Good short-term outcomes of kangaroo mother care in infants with a low birth weight in a rural South African hospital

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Abstract

Objective

The aim of the study was to determine the outcome of kangaroo mother care (KMC) in low birth weight infants at a community hospital.

Methods

This descriptive study included 87 mothers and their low birth weight infants who were in a stable condition and eligible for KMC at Dr JS Moroka Hospital, Thaba Nchu. The infants were assessed four times: at birth, twice during hospitalisation, and a week after discharge. Infants received breast milk exclusively.

Results

Regarding the mothers' obstetric history (n=87), gravidity ranged from 1 to 7 (median 3), with a 43% incidence of miscarriage. The median birth weight of the infants (n=87) was 1.5 kg (first assessment), the discharge weight (third assessment) was 1.8 kg, and a week after discharge (fourth assessment) it was 2.2 kg. Initially the infants lost weight significantly from birth to the second assessment (95% CI for median decrease [-0.02; -0.01]), but significantly gained weight from the second to the third (95% CI for median increase [0.27; 0.33]) and from the third to the fourth assessment (95% CI for median increase [0.32; 0.45]). Approximately half (49%) of the infants had developed jaundice by the time of second assessment. These babies had a significantly lower birth weight [0.12;0.30].

Conclusion

Our findings confirm that infants with a low birth weight treated with KMC can have a good growth pattern, and exclusive breast milk is sufficient to guarantee such growth. Kangaroo mother care is a safe method for stable infants with a low birth weight in a community hospital.

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Introduction

Approximately 98% of the 5 million worldwide neonatal deaths occur in low-income countries, with low birth weight being the underlying cause of most of these deaths.[1,2] Quality care of low birth weight infants could reduce neonatal mortality in these countries.[1] Staff and equipment shortages prompted Rey and Martinez to practise Kangaroo mother care (KMC) in Bogotá, Colombia in 1979.[1,3] This practice also decreased overcrowding in the incubators, as well as infections in and the mortality rate of the infants.[3]

Infants are considered for KMC if they have a low birth weight but are in a stable condition. Kangaroo mother care is defined as early, prolonged and continuous skin-to-skin contact between a mother and her newborn low birth weight infant, both in hospital and after early discharge, until at least the 40th week of postnatal gestational age. Kangaroo mother care does not need sophisticated equipment, can be applied almost anywhere, could contribute to the humanisation of neonatal care, and contain costs. For these reasons, KMC is attractive to neonatal units in both low- and high-income countries.[1]

Infants gain weight much faster in the kangaroo position than in any other conventional method of care, because they maintain thermal control, sleep well, show better tolerance of enteral and oral feeding, and show improved breathing, and because the parents are supported in their roles, and the mothers are supported in the initiation and maintenance of lactation.[4,5,6] This method also improves growth and brings about a shorter hospital stay for the infants, increased milk production and duration of breastfeeding, reduced maternal stress and an increase in maternal feeling of empowerment.[3,7,8,9] Kangaroo mother care can also help to decrease the prevailing high levels of morbidity and mortality.[10,11,12]

In South Africa, a developing country, a number of training hospitals have established separate KMC wards. Mothers of low birth weight infants were able to practise continuous KMC, which resulted in those infants being discharged from the incubator sooner than they would traditionally have been.[4]

The aim of the study was to document the short-term outcomes of KMC care in infants with a low birth weight at a rural community hospital.

Methods

This descriptive study included mothers and their low birth weight infants in a stable condition, admitted to the nursery of the Dr JS Moroka Hospital in Thaba Nchu, who were eligible for KMC. Infants were excluded if they weighed more than 2 500 grams, were in an unstable condition, were dependent on oxygen or fluids, had visible malformations, or if the mother was unwilling to participate. The screening for the study was done using a screening tool (see Table I).

