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The Effect of Paternal Kangaroo Care on Paternal Role Adaptation in Preterm Infants Hospitalized in Neonatal Intensive Care Units: A Randomized Controlled Trial

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Article

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Abstract

Background:

Hospitalization of a preterm infant in the neonatal intensive care unit (NICU) may limit the opportunities for parents to fulfill their parental roles and may affect their adaptation to their new roles. Fathers may face challenges in adapting to fatherhood under these circumstances. Kangaroo care, as an effective, accessible, and low-cost approach, provides opportunities for close contact and active paternal participation in infant care and may facilitate father–infant interaction. Given the importance of paternal involvement in the care of preterm infants, this study aimed to determine the effect of paternal kangaroo care on paternal role adaptation among fathers of preterm infants hospitalized in neonatal intensive care units.

Methods:

This randomized controlled trial was conducted in neonatal intensive care units of hospitals affiliated with Shiraz University of Medical Sciences, Iran, in 2025, among 40 couples with preterm infants. Participants were randomly allocated to intervention and control groups using simple randomization. Data were collected using a demographic questionnaire and a paternal role adaptation questionnaire before the intervention, immediately after the intervention, and four weeks after the intervention. Data were analyzed using descriptive statistics (frequency and percentage) and inferential statistics, including the chi-square test, Mann–Whitney U test, independent-samples t-test, paired-samples t-test, and Wilcoxon test, using SPSS version 25. A significance level of 0.05 was considered for all analyses.

Results:

The mean age of the fathers was 33.77 ± 7.15 years, and the gestational age of the infants was 32–36 weeks. The intervention and control groups were homogeneous in terms of demographic characteristics at baseline. Following the intervention, paternal role adaptation increased significantly in the intervention group ($P < 0.001$). The improvement in paternal role adaptation was significant both immediately after the intervention and four weeks later, indicating that the effect was sustained ($P < 0.001$).

Conclusion:

In this study, paternal kangaroo care was an effective intervention for improving paternal role adaptation, and its effect was maintained four weeks after the intervention. Therefore, utilizing fathers' potential to participate in the care of preterm infants may represent a practical strategy for promoting family-centered care in neonatal intensive care units.

INTRODUCTION

Preterm infants, defined as those born before 37 weeks of gestation, are at increased risk of mortality and short- and long-term neurodevelopmental disorders [1]. Prematurity is considered one of the major causes of neonatal mortality and various complications in this population, and its consequences may also have substantial effects on families. Therefore, prematurity has consistently been an important concern for researchers and healthcare systems [2]. Due to the immaturity of their body systems, preterm infants are vulnerable and require support and care for feeding, respiratory regulation, protection against infection, and maintenance of body temperature. Consequently, admission to the neonatal intensive care unit (NICU) is often unavoidable [3].

Adaptation to the parental role, particularly fatherhood, is an important and challenging life event for men that may challenge their ability to accept and fulfill new responsibilities. Paternal role adaptation refers to the process through which an individual develops an understanding of fatherhood, acquires the characteristics and requirements of this role, accepts its associated responsibilities, and adapts to the changes and transformations resulting from entering the paternal role. Ultimately, this process may contribute to stabilization of the paternal role and increase parental-role satisfaction and paternal self-efficacy. Paternal role adaptation can be influenced by various factors. Readiness for parenthood, efforts to manage the new situation, reduction of psychological stress, and gradual maturation over time may affect the men's adaptation to fatherhood. Providing fathers with opportunities for active participation in infant care may strengthen their adaptation to the paternal role and increase their sense of self-efficacy. Kangaroo care is one of the effective approaches for facilitating such participation [4–10].

Kangaroo care consists of skin-to-skin contact between an infant and the mother or father and has been associated with reduced mortality among preterm infants [11, 12]. The World Health Organization also recommends kangaroo care as part of routine care for infants after clinical stabilization and suggests continuing it until the preterm infant reaches 40 weeks of gestational age [13]. However, the optimal timing for initiating kangaroo care, ranging from 3 to 24 days of age, remains under discussion, as a considerable proportion of neonatal deaths occur during the first three days of life, and the effectiveness and safety of initiating kangaroo care within the first 24 hours after birth have not yet been fully established [14, 15].

