant on the mother's breast by a second nurse after the mother and infant were prepared, and the end time of KC was noted when the infant was removed from the KC clothes.

Data collection

Stage 1: Preparation stage before KC

Providing training

Before the study, all nurses, midwives and neonatology residents working in the NICU were provided with KC training with the consent and request of the NICU head physician. Furthermore, all mothers whose infants were

staying in the NICU and who came to visit their infants were provided with KC training by the researcher on the dates of the study.

Getting permission from mothers

Before data collection, the aim of the study was explained by the researcher to the mothers who would practice kangaroo care, and the participant information and consent form was read. The participant information and consent form was signed by those who wanted to participate in the study. Individual characteristics were obtained from the file of the newborn, family members and the physician and recorded in the data collection form.

Monitoring of vital signs

A pulse oximetry device was placed on the feet/hands of the newborns in both the intervention and control groups immediately before the KC practice. Oxygen saturation and peak heart rate before KC were noted. Body temperatures of mothers and their infants were evaluated by non-contact thermometer.

Checking the variables

- The mothers were interviewed by phone or face to face the day before the KC practice, and they were asked to have a shower and bring a clean, washed, ironed shirt, button-front or "V-necked" pajamas with them on the following day.
- It was checked by the researcher to provide the desired environment for KC and to create the same environmental conditions for each newborn. The room temperature was ensured to be in the range of 22–24 °C.
- The armchair was placed close to the incubator so that the mother would practice the KC.
- In both groups, the mothers were asked to take off their tops.
- Prior to KC, the researcher, NIC head nurse (observer) and mothers were ensured to wash their hands.
- While removing the infants from the incubator before KC, the infant's blanket was requested from the mother, then the infant was wrapped with it after it was heated in the incubator, and it was ensured that the infant was placed on the mother's breast.
- Body temperature, oxygen saturation and HR before KC of the newborns in both groups were measured and recorded. The infant's diaper was changed.
- Body temperatures of the mothers in both groups were measured and recorded before KC.

Stage 2: Implementation of KC

The environmental variables were arranged in the same way in both the intervention and control groups. In both groups, it was aimed that the duration of KC practice was targeted to continue so that the infant would have a sleep cycle.

As soon as the infant was placed on the mother's chest in both groups, the watch was examined by the observer nurse and the researcher to determine the duration of KC practice, and the start time of KC was recorded on the data collection form for the infant and mother. As soon as the infant was removed from the mother's chest, the end time of KC was noted by the same observer nurse and researcher. In both groups, the behaviors observed in the infant and mother during KC were noted.

Intervention group

The mothers were told how to wear "Sarbebe" KC clothes designed by the researcher. The mothers were ensured to use nurse dressing rooms or empty patient rooms at the entrance of the NICU in order to change their clothes. It was ensured that the mother would wear "Sarbebe" KC clothes approximately 10 min before the KC practice in order to maintain the body temperature of the mother, to protect the infant from hypothermia, to warm the clothes with the body temperature of the mother.

Control group

The necessary preparations before KC and the KC practice were conducted in the same way as the intervention group. The mothers were asked to change their clothes with a suitable shirt or pajamas for KC. The mothers were ensured to use nurse dressing rooms or empty patient rooms at the entrance of the NICU in order to change their clothes. As in the intervention group, it was ensured that the mothers would wear the clothes they changed 10 min before the KC practice.

Analysis of data

The analyses were performed using the IBM SPSS Statistics 23 package program. Frequencies for categorical variables (number, percent) and descriptive statistics (mean, standard deviation, median) for numerical variables were given while evaluating the data of the study. The normality assumptions of numerical variables were examined by Shapiro Wilk normality test, and it was observed that the variables were not normally distributed. Therefore, nonparametric statistical methods were used in the study. The relationships between two independent categorical variables were

interpreted by Chi Square analysis. Fisher Exact test results were used in cases where the expected value assumption was not fulfilled in the Chi Square analysis. The differences between the two independent groups were examined by the Mann Whitney U test. The differences between the two dependent numerical variables were examined by the Wilcoxon test. The statistical significance was considered as (p) 0.05 in the analyses.

