

Original Research Article

Kangaroo mother care in Preterm baby receiving assisted respiratory support (CPAP): a case-control trial

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ABSTRACT

Background: Kangaroo Mother Care (KMC) is conventionally initiated in a baby who is stable and may or may not be on intravenous fluids, enteral feeds or oxygen. We hypothesized that KMC will be beneficial to preterm babies receiving assisted respiratory support in the form of continuous positive airway pressure (CPAP).

Methods: Prospective case-control trial of 28 preterm neonates (weight <2 kg and gestational age between 26 to 36 weeks) with respiratory distress who were on assisted respiratory support (CPAP), was conducted at a medical college hospital. They were studied in two groups of 14 each of KMC and no KMC. Primary outcome was early weaning from CPAP and secondary outcome was episodes of apnoea, hypothermia, septicemia and mortality.

Results: KMC group received KMC for an average 6.7 hours/ day. Most of the KMC practice occurred between 12 noon to midnight. Babies with KMC and NO KMC group took an average of (39±12) versus (52±24) hours to wean off from CPAP ($p = ns$). Episodes of apnoea, hypothermia, septicemia and deaths were less in KMC group as compared to NO KMC group. Occurrence of physiological jaundice was higher among the KMC group as compared to the NO KMC group.

Conclusions: It is possible to give KMC in preterm infants from the first day of birth who are on respiratory support (CPAP). Preterm infants receiving KMC had less episodes of apnoea, hypothermia, sepsis, and reduced mortality, though not significant. It was also beneficial in early weaning from assisted ventilation (CPAP).

Keywords: CPAP, KMC, Kangaroo mother care, Preterm

INTRODUCTION

Kangaroo Mother Care (KMC) is defined as early, prolonged and continuous skin to skin contact between the mother and low birth weight infant, both in hospital and after discharge with exclusive breastfeeding and proper follow up.

In 1979, Drs. Martinez and Rey of the Maternal Child Institute in Bogotá, Colombia, developed a simple method to care for LBW infants called the "kangaroo mother care" (KMC). The name derives from the

similarity between the way a kangaroo carries her baby after birth, and the way the mothers in the programme carry their premature newborns. The proximity to the mother her care, her voice, her heartbeat is considered as an important factor in stimulation of the child's breathing to avoid apnoea. Love, warmth, maternal lactation and the kangaroo position is the essence and the basic foundation of the Kangaroo mother method.

Kangaroo mother care is a scientifically sound and socially acceptable method. It is a powerful, easy-to-use method to promote the health and well-being of infants

born preterm as well as full-term. Hoe S has mentioned KMC as a neonatal therapy.¹

Main benefits of KMC are breastfeeding, thermal control, early discharge and less morbidity. Other benefits are the baby's legs kicking on the mother's abdomen causes the mother's uterus to contract strongly. A baby in kangaroo position gains weight of around 15-20 grams/day. The suckling motion releases the hormone morphine, in the brain which acts as a powerful pain reliever for the infants. It is vital for the general wellbeing of the baby.²

Its key features are early, continuous and prolonged skin-to-skin contact between the mother and the baby.³ It is initiated in hospital and can be continued at home. KMC also improve the normal physiological parameter of baby.⁵⁻⁷

It is applied to obtain "cerebral protection" as it has been proved that the simple fact of promoting skin to skin contact improves the patterns of behaviour of the baby and places him closest to where he was in the womb.^{8,9}

The other components in KMC are exclusive breastfeeding and early discharge in kangaroo position with strict follow-up. KMC enhances bonding and attachment; reduces maternal postpartum depression symptoms; enhances infant physiologic stability and reduces pain, increases parental sensitivity to infant cues; contributes to the establishment and longer duration of breastfeeding and has positive effects on infant development and infant/parent interaction.^{4,10,11,12}

Aims and objectives of this study were to study the feasibility of Kangaroo mother care in preterm baby requiring respiratory support (CPAP support) and its outcome, by conducting a prospective case-control trial in a medical college hospital NICU.