Mothers are generally considered the primary providers of kangaroo care, while fathers have often been overlooked. Consequently, limited information is available regarding the fathers' perspectives on providing kangaroo care in NICUs [16]. Every year, millions of fathers experience the hospitalization of their infants in NICUs without adequate preparation for accompanying and caring for their newborns. Hospitalization can result in separation between the infant and father and may interfere with the development of attachment between them [17]. Paternal kangaroo care, similar to maternal kangaroo care, is safe and can promote bonding between fathers and infants while also providing reassurance to mothers who may be unavailable for various reasons, including fatigue, medical conditions, or multiple childbirths [5, 11, 13].

Fathers have described kangaroo care as a positive experience accompanied by feelings of love and joy [16]. This type of care may strengthen the father–infant bond, improve parent–infant interaction, and reduce parental tension, thereby facilitating the development of an emotional relationship between fathers and infants. Accordingly, appropriate support from healthcare professionals for fathers' participation in kangaroo care may strengthen this bond and facilitate more effective fulfillment of the paternal role [17, 18]. Nevertheless, studies conducted in this field in Iran remain limited [19].

Given that the postpartum period represents an important opportunity for fathers to adapt to their new role and successfully transition into fatherhood [5], paternal participation in kangaroo care may be considered an effective, accessible, and low-cost approach to strengthening paternal role adaptation [19, 20]. Therefore, this study was designed to investigate the effect of paternal kangaroo care on paternal role adaptation among fathers of preterm infants hospitalized in NICUs, with the expectation that its findings could contribute to improving the quality of care for preterm infants, strengthening parent–infant relationships, and promoting the fathers' participation and effective role in infant care.

MATERIALS AND METHODS

This randomized controlled trial was conducted among two groups of 20 parents of preterm infants hospitalized in NICUs of hospitals affiliated with Shiraz University of Medical Sciences in 2025. Data were collected using parent–infant demographic questionnaires, a parental stress questionnaire, and a paternal role adaptation questionnaire.

Based on the study by Salmani et al. [21], with a type I error of $\alpha = 0.05$ and a statistical power of 99% ($1 - \beta = 0.99$), the required sample size was calculated as 16 couples per group. Considering a 25% attrition rate, 20 couples were included in each group.

Randomization

Participants were allocated using a permuted block randomization method with blocks of four. Accordingly, a random allocation sequence consisting of 10 blocks of four for 40 couples was generated using Allocation Random software, and participants were equally assigned to the intervention and control groups, with 20 couples in each group. The trial design adheres to the CONSORT 2025 guidelines for randomized trials.

DATA COLLECTION TOOLS

Instrument 1: Demographic and Fertility Information Questionnaire

Instrument 2: Paternal Role Adaptation Questionnaire

The standardized Paternal Role Adaptation Questionnaire, developed and psychometrically evaluated in Iran by Eskandari et al. in 2015, has a total content validity index of 68% and a total content validity ratio of 92%. Its internal reliability, assessed using Cronbach's alpha, was 89%, while its external reliability, assessed using the test–retest method, was 96%. The questionnaire consists of 38 items and five subscales.

Items are scored using a five-point Likert scale ranging from "always" (score 5), "often" (score 4), "sometimes" (score 3), "rarely" (score 2), to "never" (score 1). For the dimensions of role performance and responsibilities, spiritual stability and inner satisfaction, and challenges and concerns, as well as for the dimensions of understanding parental development and establishment in the paternal position, items are scored from "strongly agree" (score 5), "agree" (score 4), "no opinion" (score 3), "disagree" (score 2), to "strongly disagree" (score 1). The challenges and concerns subscale is reverse-scored.

The score for each subscale is calculated by summing the scores of its items, while the total scale score is calculated as the sum of the subscale scores. The scores are then converted into percentages, with higher scores indicating greater paternal role adaptation [22].

DATA COLLECTION

This study was conducted from April to August 2026 in Hafez and Nemazee Hospitals in Shiraz. After obtaining written informed consent from the parents of the neonates, the parent–infant demographic questionnaire and paternal role adaptation questionnaire were administered to the fathers before the intervention. The paternal role adaptation questionnaire was subsequently completed immediately and four weeks after completion of the intervention.

The infants were randomly assigned to two groups. Infants in the first group (control) received one hour of kangaroo care from their mothers every afternoon after breastfeeding and diaper changing. Infants in the second group (intervention) received one hour of kangaroo care after breastfeeding and diaper changing for seven consecutive days, consisting of 30 minutes of kangaroo care provided by the mother followed by 30 minutes provided by the father.

