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Original Research Article

A HOSPITAL BASED PROSPECTIVE STUDY TO ASSESS THE IMPACT OF CONTINUOUS KANGAROO MOTHER CARE INITIATED IMMEDIATELY AFTER BIRTH (IKMC) V/S CONVENTIONAL CARE OF NEWBORN WITH BIRTH WEIGHT BETWEEN LESS THAN 2 KG AT TERTIARY CARE CENTRE

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ABSTRACT

Background: Kangaroo Mother Care (KMC) applied after stabilization of the infant has been shown to reduce mortality by 40% among hospitalized infants with a birth weight of less than 2.0 kg. In these studies, infants were randomly assigned and KMC was initiated after about 3 days of age, when the majority of neonatal deaths would have already occurred. The aim of this study to evaluate the safety and efficacy of continuous KMC initiated immediately after birth for neonates with a birth weight of less than 2 kg compared with initiating KMC after stabilization in improving survival.

Materials and Methods: our study is prospective randomised controlled trial, conducted in the Department of Pediatrics, Shri Jagannath Pahadiya Medical College, Bharatpur. Neonates with birth weight less then 2 kg were enrolled in this study and randomly assigned to immediate KMC (intervention) and control group (KMC after stabiliztaion). The intervention involves initiating continuous skin-to-skin contact as soon as possible after birth, encouraging and supporting early exclusive breastfeeding, and delivering health care for both mother and baby with minimal separation. The main outcomes measured were mortality rates from enrollment to 28 days of age and from enrollment to 72 hours of age.

Results: Our study showed that 1000 infants from 1060 mothers met the weight criteria for enrolment. The median time to initiation of skin-to-skin contact in the intervention group was 1.3 hours (interquartile range, 0.3 to 2.8) and that in the control group was 53.6 hours (interquartile range, 32.5 to 90.6). The median duration of NICU stay was 6.5 days in both groups. During the NICU stay, the median daily duration of skin-to-skin contact in the intervention group was 16.5 hours and that in the control group was 1.48 hours. From enrolment to 28 days of age, 60 infants (12.0%) in the intervention group and 80 infants (16%) in the control group died ($P<0.05$*). From enrolment to 72 hours of age, 24 infants (4.8%) in the intervention group and 30 infants (6%) in the control group died ($P>0.05$).

Conclusion: We resulted in a significantly lower risk of neonatal death than the currently recommended initiation of kangaroo mother care after stabilization.

Keywords: Immediate kangaroo mother care, Conventional care, Infants, Low birth weight, Neonatal death, NICU.

INTRODUCTION

Infants with low birth weight who are born preterm, are small for their gestational age, or both constitute approximately 15% of all neonates worldwide but account for 70% of all neonatal deaths.[1] Complications of preterm birth result in >1 million neonatal deaths/year,[2] with the highest risk of death during the first 24 h after delivery.[3]

Birth weight <2000 g is a proxy for prematurity yet this group of vulnerable neonates may also include term neonates who are small for gestational age (SGA) as well as preterm neonates with or without growth restriction.

Several interventions have been proven to be effective for improving survival of LBW infants, such as antenatal corticosteroids, breastfeeding, hygiene, case management of suspected infections, and hospital care of small babies, including Kangaroo Mother Care (KMC).[4]

"Kangaroo mother care," defined as both continuous skin-to-skin contact of the infant with the chest of the mother (or another caregiver when not possible with the mother) and feeding exclusively with breast milk, is among the most effective interventions for preventing death in infants with low birth weight.[4] World Health Organization (WHO),[5] guidelines currently recommend initiation of short, intermittent sessions of kangaroo mother care when the infant's condition begins to stabilize and continuous kangaroo mother care when the infant's condition has stabilized.

Preterm infants have fundamental challenges to maintain thermoregulation and become cold very rapidly after birth and to a great extent this can be prevented by SSC. Evidence shows that KMC reduces mortality, possibly by helping maintenance of better thermoregulation, facilitating the earlier initiation of breastfeeding, reducing the risk of nosocomial infection, reducing the risk of apneic attacks, and promoting bonding of the mother–infant dyad.[6]

For the routine care of newborns weighing 2.0 kg or less at birth, the "WHO recommendations on interventions to improve preterm birth outcomes" recommend KMC, which should be initiated in health-care facilities as soon as the newborns are clinically stable.[7]

These babies should be provided with as close to continuous KMC as possible. Currently, there is no recommendation for KMC for unstable neonates weighing less than 2 kg at birth. The impact of the KMC intervention could have been much larger had it been initiated immediately after birth. However, this has not been evaluated in LBW infants. Therefore, we aim to evaluate the safety and efficacy of continuous KMC initiated immediately after birth for neonates with a birth weight of less than 2 kg compared with initiating KMC after stabilization in improving survival.