METHODS

It is a prospective, case-control, observational study of 28 subjects over a period of six months.

The present prospective study was conducted in paediatric ward (NICU) at Government Medical College Hospital for six months. The protocol was approved by the medical college institutional review board. Preterm babies with respiratory distress who required respiratory support were included in the study.

Inclusion criteria

Preterm New born baby with assisted respiratory support.

Exclusion criteria

- Infants with congenital anomalies.
- Mothers who are not willing to participate in study.

Group selection will be done on the basis of the odd and even serial number of the patient included in the study. Odd numbers will receive KMC for 4-6 hours/day and even numbers will not receive KMC. All cases were subjected to detailed history, clinical examination, and laboratory evaluation and were managed according to the NICU protocols at Pediatrics Department Government Medical College Hospital.

Data collection and treatment protocol

For all the eligible neonates, an informed written consent was obtained from the parents before enrolment and following characteristics were recorded - maternal profile like age, antenatal care (ANC) visits, multiple deliveries, risk for sepsis etc.; birth weight, length and head circumference; gestational age assessment using Ballard Score within 24 hours of birth.

The neonates will be enrolled according to odd and even registration number into KMC and control groups. In the KMC group, the neonates will be given skin-to-skin contact, between the mother's breasts in an upright position dressed with a cap, socks and diaper and supported at bottom with a gown/sling/binder. Front open gowns were made available for the mothers and privacy was provided to them. Comfortable chairs and beds were provided to the mothers practicing KMC in the nursery.

Skin-to-skin contact was recommended for a minimum of 1 hour at a stretch and at least for 4-6 hours/day, duration was gradually increased to as long as comfortable to the mother and baby. Neonates in the control group were not given KMC. In both the groups, mothers were allowed to handle their babies at any hour of the day.

Statistical analysis

Tests of statistical significance used were chi-square test, z test, paired two tailed t test (for the physiological parameters). A value of $p < 0.05$ was considered statistically significant.

RESULTS

We enrolled total 28 newborn babies our study in NICU ward of Sir T Hospital, Bhavnagar. 14 babies received KMC (case group) while 14 babies did not (NO KMC control group).

There were 19 males and 9 female babies. Male:female ratio was 2.1: 1. KMC group had nine male and five female while NO KMC group had ten male and four female.

Table 1 show that mothers were more comfortable to provide KMC during 12-3 pm, 6-9 pm and 9-12 pm. While some mothers preferred midnight hours (12-3 am). KMC babies received average 6.7 hrs of KMC per day (Table 2).

Table 1: Time slot of KMC hrs and number of sittings.

Subject No.	Time (hrs)							
	PM				AM			
	12-3	3-6	6-9	9-12	12-3	3-6	6-9	9-12
1	3	3	3					
3				1	1	1	1	1
5		1	1	2	1			
7	1		2	2	1			
9	2			2	2			
11	1		2	2				
13	1		3	3				
15			2	3	1		1	1
17	2		2	2				
19	2		2	2				
21	1			1	1			
23	1	1	2	2				
25	2		2	2				
27	2		2	2				

Table 2: Total hours of assisted respiratory support in KMC and No KMC group.

KMC Group			No KMC Group	
Subject no.	Total hour of assisted respiratory support	Average hour of KMC/ day	Subject no.	Total hour of assisted respiratory support
1	61	6	2	61
3	29	7	4	91
5	58	5	6	65
7	31	9	8*	77
9	21	6	10	37
11	31	6	12*	21
13*	52	6	14	46
15	51	7	16	92
17	44	6	18	39
19	45	7	20	46
21	21	7	22	53
23	34	8	24	64
25	49	7	26	15
27	38	7	28	24
Mean± SD	40.36± 12.99 [#]	6.7 hour	Mean± SD	52.21± 24.37 [#]

*Expired; [#]p = 0.4577

Birth weight and gestational age data are as per Table 3.

