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Original Research Article

A study on breastfeeding initiation in low birth weight and very low birth weight babies and their developmental outcome with special reference to kangaroo mother care

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ABSTRACT

Background: Kangaroo Mother Care (KMC) was developed for caring of low birth weight (LBW) babies in developing countries. Study was done with the objective to evaluate the factors affecting initiation of breast feeding and effect of Kangaroo Mother Care (KMC) on morbidity problems and developmental outcome in Low Birth Weight (LBW) and Very Low Birth Weight (VLBW) babies.
Methods: Prospective follow-up cohort study was carried out at Neonatal Intensive Care Unit (NICU) at Narayana medical college hospital Nellore from January 2018 to December 2019 and details of neonates were recorded on prestuctured proforma. Kangaroo mother care was given to one group. ASQ 3 questionnaire was used to assess the developmental outcome of the infants.
Results: In this study, 100 babies were divided into two groups, case group consists of 50 babies where KMC is given and another control group consists 50 babies where KMC is not given. Mean gestational age for case and control group babies were 34.5 and 33.7 weeks respectively. Mean Birth weight in cases (1700 gr) and control (1580) grams respectively. Number of Male babies were more in cases (51%) and Group B (53%). Main factors affecting the initiation of breastfeeding in babies are LSCS (62% and 48%), RDS (50% and 40%), Apnea (24% and 25%) and seizures (20% and 14%) respectively in case and controls. Rates of exclusive breastfeeding is significantly increased in cases (90%) when compared to control (72%). Morbidity in cases is comparatively lesser than controls. At 6 months of corrected gestational age, mean weight in cases (5.2 kg) is significantly more than mean weight in control (4.7 kg). Significant development is noticed in communication (p=0.036), gross motor (0.04), and fine motor (0.05) compare to controls. Percentage of babies who acquired better personal social skills are more in cases (80%).
Conclusions: The main factors affecting the initiation of breastfeeding in LBW and VLBW babies are LSCS, RDS, not secreted milk and seizures. KMC helps to achieve smooth and early transition to direct breastfeeding, increases the exclusively breastfeeding rate, better growth and developmental outcome and reduces the morbidities in LBW neonates.

Keywords: Developmental outcome, Exclusive breastfeeding, Head circumference, Kangaroo mother care, Low birth weight

INTRODUCTION

The World Health Organization (WHO) defines prematurity as birth before 37 completed weeks of pregnancy. A newborn infant weighing less than 2500 g at birth is termed as Low Birth Weight (LBW) neonate. Low birth weight is further categorized into very low birth weight (VLBW, <1500 g) and extremely low birth weight (ELBW, <1000 g).[1] The LBW can be caused by either prematurity or intrauterine growth retardation

(Small for Gestational Age or SGA). Globally, it is estimated that 15-20% of all births, or >20 million newborns annually, are low birth weight infants.[2] The incidence of Low Birth Weight (LBW) in India varies between 25-30% and of which 60-65% are because of Intra Uterine Growth Retardation (IUGR).[3] Majority of LBW neonates in India weigh between 2000-2499 g. According to the National Neonatal Perinatal Database of the National Neonatology Forum, India; the incidence of LBW in tertiary care centers is 32.8 percent with only 14% neonates weighing less than 2000 g. We are home to eight million LBW infants born each year and around three fourths of them are delivered at full term of gestation.[4,5]

LBW is the most significant factor contributing to neonatal mortality and morbidity. These neonates are at higher risk of asphyxia, sepsis, hypothermia, and feeding problems, etc. Common illnesses tend to be more severe and last longer in this group. Apart from immediate problems, LBW neonates are prone to long term disorders like infections, malnutrition, and neurodevelopmental disabilities.[6] Medical advances in NICU coupled with program to regionalizing perinatal care have improved survival of VLBW who are prone for long term complications as compared to their term counterparts.[7-10] Proper feeding practices during infancy and childhood might permanently shape individual's life course. Feeding practices which comprise of exclusive breastfeeding and complementary feeding can be a support to the child. To a large extent, breast milk is more than just food. It is also a potent medicine that is tailored to the needs of each child. Breast Feeding (BF) is well known since ancient age and has been practiced universally. National Family Health Survey (NFHS) reports that 96 % of children in India are breast fed. Kangaroo Mother Care can be a very effective intervention in optimizing the neonatal outcome in low birth babies. Kangaroo Care (KC) or Skin to Skin Care (SSC) is the method of placing an infant between or on the mother's breasts dressed only in a hat and nappy so that the frontal contact of mother and baby is skin to skin.[11] The exclusive breast fed number is just 43% in the age group 0-6 months all over the world. In low and middle income countries children aged <6 months age who received top feeds in addition to breast milk were up to 2.8 times more likely to die than their exclusively breast fed counterparts; the risk of dying was 14 fold higher among those not breastfed at all.[12] In high and low income countries alike, long periods of breastfeeding are seen to be associated with higher intelligence scores and there is evidence that this transformed into improved academic performance and earnings capacity is increased to longer periods. Inspite of intensive efforts by the various governments, NGO's and WHO across the world, breastfeeding rates are still unsatisfactory especially in the developing world.[13-16] Breast feeding alone for initial 6 months is the most cost effective method for reducing infant deaths due to Diarrhoea, ARI and other infectious agents. Good breastfeeding practices can save up to 2.5 lakhs deaths annually occurring due to diarrhoea and acute respiratory tract infections. Breastfeeding also reduces the incidence and severity of various chronic ailments occurring later in life. Other benefits of breastfeeding include lower incidence of various cancers in mother, spacing and early gain of pre-pregnancy weight. Kangaroo Mother Care (KMC) is a nonconventional low-cost method of newborn care. It is one of the methods for protecting high-risk Low-Birthweight (LBW) and premature infants against developmental delay. It was introduced as a substitute for incubators and has become an effective and cost-effective alternate approach for providing thermal care of preterm and LBW infants thereby reducing the risk of mortality in this highly vulnerable group. Evidence show that with improved survival rate of VLBW and LBW infants, there is also increased rate of neurodevelopmental handicap. Along with this evidence, even some reports have shown improved survival without increased rates of handicap.[17]