The nurses reported the births of low-weight infants, after which the first author carried out an initial clinical assessment for KMC selection. This assessment was done in the nursery ward. Mothers were assisted with exclusive breastfeeding and expressing. Infants were assessed a second time on day 3, on discharge (third assessment) and a week after discharge (fourth assessment). A mother was discharged once she was comfortable and the infant was steadily gaining weight (154 g/week). The measuring scale was calibrated in order to avoid errors when weighing the infants.

Descriptive statistics, namely frequencies and percentages for categorical data and medians and percentiles for continuous data, were calculated for all the assessments. The change in weight and medical conditions were calculated and described by means of 95% confidence intervals.

Four infants were included in a pilot study to assess this study's feasibility. The Ethics Committee of the Faculty of Health Sciences, University of the Free State approved the study and the participants gave written consent.

Table I: Screening tool to evaluate eligibility for KMC

Criterion	Yes	No
Birth weight > 1 000 g		
Child can be without oxygen for most of the day		
Child is without continuous intravenous fluids		
Mother is healthy enough for KMC		
Mother is willing to practice KMC		
Baby is haemodynamically stable		
Baby can maintain body temperature in kangaroo position		
No visible congenital malformations		

Results

Of the 101 mothers and their infants screened for KMC, 87 took part in the study. The main reason for non-participation was that the mothers did not give written consent, or that the infants became ill.

Regarding the obstetric history of the mothers (n=87), the gravidity ranged from 1 to 7 (median 3). The incidence of previous miscarriage was 43%, with all the mothers in the gravidity 6 or 7 group having had at least one miscarriage. Sixty mothers (69%) had spontaneous vertex delivery and 24 (27.6%) had a Caesarean section. Three babies(3.4%) were born before arrival at the hospital. The infants' (n=87) one-minute Apgar scores varied between 7 and 10 (median 8), and the five-minute Apgar scores were between 8 and 10 (median 9). All infants were able to suck properly and had a stable body temperature.

The median period between assessments varied considerably owing to administrative and patient factors: from birth to the second assessment the median was three days (range one to 13 days); from the second to the third assessment it was eight days (range three to 22 days); and from the third to the fourth assessment the median was nine days (range five to 27 days). The median period from birth to the final assessment was 22 days (range 13 to 40 days). Thirty-two babies were lost due to failure of follow-up and the final assessment was done on 55 babies.

The infants' weight gain, as well as change in weight gain from birth until the final assessment, is given in Table II. The median birth weight was 1.5 kg (range 900 g to 1.9 kg). On discharge (third assessment) and at the final (fourth) assessment, the infants' median weight was 1.8 kg (range 1.3 kg to 2.4 kg) and 2.2 kg (range 1.55 to 2.5 kg) respectively. Only 55 were measured one week after discharge. Initially, the infants lost weight significantly from birth to the second assessment (95% confidence interval (CI) for median decrease [-0.02; -0.01]), but significantly gained weight from the second to the third (95% CI for median increase [0.27; 0.33]) and from the third to the fourth assessment [0.32; 0.45].

Table II: Infants' weight gain and change in weight gain from birth until the final assessment (n=87)

Weight assessment (kg)	25%	Median	75%	95% CI#
Birth weight	1.30	1.50	1.62	
Weight at 2nd assessment	1.30	1.48	1.60	[-0.02 ; -0.01]*
Weight at 3rd assessment (discharge) (n=82)	1.70	1.78	1.85	[0.27 ; 0.33]*
Weight at 4th assessment (week after discharge) (n=55)	1.98	2.22	2.30	[0.32 ; 0.45]*

95% confidence interval for the median difference between birth and 2nd assessment, 2nd and 3rd assessment, 3rd and 4th assessment
* Statistically significant

Table III: Comparison between parity, delivery mode, jaundice and infants' birth weight (n=87)