Results

Developing the material to be used in the study

This stage was the product design (Figures 1 and 2).

Description of the references

1. Wearing area
2. Front double layer fabric (internal and external)
3. Baby hat
4. Adjustable rubber and the bag formed when it is shrunk
5. Snap fastener part opened from the front and sides

Pilot study

Two mothers with term infants were visited at home after their discharge, and KC practice was performed with Sarbebe. Mothers' opinions were received. KC was practiced in the NICU with 3 premature newborns and their mothers. The pilot study was completed by receiving the opinions of 28-year experienced charge nurse of the NICU and the nurses working in the NICU (duration of professional experience: 5–25 years). The product was made ready for use by making the necessary changes in line with the recommendations.

The study sample was randomly allocated into two groups: KC with "Sarbebe" KC clothes was applied on one group (Intervention group), and KC with her clothes was only applied in the other group (Control group). KC training was given to the mothers by the researcher, a day before KC during the study

This section includes the results of 30 mothers and their infants in the control and intervention groups. It was found that the maternal average age was 26.0 ± 5.5 years in the control group and 26.8 ± 5.9 years in the intervention group. The average marriage age of mothers was 21.3 ± 3.9 years in the control group and 19.6 ± 3.4 years in the intervention group. In the control group, it was determined that 53.3% of the mothers were secondary school/high school graduates, 96.7% of them were

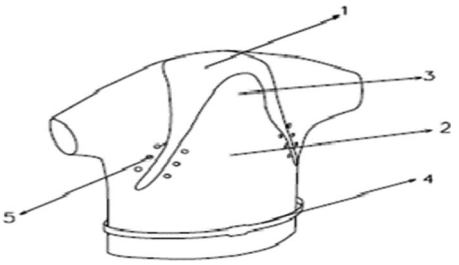

Figure 1. Front view of sarbebe.

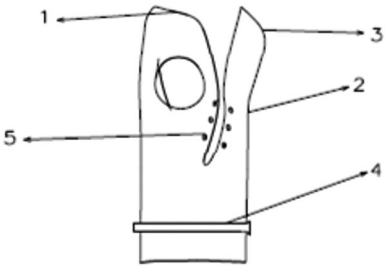

Figure 2. Side view of sarbebe.

unemployed, 83.3% of them had social security, 90% of them did not receive training on KC, 66.7% of them received social support in the care of their infants, 100% of them conceived spontaneously, 43.3% of them gave birth as a result of unplanned pregnancy, 56.7% of them had vaginal delivery, 13.3% of them had problems during delivery and 20% of them had problems after the birth. In the intervention group, it was determined that 43.3% of the mothers were secondary school/high school graduates, 83.3% of them were unemployed, 90% of them had social security, 96.7% of them did not receive training on KC, 80% of them received social support in the care of their infants, 96.7% of them conceived spontaneously, 30% of them gave birth as a result of unplanned pregnancy, 60% of them had delivery by cesarean section, 10% of them had problems during delivery and 16.7% of them had problems after the birth.

It was determined that there was no significant difference the groups ($p > 0.05$) according to age, marriage age, educational status, employment status and income level of the mothers and fathers of newborns in the intervention and control groups, and receiving information on KC by mothers, receiving social support, the number of alive children, the number of miscarriage, number of stillbirths, delivery method, whether the pregnancy was planned, and mothers' problems during/after the birth, and that the groups were similar in terms of family characteristics (homogeneous).

It was determined that there was no significant difference ($p > 0.05$) between the newborns in the intervention and control groups according to gender, gestation age, postnatal age, form of nutrition, birth weight, current

Table 1. Investigation of the relationship between the descriptive characteristics of the newborns and the groups.