21.4% infants (3 babies) with KMC had apnoeic episodes, while without KMC 35.7% infants (5 babies) had apnoeic episodes, (p = 0.675, NS). Infants with KMC did not have any hypothermic episodes, while without KMC, 21.4% infants (3 babies) had hypothermic episodes, (p = 0.2217, NS). 14.2 % infants (2 babies) among KMC group expired, while 21.4% infants (3 babies) among No KMC group expired, (p = 0.621, NS).

Table 3: Division according to birth weight and gestational age.

	No KMC	KMC	Total
Birth weight			
<1 kg	5	2	7
1-1.5 kg	8	8	16
>1.5 kg	1	4	5
Gestational age			
<30 week	3	6	9
30-32 week	9	8	17
>32 week	2	0	2

Total five newborns expired out of 28. There were seven babies <1 kg out of whom two (28.5%) expired. There were 16 newborns between 1-1.5 kg out of whom three (18.7%) expired. Among nine newborn of <30 weeks, two (22.2%) expired and among 17 newborns of 30-32 weeks, three (17.6%) expired.

Seven (50%) infants among KMC group had exaggerated physiological jaundice, and three (21.4%) among NO KMC developed jaundice, (p = 0.236 NS).

Three newborns (one KMC, 7.14%; two NO KMC, 14.28%) out of 28 had positive blood culture report (p = 0.541 NS).

Most important observation in our study was the time duration required to wean the infant from assisted respiratory support (Table 2). KMC group required an average of (40.36±12.99) hours, while NO KMC group required (52.21±24.37) hours, to get weaned off from assisted respiratory support (p = 0.125 NS). At the end mothers were convinced and hopeful for the beneficial effects of KMC.

DISCUSSION

KMC gives good support to the growth of the baby as well it helps to maintain the baby its normal physiological activity in body system.¹³⁻¹⁵

Mothers who were giving KMC had faith in KMC, and they believed that KMC will help their babies to grow faster and it will help their babies to get early discharge. We found that during the KMC mother were feeling good and they were taking proper care of their baby very gently.¹⁶⁻¹⁸

Even KMC Was found to decrease the pain in newborn during the icu procedures (like sampling and IC insertion).¹⁹ Mothers were cooperative and following instructions given to them. KMC was well accepted among the family. And mothers were getting good support from their family members as well.

In present study we observed that privacy was not an issue for mothers, they were quite comfortable during the

KMC hrs as males were not allowed in NICU, except for a short time of 10 minutes daily for the father. KMC initially seemed strange and difficult for all the participants during the first few hours in the NICU ward and their satisfaction evolved gradually as they experienced its benefits.

According to the World Health Organisation, nearly one in 10 babies worldwide is born preterm (before 37 completed weeks of gestation), with resulting birth complications the leading cause of death among children under five.

Preterm birth rates are rising globally every year, yet more premature babies are born in low-income countries (9%), where they face a greater risk of complications than high-income countries (12%). In Malawi, for example, 18 in every 100 births are preterm.

Many survivors face a lifetime of disability including learning disabilities and visual and hearing problems and require extra care to avoid illness and death from secondary, preventable complications including hypothermia. In developing countries, where incubators are often scarce and unreliable, kangaroo mother care could save lives.

A premature infant is born somewhere in the world every two seconds. This study shows that kangaroo mother care gives premature and low birth-weight babies a better chance of thriving. Kangaroo mother care saves brains and makes premature and low birth-weight babies healthier and wealthier.

While the technique does not replace modern science or neonatology, it is an excellent complement. The study's positive findings are impossible to attribute to one reason alone. Rather, they result from a multidisciplinary approach involving regular skin-to-skin contact, breastfeeding, education of the mother and family, and support over period of hospitalisation. So, we firmly believe that this is a powerful, efficient, scientifically based healthcare intervention that can be used in all settings, from those with very restricted to unrestricted access to healthcare.

CONCLUSION

It is possible to give KMC in preterm infants from the day of birth onwards who are on CPAP. KMC babies had less episodes of apnoea, hypothermia, sepsis, and reduced mortality, and more jaundice. KMC is beneficial in early weaning from assisted ventilation. However, the effect was statically not significant.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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