	Birth weight (kg)			95% CI#
	25%	Median	75%	
Parity:				
<3 (n=53)	1.32	1.50	1.65	
≥3 (n=34)	1.30	1.46	1.60	[-0.06 ; 0.15]
Delivery mode:				
Spontaneous vertex delivery (n=60)	1.31	1.50	1.66	
Caesarean section (n=24)	1.34	1.53	1.60	[-0.11 ; 0.10]
Jaundice (2nd assessment):				
No (n=44)	1.46	1.60	1.70	
Yes (n=43)	1.20	1.34	1.55	[0.12 ; 0.30]*

95% confidence interval for the median difference
* Statistically significant

Approximately half (49%) of the infants had developed jaundice (defined as a bilirubin value of > 10 % of the baby's weight in grams) by the time of the second assessment, but only 9.2% had anaemia (defined as a hematocrit of < 35%), which had improved by the third assessment (discharge). Heart lesions were present in 3.4% of the infants, and most of these were referred to secondary levels of care. A comparison between parity, delivery mode, jaundice and the infants' weight is given in Table III. Those infants who had jaundice at the second assessment had a significantly lower birth weight (95% CI for median decrease [0.12; 0.30]). There was no significant difference between parity or delivery mode and birth weight.

Discussion

From the literature, it is clear that differences in reproductive history, education, social and economic condition and mode of delivery do not influence the practice of KMC in low birth weight infants.[2,12,13,14] Similarly, the mode of delivery and obstetric history did not influence the practice of KMC in our setting. Therefore, the only exclusion criterion for KMC was an unstable baby or mother.

In our study, 50% of the infants initially lost weight (40 g) after birth, but significantly gained weight after seven days. All infants were able to suck properly, had a stable body temperature, gained weight satisfactorily, and 96% weighed more than 1.5 kg on discharge. Several authors argue that weight gain should approximate an intrauterine growth rate of 16.8 to 30.7 g/day.[15,16,17,18] Kangaroo mother care infants breastfeed more and show a higher trend towards mean daily weight gain. For this reason, KMC infants achieve the discharge weight in a shorter time and go home earlier than those in conventional care.[1,2,19,20] This is not only advantageous for the mother and baby, who can be discharged from the hospital earlier, but also for the hospital, which can save on resources. Our results correspond with those in most of the literature, where mothers practising KMC were discharged after 21 to 29 days. The mothers were encouraged to continue with KMC at home after discharge.[2,11,12,13,21]

The infants who developed jaundice weighed statistically less and had a slower weight gain than those without jaundice. During the jaundice episode, the mothers could only partially practise KMC because the infants were under phototherapy lights. According to the literature, infants who develop jaundice experience a significant reduction in weight.[22,23,24] Although jaundiced infants have significantly lower birth weights, respiratory distress is uncommon and most deaths are due to asphyxia or infection.[1,20,25]

Conclusion

Our findings confirm that low birth weight infants treated with KMC can have a good growth pattern and that exclusive breastfeeding is sufficient to guarantee such growth. Kangaroo mother care is a safe method for stable infants with a low birth weight in a community hospital.

References

1. Cattaneo A, Davanzo R, Uxa F, Tamburlini G. Recommendations for the implementation of kangaroo mother care for low birth weight infants. International network on kangaroo mother care. Acta Paediatr 1998;87(4):440–5.
2. Cattaneo A, Davanzo R, Worku B, *et al.* Kangaroo mother care for low birthweight infants: a randomized controlled trial in different settings. Acta Paediatr 1998;87(9):976–85.
3. Tessier R, Cristo M, Velez S, *et al.* Kangaroo mother care and the bonding hypothesis. Pediatrics 1998;102(2):e17.
4. Bergh AM, Pattinson RC. Development of a conceptual tool for the implementation of kangaroo mother care: Acta Paediatr 2003;92(6):709–14.
5. Bergman N, Malan A, Hann M. Fourth international workshop on kangaroo mother care. J Trop Pediatr 2003;49(5): 311–2.
6. Bergman N. Kangaroo mother care: rediscover the natural way to care for