Inclusion Criteria for Parents

The inclusion criteria for parents were being 18–45 years old; being Iranian; the infant being the first child in the family; being free from stress or having a low level of stress based on an interview; not participating simultaneously in another study or intervention; not having physical or mental illness; not using medications such as sedatives, antidepressants, or anxiolytics based on self-report; being literate; and being able to visit the hospital daily to provide care for the infant.

Inclusion Criteria for Infants

The infant inclusion criteria were the birth weight of at least 1500 g; a clinically healthy appearance; gestational age between 32 and 36 weeks; ability to feed with breast milk; no use of mechanical ventilation; no surgical intervention performed or required; absence of an umbilical arterial catheter or chest tube; absence of congenital anomalies; care in an incubator or cot; absence of grade III or IV intraventricular hemorrhage; and absence of neonatal respiratory problems.

Exclusion Criteria

The exclusion criteria included infants' need for intubation or administration of vasodilator medications during the study, hypothermia, hospitalization for less than one week, incomplete questionnaires, and parents' unwillingness to continue participation in the study.

STATISTICAL ANALYSIS

Descriptive statistics included the mean, standard deviation, frequency, and percentage. Inferential analyses included the chi-square test, Wilcoxon test, paired-samples t-test, independent-samples t-test, and Mann–Whitney U test. The data were analyzed using SPSS version 25, and a significance level of 0.05 was considered statistically significant.

RESULTS

In this study, 40 couples with preterm infants were enrolled and randomly allocated to the intervention and control groups (Fig. 1).

The demographic and fertility characteristics of the participants were initially assessed. Most participants in both the intervention and control groups had a high school diploma or higher level of education. Most fathers were self-employed, whereas most mothers were housewives. The majority of participants lived in rented housing and reported a moderate economic status. The results showed no statistically significant differences between the two groups in terms of demographic variables ($P > 0.05$), indicating that the groups were homogeneous at baseline (Table 1).

Table 1
Distribution of qualitative demographic characteristics of the study participants in the intervention and control groups

Variable	Category	Intervention, n (%)	Control, n (%)	P-value
Father's education	Primary school	1 (5%)	1 (5%)	0.764
	Middle school	2 (10%)	2 (10%)	
	High school	2 (10%)	0 (0%)	
	Diploma	8 (40%)	7 (35%)	
	University education	10 (50%)	7 (35%)	
Mother's education	Primary school	1 (5%)	1 (5%)	0.440
	Middle school	3 (15%)	1 (5%)	
	High school	3 (15%)	0 (0%)	
	Diploma	8 (40%)	7 (35%)	
	University education	8 (40%)	8 (40%)	
Father's occupation	Self-employed	13 (65%)	16 (80%)	0.288
	Employee	7 (35%)	4 (20%)	
Mother's occupation	Employed	6 (30%)	4 (20%)	0.465
	Housewife	14 (70%)	16 (80%)	
Economic status	Poor	4 (20%)	2 (10%)	0.717
	Moderate	12 (60%)	14 (70%)	
	Good	3 (15%)	4 (20%)	
	Very good	0 (0%)	1 (5%)	
Housing status	Private/owned	7 (35%)	6 (30%)	0.741
	Rented	14 (70%)	12 (60%)	
	Government-provided	1 (5%)	0 (0%)	

The demographic and fertility characteristics also showed no statistically significant differences between the intervention and control groups, indicating baseline homogeneity ($P > 0.05$). The means and standard deviations of the quantitative characteristics of the participants are presented in Table 2.

Table 2
Comparison of quantitative characteristics of the study participants in the intervention and control groups

Variable	Intervention, Mean ± SD	Control, Mean ± SD	P-value
Father's age (years)	33.00 ± 9.24	34.55 ± 7.15	0.704
Mother's age (years)	29.10 ± 7.93	29.40 ± 5.12	0.765
Father's age at marriage (years)	28.20 ± 10.28	28.15 ± 5.89	0.958
Mother's age at marriage (years)	23.05 ± 5.84	23.30 ± 6.00	0.797
Duration of marriage (years)	6.35 ± 4.13	6.70 ± 5.23	0.935
Infant gestational age (weeks)	33.95 ± 1.57	34.10 ± 1.11	0.730
Number of abortions	1.50 ± 1.00	1.83 ± 0.98	0.542
Duration of infertility	9.00 ± 5.40	4.75 ± 3.49	0.098

The total paternal role adaptation score and its different dimensions were compared between the intervention and control groups at three assessment time points (Table 3). Before the intervention, there was no statistically significant difference in the mean paternal role adaptation score between the two groups (P = 0.839). Following the intervention, the mean paternal role adaptation score increased significantly in the intervention group, and the between-group difference was statistically significant both immediately after the intervention and four weeks later (P < 0.001). Therefore, kangaroo care was associated with improved paternal role adaptation, and this effect was maintained at the four-week follow-up.