	Control ($n = 30$)		Intervention ($n = 30$)		Total ($n = 60$)			
	n	%	n	%	n	%	Chi Square	*P*
Gender								
Female	13	43.3	16	53.3	29	48.3	0.601	0.438
Male	17	56.7	14	46.7	31	51.7		
Gestation Age								
<28 weeks	3	10.0	0	0.0	3	5.0	2.900	0.323
28-31 weeks	2	6.7	2	6.7	4	6.7		
32-37 weeks	25	83.3	28	93.3	53	88.3		
Postnatal Age								
1–11 days	17	56.7	15	50.0	32	53.3	0.268	0.605
12 days and older	13	43.3	15	50.0	28	46.7		
Form of nutrition								
Only breastfeeding	7	23.3	11	36.7	18	30.0	2.502	0.286
Breastfeeding and formula	22	73.3	19	63.3	41	68.3		
Only formula	1	3.3	0	0.0	1	1.7		
Birth weight								
<1000 gr	3	10.0	0	0.0	3	5.0	3.834	0.289
1000–1500 gr	2	6.7	1	3.3	3	5.0		
1501–2499 gr	14	46.7	19	63.3	33	55.0		
2500 gr and more	11	36.7	10	33.3	21	35.0		
Current Weight								
<2500 gr	18	60.0	16	53.3	34	56.7	0.271	0.602
2500 gr and more	12	40.0	14	46.7	26	43.3		
Duration of hospitalization								
1–10 days	18	60.0	17	56.7	35	58.3	0.069	0.793
11 days and more	12	40.0	13	43.3	25	41.7		
Having problem during the birth of the infant								
No	13	43.3	8	26.7	21	35.0	1.832	0.176
Yes	17	56.7	22	73.3	39	65.0		
Having Postpartum Intervention								
No	13	43.3	8	26.7	21	35.0	1.832	0.176
Yes	17	56.7	22	73.3	39	65.0		

*: $p < 0.05$ Fisher's Exact was used when the expected value assumption of Chi-Square analysis was not provided.

weight, birth length, head circumference at birth, duration of hospitalization in the NICU, and having postpartum problem/intervention (Table 1) and that the groups were similar in terms of newborn characteristics (homogeneous).

While the duration of KC practice was 34.5 ± 16.7 min in the control group, it was found to be 65.8 ± 16.4 in the intervention group, and the duration of KC practice was found to be significantly higher in the intervention group compared to the control group (Table 2).

The mother's fever before KC was calculated as $36.1 \pm 0.2\,^{\circ}C$ in the control group and $36.2 \pm 0.2\,^{\circ}C$ in the intervention group. The mother's fever before KC showed a statistically significant difference between the control and intervention groups ($p < 0.05$). Accordingly, mother's fever before KC was found to be significantly higher in the intervention group compared to the control group (Table 2).

Table 2. Comparison of descriptive characteristics according to groups and environmental features regarding KC.

	Control			Intervention				
	Mean.	S.D.	Med.	Mean.	S.D.	Med.	Z	P
Gestation Age (week)	33.98	3.75	35.43	34.2	2.25	34.21	−0.624	0.533
Postnatal age (day)	23.2	29.9	8	15.7	10.3	12.5	−0.54	0.589
Birth weight (gram)	2191.7	765.4	2290	2194.3	533	2025	−0.525	0.6
Current weight (gram)	2407	448.9	2375	2390	426.4	2350	−0.192	0.847
Birth Length (cm)	45.2	6.3	47.5	44.5	3.7	44	−1.696	0.09
Head Circumference at Birth (cm)	31	4	32.5	31.7	1.7	32	−0.497	0.619
Duration of hospitalization (day)	20.8	30.8	5	11.9	9.9	9	−0.334	0.738
Duration of KC practice (minutes)	34.5	16.7	35	65,.8	16.4	65	−5.476	**0.000***
Mother's fever before KC (°C)	36.1	0.2	36.1	36.2	0.2	36.3	−2.99	**0.003***
1st minute Apgar Score	7	1.8	8	7.1	1.2	7	−0.781	0.435
5th minute Apgar Score	8.3	1.5	9	8.4	0.9	9	−0.162	0.871

*: $p < 0.05$ (Statistically significant).