newborn baby. Int J Trop Pediatr 2003;18(1):26–7.
7. Fisher DA, Odell WD. Acute release of thyrotropin in the newborn. J Clin Invest 1969;48:1670–7.
8. Travert G, Lemonnier F, Fernandez Y. Free thyroxin measured in dried blood spots: results for 10 000 euthyroid and 29 hypothyroid newborns. Clin Chem 1985;31(11):1829–32.
9. Thompson R, Seargeant L, Winter JS. Screening for congenital adrenal hyperplasia: distribution of 17 alpha-hydroxyprogesterone concentrations in neonatal blood spot specimens. J Pediatr 1989;114(3):400–4.
10. Nyqvist KH. How can kangaroo mother care and high technology care be compatible? J Hum Lact 2004;20(1): 72–4.
11. Pacchiarotti A, Bartalena L, Chiovato L, ***et al.*** Free thyroxine values in dried blood spots on filter paper in newborns are related to both gestational age and birth body weight. J Endocrinol Invest 1988;11(7):515–9.
12. Sloan NL, Camacho LW, Rojas EP, Stern C. Kangaroo mother method: randomised trial of an alternative method of care for stabilised low-birthweight infants. Maternidad Isidro Ayora Study Team. Lancet 1994;344(8925):782–5.
13. Lincetto O, Vos ET, Graça A, Macome C, Tallarico M, Fernandez A. Impact of season and discharge weight on complications and growth of Kangaroo Mother Care treated low birthweight infants in Mozambique. Acta Paediatr 1998;87(4):433–9.
14. Ballard JL, Novak KK, Driver M. A simplified score for assessment of fetal maturation of newly born infants. J Pediatr 1979;95(5 Pt 1):769–74.
15. Weller A, Rozin A, Goldstein A, ***et al.*** Longitudinal assessment of pituitary-thyroid axis and andrenal function in preterm infants raised by "kangaroo mother care". Horm Res 2002;57(1–2): 22–6.
16. Charpak N, Ruiz- Pelaez JG, Charpak Y. Rey-Martinez. Kangaroo Mother Program: an alternative way of caring for low birth weight infants? One year mortality in a two cohort study. Pediatrics 1994;94(6 Pt1):804–10.
17. Lincetto O, Nazir AI, Cattaneo A. Kangaroo mother care with limited resources. J Trop Pediatr 2000;46(5): 293–5.
18. Shimon I, Kaiserman I, Sack J. Home monitoring of 17 alpha-hydroxyprogesterone levels by filter paper blood spots in patients with 21-hydroxylase deficiency. Horm Res 1995;44(6): 247–52.
19. Whitelaw A, Sleath K. Myth of the marsupial mother: home care of very low birth weight babies in Bogota, Colombia. Lancet 1985;1(8439):1206–8.
20. Anderson GC. Current knowledge about skin-to-skin (kangaroo) care for preterm infants. J Perinatol 1991;11(3): 216–26.
21. Berry J, Betts P, Wood PJ. The interpretation of bloodspot 17 alpha-hydroxyprogesterone levels in term and pre-term neonates. Ann Clin Biochem 1986;23(Pt 5):546–51.
22. Charpak N, Ruiz-Pelaez JG, Calume ZF. Current knowledge of kangaroo mother intervention. Curr Opin Pediatr 1996;8(2):108–12.
23. Eldar D, Gelernter I, Sack J. Blood-spotted filter paper measurements of thyroxin and thyroid-stimulating hormone in the follow-up of children with congenital hypothyroidism. Horm Res 1990;34(5–6):219–23.
24. Simchak M. Audiovisual Review Kangaroo mother care. Int J Childbirth Educ 2003;18(1):24–5.
25. Acolet D, Modi N, Giannakoulopoulos X, ***et al.*** Changes in plasma cortisol and catecholamine concentrations in response to massage in preterm infants. Arch Dis Child 1993;68(T1 Spec No):29–31.