Table 3
Comparison of the mean total paternal role adaptation score at three assessment time points

Assessment time	Intervention, Mean ± SD	Control, Mean ± SD	Between-group P-value
Before intervention	145.20 ± 13.06	144.55 ± 8.44	0.839
Immediately after intervention	172.65 ± 7.47	149.20 ± 7.79	< 0.001
Four weeks after intervention	176.15 ± 5.45	153.85 ± 9.30	< 0.001

Changes in paternal role adaptation scores from baseline to after the intervention were also compared between the intervention and control groups (Table 4). The increase in paternal role adaptation scores in the intervention group was significantly greater than that in the control group both immediately after the intervention and four weeks later (P < 0.001). The greatest increase in the intervention group was observed from baseline to four weeks after the intervention, indicating the persistence of the effect of kangaroo care on paternal role adaptation.

Table 4
Comparison of the mean changes in paternal role adaptation scores between the intervention and control groups

Time interval	Intervention, Mean Change ± SD	Control, Mean Change ± SD	P-value
Baseline to immediately after intervention	16.05 ± 14.87	4.53 ± 4.65	< 0.001
Baseline to four weeks after intervention	20.12 ± 14.64	5.84 ± 9.30	< 0.001

Table 5 showed that the increase in scores for the three dimensions of role performance and responsibilities, understanding parental development, and establishment in the paternal position was significantly greater in the intervention group than in the control group (P < 0.001). In contrast, between-group differences in spiritual stability and inner satisfaction (P = 0.086) and challenges and concerns (P = 0.057) were not statistically significant.

Table 5
Comparison of the changes in the dimensions of paternal role adaptation from baseline to four weeks after the intervention between the intervention and control groups

Paternal role adaptation dimension	Intervention, Mean Change ± SD	Control, Mean Change ± SD	Between-group P-value
Role performance and responsibilities	5.92 ± 5.81	2.66 ± 2.35	< 0.001
Understanding parental development	6.12 ± 4.76	2.50 ± 2.21	< 0.001
Establishment in the paternal position	5.35 ± 3.84	2.95 ± 2.01	< 0.001
Spiritual stability and inner satisfaction	3.30 ± 2.67	1.75 ± 1.68	0.086
Challenges and concerns	0.20 ± 1.52	−0.25 ± 1.06	0.057

Overall, the findings of this study demonstrated that kangaroo care significantly increased paternal role adaptation. Although there was no significant difference between the two groups before the intervention, the mean paternal role adaptation score was significantly higher in the intervention group than in the control group both immediately after the intervention and four weeks later (P < 0.001). In addition, the increase in the overall paternal role adaptation score in the intervention group was significantly greater than that in the control group at both post-intervention assessment points. This effect was also observed in the dimensions of role performance and responsibilities, understanding parental development, and establishment in the paternal position, whereas the between-group differences in spiritual stability and inner satisfaction and in challenges and concerns did not reach statistical significance. Thus, in this study, kangaroo care was associated with improved paternal role adaptation,

particularly in the functional dimensions and establishment of the paternal role, and this effect persisted for four weeks after the intervention.

Discussion

The main finding of this study was that paternal kangaroo care was associated with a significant increase in paternal role adaptation among fathers of preterm infants, and this effect persisted for four weeks after completion of the intervention.

In the present study, the two groups did not differ significantly in demographic variables or baseline paternal role adaptation scores. Therefore, no substantial evidence of baseline heterogeneity between the groups was observed. However, the lack of statistical significance in baseline variables should be interpreted in conjunction with randomization, sample size, and the data analysis method. Accordingly, the observed post-intervention difference in the outcome can, within the framework of the study design and statistical analysis, be interpreted as evidence supporting the effectiveness of kangaroo care. Previous intervention studies have also attempted to ensure comparability between intervention and control groups with respect to baseline characteristics so that observed effects can be attributed to the intervention. For example, in the study by Zekey et al., the groups were compared at baseline, and the primary difference was evaluated after implementation of the intervention [23].