Table 3. Investigation of the vital signs of the newborns before and after kangaroo care and inter group differences.

	Control			Intervention				
	mean.	S.D.	Med.	mean.	S.D.	Med.	Z	p^b
Infant's fever before KC	36.4	0.4	36.5	36.4	0.3	36.3	−1.335	0.182
Infant's fever after KC	36.7	0.3	36.7	37	0.3	37	−2.571	**0.010***
	Z=-3.639	p^a=**0.000***		Z=-4.791	p^a=**0.000***			
Infant's SpO_2 before KC	94.7	4	96	94.4	4.7	96	−0.082	0.934
Infant's SpO_2 after KC	97.6	2.6	99	98.3	2.9	100	−1.751	0.08
	Z=-4.405	p^a=**0.000***		Z=-4.478	p^a=**0.000***			
Infant's HR before KC	144.8	10.5	148.5	147.2	5.6	149	−0.529	0.597
Infant's HR after KC	144	12.3	147	145.1	9.5	150	−0.03	0.976
	Z=-0.812	p^a=0.417		Z=-0.741	p^a=0.458			

*: $p < 0.05$ a: Wilcoxon Test (Intra-group changes) b: Mann Whitney U (Differences between groups).

The mean 1st and 5th minute apgar scores of the newborns in the control group were found to be 7.0 ± 1.8 and 8.3 ± 1.5, respectively. The mean 1st and 5th minute apgar scores of the newborns in the intervention group were 7.1 ± 1.2 and 8.4 ± 0.9, respectively. It was determined that there was no significant difference between the newborns in the intervention and control groups according to the apgar scores ($p > 0.05$) (Table 1), the mean apgar scores of newborns in both groups were between 7 and 10 (healthy newborn), and the groups were similar (homogeneous) in terms of apgar scores (Table 2).

A statistically significant difference was found between the control and intervention groups in terms of the infant's fever before KC ($p < 0.05$). Accordingly, the infant's fever before KC in the intervention group was significantly higher compared the control group and within the reference values (Table 3).

Table 4. Investigation of the differences of kangaroo care comfort scale, maternal satisfaction level, newborn comfort behavior scale according to groups.

	Control			Intervention				
	mean.	S.D.	Median	mean.	S.D.	Median	Z	p
KC Comfort Scale	71.1	14.8	78	84	1.5	85	−4.785	**0.000***
Maternal Satisfaction Scale	4.1	1	4	4.9	0.3	5	−3.728	**0.000***
Newborn Comfort Behavior Scale (Comfort-Neo)	12.47	6.9	10	8.67	3.46	7	−1.837	0.066
Comfort-Neo Pain	1.5	1.7	1	0.1	0.4	0.-	−4.439	**0.000***
Comfort-Neo Distress	1.8	1.5	2	0.2	0.6	0.-	−4.601	**0.000***

*: $p < 0.05$ *Z: Mann Whitney U.*

The infant's fever after KC in the control group was significantly higher than the infant's fever before KC (at the accepted reference values). In the control group, the infant's SpO_2 level after KC was found to be significantly higher than the SpO_2 level before KC (Table 3).

The infant's fever after KC in the intervention group was found to be significantly higher than the infant's fever before KC (at the accepted reference values). In the intervention group, the infant's SpO_2 level after KC was found to be significantly higher than the SpO_2 level before KC (Table 3).

The infant's fever and SpO_2 level after KC were found to be significantly higher in the intervention group compared to the values before KC. Similar results were obtained between the HRs of the infants in both groups before and after KC (Table 3).