MATERIALS AND METHODS

This is a hospital based prospective study done on all infants with a birth weight less than 2 kg (regardless of gestation, mode of delivery) who were assigned to receive immediate kangaroo mother care (intervention) or conventional care in an incubator or a radiant warmer until their condition stabilized and kangaroo mother care thereafter (control) in NICU at Shri Jagannath Pahadiya Medical College, Bharatpur, Rajasthan, India during one-year period.

Exclusion Criteria

1. Major congenital malformations
2. Lack of written informed consent within 24 h of admission

Procedure

Changes in the nature of obstetrical and neonatal care as well as structural changes in the neonatal intensive care units (NICUs) were necessary for mothers providing immediate kangaroo mother care. In this study reclining chairs were provided for KMC along with radiant warmer in the NICU. Infants receiving kangaroo mother care were secured firmly to the mother's chest with a binder that ensured a patent airway.[8] All care of the mother and infant was provided while skin-to-skin contact was maintained, if possible, and all interruptions in kangaroo mother care were documented.

Infants who were assigned to the control group, in accordance with standard practice. Mothers provided expressed breast milk and participated in brief sessions of kangaroo mother care when their infant began to recover from preterm birth complications and was at least 24 hours old.

Hospital staff provided care for all infants enrolled in the study, in accordance with the WHO minimum-care package for small infants.[9] In both the intervention and control groups, once infants were clinically stable (as determined on the basis of prespecified criteria),[10] for 24 hours, they were transferred to the step down unit, where continuous kangaroo mother care was provided for all infants until discharge.

Outcomes

The primary outcomes were mortality from enrollment to 28 days of age and mortality from enrollment to 72 hours of age. The secondary outcomes included hypothermia (any axillary temperature <36°C), hypoglycemia (any blood glucose level of <45 mg per deciliter, measured when clinically indicated), suspected sepsis, time to clinical stabilization, exclusive breast-feeding (only by suckling) at the time of discharge, exclusive breast-feeding at the end of the neonatal period (at 28 days of age), maternal satisfaction with care, and maternal depression.[10]

RESULTS

Our study showed that 1000 infants from 1060 mothers met the weight criteria for enrolment.

Among them, 500 infants assigned to immediate kangaroo mother care and 500 infants assigned to conventional care, including kangaroo mother care after stabilization.

The mean gestational age at birth was 31.9 weeks in interventional group & 32.7 weeks in control group. The mean birth weight 1.36 kg in interventional group & 1.48 kg in control group. [Table 1]

The median time to initiation of skin-to-skin contact in the intervention group was 1.3 hours (interquartile range, 0.3 to 2.8) and that in the control group was 53.6 hours (interquartile range, 32.5 to 90.6). The median duration of NICU stay was 6.5 days in both groups. During the NICU stay, the median daily duration of skin-to-skin contact in the intervention group was 16.5 hours and that in the control group was 1.48 hours. [Table 1]

From enrolment to 28 days of age, 60 infants (12.0%) in the intervention group and 80 infants (16%) in the control group died (P<0.05*). From enrolment to 72 hours of age, 24 infants (4.8%) in the intervention group and 30 infants (6%) in the control group died (P>0.05). [Table 1]

The proportion of infants with suspected sepsis was 23% in the intervention group and 27.8% in the control group, hypothermia was documented in 5.6% and 8.4% of infants, respectively. The time to stabilization and the incidence of hypoglycemia, feeding fully by suckling at the time of discharge, and exclusive breast-feeding at the end of the neonatal period were similar in both groups. [Table 1]

Table 1: Comparison of different variables in between interventional & control groups