On the other hand, differences in demographic characteristics observed in some studies may be attributable to differences in the study design and statistical analysis. Therefore, direct comparison of the demographic characteristics of the present study with those of other studies should be made with caution. The homogeneity of the baseline characteristics of the two groups provided appropriate conditions for evaluating the effect of paternal kangaroo care. Thus, the increase in paternal role adaptation observed in the intervention group can be interpreted with greater confidence as being in favor of the effectiveness of the intervention.

The results of this study showed that the mean total paternal role adaptation score did not differ significantly between the two groups at baseline; however, after the intervention, the mean paternal role adaptation score increased more substantially in the intervention group. This difference was maintained four weeks after the intervention. Furthermore, comparison of mean score changes showed that the increase in paternal role adaptation in the intervention group was greater than that in the control group both immediately and four weeks after the intervention.

One possible explanation for this finding is that kangaroo care transforms the father from a relatively passive family member into an active caregiver of the infant. During skin-to-skin contact, the father has the opportunity to hold his infant, respond to the infant’s needs, and actively participate in care. This experience may enhance the father’s sense of competence and paternal efficacy and, consequently, facilitate adaptation to the new paternal role. A systematic qualitative review by Mu et al. also showed that kangaroo care could increase the parents’ sense of competence and improve their ability to perform their parental roles [24].

The qualitative study by Blomqvist et al. (2012) showed that kangaroo care helped fathers better attain their paternal role in the NICU. Fathers felt that they were real participants in caring for their infants. This finding is consistent with the results of the present study because, in both studies, direct paternal participation in infant care was identified as a factor that strengthened the paternal role [25]. Similarly, the study by Varela Pulido et al. (2026), which included 42 fathers of preterm infants, measured paternal self-efficacy before kangaroo care, at NICU discharge, and three months after discharge. This finding is consistent with the present study, as increased paternal empowerment may be one of the factors contributing to greater paternal role adaptation [26].

The study by Chavan et al. also demonstrated that, after seven days of kangaroo care among infants with very low birth weight, fathers' anger and anxiety regarding infant care decreased significantly. Since reduced caregiving anxiety is an important component of parental role development, these findings may also help explain the increase in paternal role adaptation observed in the present study (20). However, because Chavan's study had a different design and did not include a control group, comparisons with the present randomized controlled trial should be made cautiously.

The consistency of these findings with studies addressing increased paternal self-efficacy and facilitation of paternal role attainment suggests that providing fathers with opportunities for direct participation in infant care may be an effective strategy for facilitating the transition to fatherhood under the stressful conditions of the NICU. However, differences in findings across studies indicate that the extent of the effect of kangaroo care on different dimensions of the paternal role may be influenced by the duration and frequency of the intervention, the infant's clinical condition, the level of staff and family support, and the measurement instrument used.

The results of the present study showed that kangaroo care had a significant effect on most dimensions of paternal role adaptation. Regarding competence in performing roles and responsibilities, although the mean score before the intervention did not differ significantly between the two groups, the mean score in the intervention group was significantly higher than that in the control group after the intervention. Conceptually, this finding is consistent with the view that direct caregiving experiences provide opportunities for learning, skill acquisition, and successful experiences in fulfilling paternal responsibilities.

Significant between-group differences were also observed in the dimensions of understanding parental development and establishing the paternal position, and the intervention effect remained stable four weeks later. This finding may indicate that kangaroo care helps fathers perceive themselves as genuine and responsible caregivers in the infant-care process. From this perspective, increased paternal participation in infant care may facilitate the process of paternal role adaptation.

A difference between the groups was also observed in the dimension of spiritual stability and inner satisfaction following the intervention. Given the nature of this dimension, participation in infant care may have strengthened feelings of satisfaction and acceptance of the new role. However, no significant difference was observed between the two groups in the dimension of challenges and worries. The

between-group p-values at different time points were 0.548, 0.126, and 0.081, respectively, and within-group changes were also not significant. This finding suggests that increased paternal participation in infant care does not necessarily lead to a reduction in all concerns associated with having a preterm infant.