A statistically significant difference was found between the control and intervention groups in terms of KC Comfort Scale and Maternal Satisfaction Form total scores ($p < 0.05$). Accordingly, KC Comfort Scale (z: −4.785 p: 0.000) and Maternal Satisfaction Form (z: −3.728 p: 0.000) scores in the intervention group were significantly higher compared to the control group. The control and intervention groups were found to be similar in terms of the Newborn Comfort Behavior Scale (z: −1.837 p: 0.066) total scores. A statistically significant difference was observed between the control and intervention groups in terms of Newborn Comfort Behavior Scale pain and distress levels ($p < 0.05$). Accordingly, pain (z: −4.439 p: 0.000) and distress (z: −4.601 p: 0.000) levels of the control group were found to be significantly higher compared to the intervention group (Table 4).

Discussion

When the mothers in the intervention and control groups included in the study were compared in terms of maternal education status, parental employment status, status of having social security, receiving information on KC, receiving social support, the number of alive children, the number

of miscarriage, number of stillbirths, the way pregnancy occurs, whether the pregnancy was planned, delivery method, mothers' problems during/after the birth, we showed that there was no statistically significant difference between the groups and both groups showed a homogeneous distribution in terms of the characteristics indicated ($p > 0.05$). The fact that similar results were obtained in both groups was one of the strengths of the study. In the studies of Amaliya *et al.* (2017) in which the effect of KC on maternal comfort was examined, the maternal average age was found to be 30.95 ± 6.9 years which was higher compared to our study. When the results were compared with our study, it appeared that the parental education level was found to be lower in the study of Peker (2015) and other results were similar to our study.

When the newborns in the intervention and control groups included in our study were compared in terms of gender, gestation age, postnatal age, form of nutrition, birth weight, current weight, birth length, head circumference at birth, duration of hospitalization in the NICU, and having postpartum problem/intervention, we determined that there was no statistically significant difference between the groups and both groups showed a homogeneous distribution in terms of the characteristics indicated ($p > 0.05$) (Table 1). The fact that similar results were obtained in both groups was one of the strengths of the study. The fact that the newborn is stable and has a weight of 1800 gr and above indicates that KC can be initiated immediately (WHO, 2003; All India Institute of Medical Sciences, 2013). In a study, it was reported that the mean gestational week of preterm infant provided with kangaroo care was 33 weeks (Perry et al., 2010). In another study, it was determined that the birth weight of newborns was $1.841.75 \pm 194$ grams, the mean gestational week of the newborn was 33.0 ± 2.5 weeks, and the mean postnatal age was 11 days (min: 2 max: 49 days) (Amaliya et al., 2017). The results of this study are similar to the literature.

The evaluation, measurement and monitoring of vital signs are extremely important for neonatal (pediatric) nurses. Vital signs such as body temperature, heart rate, oxygen saturation give information about the physiological state of the individual (Koç & Kaya, 2017).

In our study, a statistically significant difference was found in both groups in terms of the infant's fever and SpO_2 level after KC, and the infant's fever and SpO_2 level after KC were significantly higher compared to the values before KC (found at the accepted reference values) ($p < 0.05$; Table 2). The infant's fever and SpO2 level after KC were found to be significantly higher compared to the values before KC in the intervention group compared to the control group (at the accepted reference values) ($p < 0.05$; Table 2). Similar results were obtained between the HRs of the infants in both groups before and after KC (Table 2).

A study showed that hypothermia did not develop in the infants provided with kangaroo care and that kangaroo care was effective in regulating the body temperature of the newborn (Walters et al., 2007). Similarly, in another study, kangaroo care was found to be effective in maintaining the body temperature (Chiu et al., 2005). In their kangaroo care study in postpartum term infants, Koç and Kaya (2017) found a statistically significant difference between the intervention and control groups in terms of body temperature in the infants with and without kangaroo care. In another study in which the effect of kangaroo care on heart rate in premature infants was examined, it was shown that the level of stress was low with kangaroo care, and thus, the heart rate was regulated with kangaroo care (McCain et al., 2005). In the study in which the effect of kangaroo care provided for one hour in preterm infants on the vital signs of the mother and newborn was evaluated, it was demonstrated that the mother's blood pressure and infant's respiratory rate were regulated after KC and that KC had no effect on the peak heart rate and SpO_2 values of the infant (Nimbalkar et al., 2013). The results of this study are generally similar to the literature.