Variables	Intervention	Control	P-value
Total No. of Mother-infants pair	500	500	-
Median age of infants at enrolled (Min.)	34	33	>0.05
Mean birth weight of infants	1.36±0.2	1.48±0.3	>0.05
Mean gestational age of birth (wk)	31.9±2.8	32.7±2.6	>0.05
Delivery by caesarean section	175 (35%)	170 (34%)	>0.05
Median duration of skin-to-skin contact (hr/day)	1.3 (0.3-2.8)	53.6 (32.5-90.6)	<0.05*
Median duration of skin-to-skin contact in NICU (hr/day)	16.5 (12.5-19.3)	1.48 (0.3-2.9)	<0.05*
Death between enrolment and 28 days	60 (12%)	80 (16%)	<0.05*
Death between enrolment and 72 hours after birth	24 (4.8%)	30 (6%)	>0.05
Suspected Sepsis	115 (23%)	140 (28%)	>0.05
Hypothermia	28 (5.6%)	42 (8.4%)	>0.05
Hypoglycemia at any time 0 and 36 hr after birth	52 (10.4%)	50 (10%)	>0.05
Mean duration of hospital stay (days)	14.6±0.3	15.2±0.2	>0.05

DISCUSSION

The WHO has strongly recommended immediate KMC for preterm or LBW neonates.[11] However, compliance with immediate KMC remains low in most parts of the world due to several reasons: (a) iKMC requires an initial investment to establish mother-newborn intensive care units (M-NICU) and train healthcare professionals, (b) safety concerns arise when initiating iKMC before stabilizing the neonate, particularly in resource-constrained settings with limited monitoring capabilities, (c) the evidence for its benefits is unclear, with the OMWANA study not indicating any mortality benefit, although it shows promising economic benefits.[12]

Implementation of the intervention required the mother or a surrogate to be with the infant 24 hours a day for the duration of stay in the NICU, which required the establishment of Mother–NICUs. The lower observed rates of hypothermia and suspected sepsis, though not adjusted for multiplicity, are consistent with results for the primary outcome and may at least in part explain the lower mortality among the infants receiving immediate kangaroo mother care.

Findings for the primary outcome and for infection and hypothermia were similar to those reported in earlier trials of the use of kangaroo mother care in clinically stable infants.[13] However, we did not find significant differences between the intervention and control groups in the two prespecified feeding outcomes — being fully breast-fed by suckling at discharge and being fed exclusively through breast-feeding at the end of the neonatal period — despite post-hoc analyses suggesting that in the intervention group there were higher rates of initiating breast-feeding within 24 hours, putting the baby to the breast within 72 hours after birth, and reaching full breast-feeding within 7 days of birth. Nor did we find a material difference between groups in the time to stabilization, unlike two previous studies involving a similar intervention.[14,15] As compared with the studies that achieved intermittent kangaroo mother care in the Cochrane review,13 we achieved high compliance with the intervention — that is, approximately 17 hours of skin-to-skin contact per day.

There are several possible mechanisms by which immediate kangaroo mother care might confer benefit. Since the mother and baby are in close contact from birth, the baby is more likely to be colonized by the mother's protective microbiome and more likely to receive early breast-feeding. There is also less handling of the baby by other persons, thus reducing the risk of infection.[16-18] Constant monitoring of the infant by the mother, more frequent monitoring of the infant's glucose levels, and absence of stress,[19] related to mother–infant separation may also have contributed to reduced mortality. Further studies in well-resourced settings could help to determine to what extent these enhanced survival

results in low- and middle-income countries are relevant to settings in which mortality is low and intensive infant monitoring is provided. We observed that the risk of death was lower in infants who received more hours of skin-to-skin contact per day. However, this association is subject to confounding by medical issues in the infant that may have precluded prolonged skin-to-skin contact.

The results of the study are generalizable to most hospitals in low-resource settings in which immediate kangaroo mother care can be implemented as described here. Challenges in scaling up of the intervention include the involvement of multiple stakeholders, the establishment of Mother–NICUs, the need for strong collaboration between the obstetrics and neonatal departments, and changes in policy that would allow surrogates to provide kangaroo mother care.

CONCLUSION

Immediate KMC can potentially reduce low-birth-weight-associated complications such as respiratory disease, hypothermia, hypoglycemia, and infection that can result in impaired neurocognitive development. We resulted in a significantly lower risk of neonatal death than the currently recommended initiation of kangaroo mother care after stabilization.

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