Fathers' concerns regarding the infant's health status, potential complications related to prematurity, the infant's future, and the conditions of hospitalization in the NICU may depend on factors beyond physical contact with the infant and may require information, psychological support, counseling, and continuous communication with the healthcare team. Therefore, kangaroo care should potentially be considered as part of a multidimensional approach to supporting fathers in addressing their psychological and role-related difficulties.

The findings of the present study are consistent with the longitudinal study by Varela Pulido et al. They found that greater paternal participation in kangaroo care, compared with maternal participation, predicted higher paternal self-efficacy after hospitalization and three months after discharge. Although the outcome examined in that study was "paternal self-efficacy", whereas the present study assessed "paternal role adaptation," these concepts are closely related because increased confidence in caregiving ability may lead to better acceptance of paternal responsibilities and greater stabilization of the paternal role [26].

Nevertheless, not all studies have demonstrated similar effects on parental role-related outcomes. In the randomized controlled trial by Zekey et al., paternal kangaroo care significantly reduced fathers' anxiety, but no significant difference was observed in father–infant bonding scores between the two groups [23]. This finding differs from the significant increase in paternal role adaptation observed in the present study. One possible explanation for this difference is the definition and measurement of the outcome. Father–infant bonding represents only one aspect of the parent–infant relationship, whereas the paternal role adaptation questionnaire used in the present study evaluates a broader range of dimensions related to role performance, responsibility, understanding of the role, and paternal position. In addition, in Zekey's study, kangaroo care was performed during infant transfer to the NICU and the assessment period was very short, whereas the present study involved a seven-day intervention with a four-week follow-up period.

Overall, the findings of the present study demonstrated that paternal participation in kangaroo care significantly increased the paternal role adaptation compared with the control group, and this effect was maintained four weeks after the intervention. The consistency of this finding with studies reporting increased paternal self-efficacy, sense of competence, and paternal participation in infant care suggests that kangaroo care may be used to empower fathers and facilitate paternal role development.

However, the findings should be interpreted in consideration of the differences between paternal role adaptation and the constructs of self-efficacy, competence, and anxiety. Furthermore, differences in the duration and frequency of kangaroo care, the infant's clinical condition, the measurement instrument, and the timing of outcome assessment may account for differences among studies. Therefore, future

studies with larger samples, longer follow-up periods, and longitudinal analyses are recommended to determine whether increases in paternal self-efficacy and competence actually mediate the relationship between kangaroo care and paternal role adaptation.

Strengths and Limitation

The strengths of the present study include its focus on the father's role in caring for preterm infants, assessment of paternal role adaptation as an outcome that has received relatively less attention in previous studies, use of kangaroo care as a simple, low-cost, and feasible intervention, and its alignment with a family-centered care approach.

Despite these strengths, the present study had several limitations. Conducting the study in a single city limits the generalizability of the findings to other populations and healthcare settings. In addition, some individual and family factors, including fathers' personal characteristics and family circumstances, may influence their adaptation to the paternal role, and complete control of these factors was not possible in the present study. Furthermore, differences among fathers in terms of participation, attendance, and adherence to kangaroo care may have resulted in variation in the frequency, duration, and manner of providing care, thereby limiting the possibility of implementing the intervention in exactly the same way for all fathers. Finally, the use of self-report questionnaires to assess paternal role adaptation may have introduced response bias and the influence of participants' subjective perceptions on the findings.

Conclusion

The results of the present study showed that paternal participation in kangaroo care for preterm infants may serve as a simple, accessible, and low-cost intervention that can contribute to improving the quality of care and increasing paternal role adaptation.

Paternal kangaroo care resulted in a significant increase in paternal role adaptation, and its effect on most dimensions of paternal adaptation remained evident for four weeks after the intervention. On the other hand, the absence of a significant effect on the dimension of challenges and worries indicates that, although kangaroo care is an effective component of support for fathers, it is not sufficient to address all psychological dimensions among fathers of preterm infants and should preferably be provided alongside education, counseling, and psychological support. Therefore, based on the findings of this study, paternal kangaroo care may be considered as part of family-centered care in neonatal intensive care units.

Declarations

Ethics approval and consent to participate

This study is part of the first author's master's thesis. It has been approved by the Ethics Committee of Shiraz University of Medical Sciences, Iran with the code of IR.SUMS.NUMIMG.REC.1404.138. The study

was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and relevant institutional guidelines. Before starting the study, written informed consent was obtained from the parents of the neonates, and they were assured that their information would remain confidential with the researcher. Finally, all the results obtained from the study will be used to improve the NICU care process.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no conflicts of interest.