Our results showed that the KC Comfort Scale total score was 71.1 ± 14.8 in the control group and 84.0 ± 1.5 in the intervention group and that the maternal satisfaction level was 4.1 ± 1.0 in the control group and 4.9 ± 0.3 in the intervention group, and a statistically significant difference was found between the control and intervention groups in terms of the KC Comfort Scale and Maternal Satisfaction Form total scores ($p < 0.05$) (Table 4). According to these results, it was determined that the KC Comfort Scale (z: -4.785 p: 0.000) and Maternal Satisfaction Form (z: -3.728 p: 0.000) scores were significantly higher in the intervention group compared to the control group. The fact that the scale total score was between 63 and 85 in the evaluation of the KC Comfort Scale indicated that comfort was high and at the desired level in the individual practicing the KC (Zengin & Çınar, 2019). In this study, it was demonstrated the KC provided with "Sarbebe KC clothes" designed by the researcher increased maternal satisfaction and comfort.

With respect to maternal comfort during KC practice at home, mother's ability to hold her infant safely in her chest, facilitation of breastfeeding, mother's ability to use both arms for other activities, practicing KC with the clothes supporting the infant's neck in mothers with preterm infants, and the use of cotton fabric suitable for the infant's sensitive skin affect the maternal comfort during KC (Amaliya et al., 2017; Charpak & Ruiz-Pelaez, 2006; Jain & Sarkar, 2000; WHO, 2003).

The fact that maternal satisfaction and comfort were higher in the intervention group can be explained by the fact that the KC clothes designed by

us was made of 100% cotton fabric, provided privacy of the mother, the fact that the infant did not need another hat, the fact that the cables and hoses attached to the infant were easily placed thanks to the snap fastener opening from the sides by facilitating breastfeeding, by the adjustable rubber under the navel, and the fact that it prevented the infant from falling. Furthermore, the absence of special clothes for KC practice in the hospitals where the study was conducted, and the fact that KC was provided with the mother's own clothes also affected this situation.

KC clothes designed by us were not found in the literature. However, in the literature, when the studies on differently designed KC clothes were examined, the methods with a long strip of fabric in the form of kangaroo pouch, thari, and wrapping were most widely used methods in KC in Indonesia (Amaliya et al., 2017). In the study of Amaliya *et al.* (2017), the effect of these three different KC methods on maternal comfort levels were compared according to anxiety level (comfort was considered high if anxiety score was low), and it was demonstrated that three different KC clothes (traditional wrapping: wrapping the baby in the mother's body with a plain shawl, thari; traditional wrapping method supported by the shoulder, kangaroo pouch: the lower body of the baby is dressed like panties and supported under the navel and the shoulder) equally affected the comfort of the mother during KC (Amaliya et al., 2017). In addition to the method of wrapping, and KC provided with the traditional method (traditional wrap: wrapping the baby with a plain wrap) resulting from a study that was started with 96 mothers and ended with 59 mothers in Nepal, according to results of the KC practice performed by a new method (ergonomic wrap) supported from the shoulder, back and under the navel, it was revealed that healthcare professionals and mothers used the new ergonomic wrapping method comfortably in the hospital and at home since it was easy to wear and supportive and flexible and the mothers moved more comfortably (Thapa et al., 2018).

In our study, "Newborn Comfort Behavior Scale" total scores were found to be 12.47 ± 6.90 in the control group and 8.67 ± 3.46 in the intervention group, and there was a similarity between the two groups in terms of the "Newborn Comfort Behavior Scale" (z: -1.837 p: 0.066) total scores (Table 4). The use of the Newborn Comfort Behavior Scale in KC was not found in the literature. However, a minimum of 6 points and a maximum of 30 points are obtained in the original evaluation of the scale. The scores between 6 and 13 indicated that the newborn has a high comfort (Kahraman et al., 2014; van Dijk et al., 2009). In the result of our study, it appeared that the total score of the scale was between 5 and 12 points in the intervention group and that the comfort was high.