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Author Contribution

All authors contributed equally to this work

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Data Availability

The datasets analyzed during the current study are not publicly available due to the confidentiality of participants' data and the difficulty of organizing the raw data to be suitable for publication; however, they are available from the corresponding author on reasonable request.

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Figures

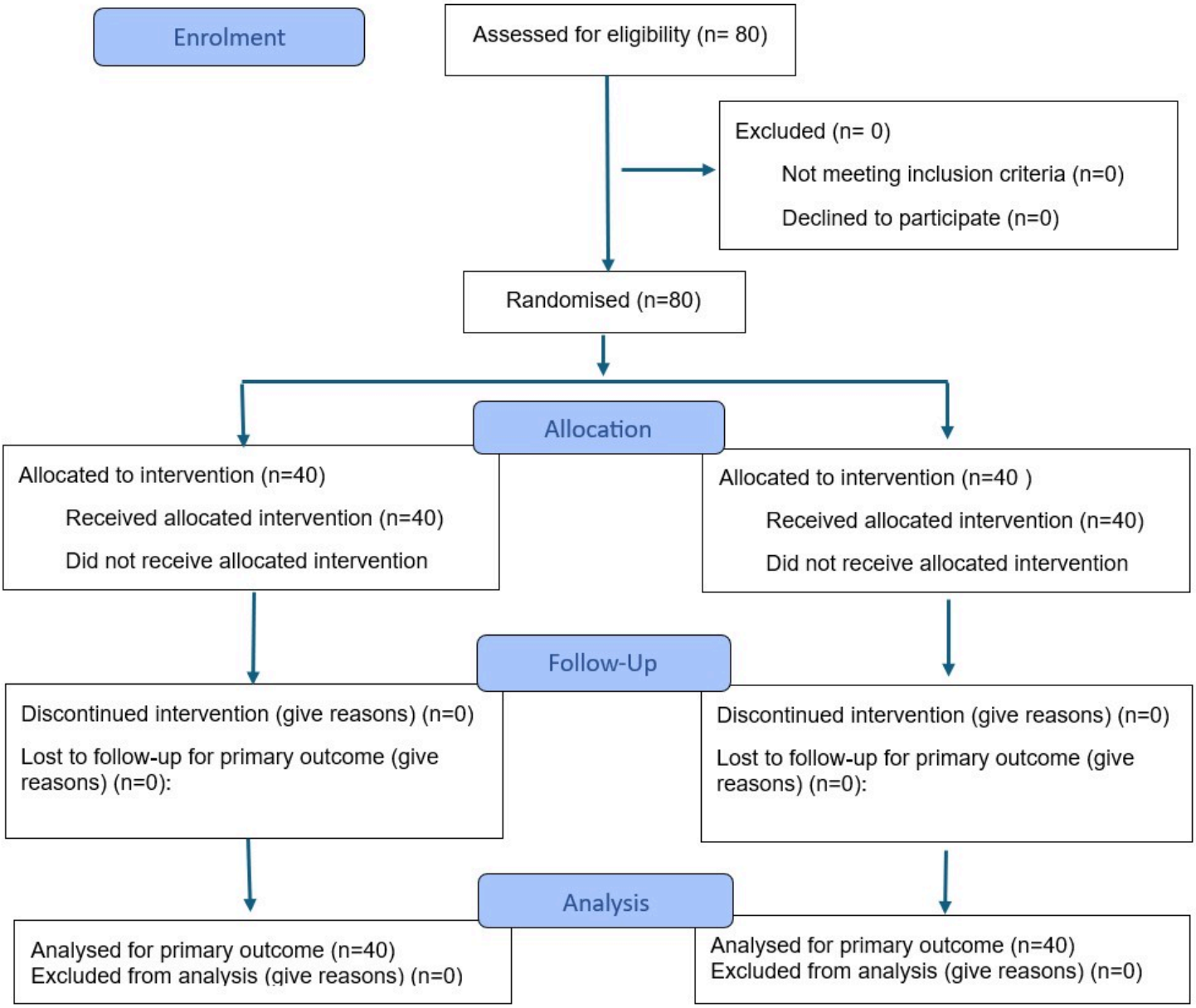

Figure 1

CONSORT flow diagram