In this study, the mean pain and distress (z: -4.601 p: 0.000) scores in the control group were found to be 1.5 ± 1.7 and 1.8 ± 1.5, respectively, and they

were 0.1 ± 0.4 and 0.2 ± 0.6, respectively, in the intervention group, and a statistically significant difference was observed between the groups in terms of Newborn Comfort Behavior Scale pain and distress levels ($p < 0.05$). Accordingly, pain (z: −4.439 p: 0.000) and distress levels of the control group were found to be significantly higher compared to the intervention group (Table 4). In the evaluation of the "Newborn Comfort Behavior Scale" pain and distress scores, getting 4–6 points indicates moderate pain and distress, getting 7–10 points indicates severe pain and distress (Kahraman et al., 2014; van Dijk et al., 2009). In the studies, it was demonstrated that KC decreased the pain (Cong et al., 2011; 2012; Johnston et al., 2011; 2012; 2014; Ludington-Hoe et al., 2005; Nimbalkar et al., 2013; Saeidi et al., 2011) and reduced the stress level (saliva cortisol and serum cortisol value were low) in the newborn (Cong et al., 2012). The results obtained from the study are similar to the literature. Newborns can cope with pain more easily along with the increase in endorphin level during KC.

While the duration of KC practice was 34.5 ± 16.7 min in the control group, it was found to be 65.8 ± 16.4 min in the intervention group, and the KC practice was found to be significantly higher in the intervention group compared to the control group (Table 2). In a study, it was emphasized that the duration of KC practice did not affect the comfort of the mother because the mother could interact with her infant during KC and the mother's anxiety could be reduced. However, it was argued that continuous KC practice may prevent the mother from sleeping with the fear that she cannot keep her baby safe, and therefore, it may negatively affect the comfort of the mother (Amaliya et al., 2017; Tarus & Tjale, 2015). In this study, mother's anxiety to drop her infant was removed since continuous KC practice was not performed (since intermittent KC practice was performed) and the mother was accompanied by the researcher nurse and NICU nurse during KC.

Mothers who experience KC practice consider that KC is an emotional, important and positive experience and is an important part of getting into parenting role and getting to know their baby. KC is not physiologically disadvantageous for the mother, however, the mother should be socially supported so that KC can be performed successfully (Amaliya et al., 2017; Blomqvist et al., 2013;). Kangaroo care is a natural, effective and low-cost application that can be provided in any environment. It can be provided in all premature and term infants. It is a practice that should be a routine part of nursing care with strong evidences that it provides numerous benefits including increasing self-confidence in parents, reducing stress, actively participating in infants' care, minimizing parent-infant separation and physiological, behavioral and pain relieving features in newborns. KC should be considered as standard care for all infants and started as early as possible after birth (Campbell-Yeo et al., 2015).

Conclusions

Base on the results in this study, the authors conclude that;

- the body temperature and oxygen saturation of the infant were significantly higher after the KC provided with "Sarbebe Kangaroo Care Clothes", and the peak heart rate was similar in both groups,
- the duration of KC practice was longer in the intervention group,
- the total scores of the KC Comfort Scale and the Maternal Satisfaction Form were higher in the intervention group compared to the control group,
- comfort was high in the intervention group but similarity was observed in both groups according to the Newborn Comfort Behavior Scale total score,
- the pain and distress scores of the newborn were significantly lower in the intervention group.

The authors recommend Sarbebe in KC practice.

Limitations and challenges of the study

The fact that mothers were made wear Sarbebe for once was the limitation of the study. The absence of a cloth for KC in the routine of the service due to the fact that KC is not performed as a routine practice in the NICUs, and the mothers in the control group were asked to perform KC with their own clothes (lack of wraparound shirt type or V-neck clothes required for KC, and sometimes, the application of the KC by putting the infant in the topcoat, sweaters) were the challenges of the study.

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