Aim of the study was to determine the factors affecting the initiation of breast feeding in LBW, VLBW babies and to describe the role of kangaroo mother care in terms of morbidity patterns and developmental outcome at 6 months of corrected gestational age.

METHODS

Source of data

This prospective study of one year was conducted at the Neonatal intensive care in Narayana medical college Nellore. Author included all LBW (1500-2499 grams) and VLBW (1000-1499 grams) who gave consent to participate in the study.

Sample size

During one year of study period, all LBW (1500-2499 grams) and VLBW (1000-1499 grams) who gave consent for the study and stratified inclusion criteria were included in the study. A total of 50 subjects were included in each group based on the calculated sample size.

Inclusion criteria

- All LBW (1500-2499 grams) and VLBW (1000-1499 grams) irrespective of gestational age admitted to Neonatal intensive care within 24 hours of birth.
- The mother who gave consent for the study.
- Mothers who agreed for giving kangaroo mother care and regular follow-up till 6months of corrected gestational age.

Exclusion criteria

- Presence of lethal congenital anomalies or who sustained birth asphyxia
- Death in the hospital stay
- The mothers who did not give consent for study

Materials used

- ESSAE sensitive balance measuring scale
- Infantometer
- Non-stretchable tape
- Fenton preterm growth charts 2013
- WHO MGRS 2006 charts for girls and boys
- Corrected gestational age calculated by using formula
- (Chronological Age) - (weeks or months of prematurity)
- Tailored smooth kangaroo care bag

Data collection

All LBW and VLBW babies who were admitted to Neonatal intensive care units of Bapuji and Chigateri district hospital which are attached to JJM medical college during the study period were included in the study after satisfying the inclusion criteria.

The purpose of the study along with importance of breastmilk and kangaroo mother care in growth and development of the baby was explained to both the parents and who gave consent for to participate in the study were included. Data of these babies were collected and documented in preformed structured questionnaire, after taking consent from the parents. Data regarding personal history of mother, family history, obstetric history, socio-economic status, pregnancy complications, and reason for LSCS, Birth history were collected from mother. Reason for NICU admission and reason for not initiating breastfeeding were ascertained after taking history and examining the baby and the information was documented in the questionnaire.

Anthropometry

Anthropometric measurements were done to all the admitted babies in NICU. Weight was measured by using a single electronic weighing machine for all the babies to avoid error due to technical methods.

Length of the babies were measured by infantometer to the nearest 0.1 cm. Head circumference was measured using non-stretchable tape to the nearest 0.1 cm. The measurements were plotted on Fenton preterm growth charts 2013. Depending on the plot results, the babies were categorized into Small for Gestational Age (SGA), Appropriate for Gestational Age (AGA), Large for Gestational Age (LGA).

During NICU stay

All babies were treated accordingly to their medical illness. The recordings of weight were done daily whereas the head circumference and length were measured only twice at the time of admission and discharge.

Feeding

Feeding was started once there was an improvement in the baby's condition. The feeding guidelines was followed using WHO feeding of preterm low birth weight infant protocol. The mothers were counseled about the procedure of expression of breastmilk, feeding the baby with spoon, breastfeeding attachment with the help of breastfeeding counselors. Decision of choice of the feeding method (nasogastric tube feed or spoon/palladi feed/ direct breastfeed) was done by assessing baby's sucking reflex, swallowing sucking coordination, swallowing breathing coordination, corrected gestational age. Direct breastfeeding was started to baby after the attainment of corrected gestational age of 36 weeks and weight of more than 2 kilograms.

Kangaroo Mother Care (KMC)

KMC providers in the institution motivated mothers for giving KMC care by counseling them and showing KMC videos. Tailored smooth cloth bags were provided for the mothers to give kangaroo mother care. KMC was started once the baby was stabilized hemodynamically, with the frequency of 3 hours for 4 times in a day.

Follow up

To avoid confusion during discharge time we calculated corrected gestational age of 2 months, 4 months, 6 months and informed mother to come on first Tuesday after crossing that date. Immunization was done during follow up itself. During follow up visit, we collected information regarding feeding issues, any difficulties in providing KMC, any health issues in babies, top feeds. Anthropometric measurements like weight, head circumference and length were measured during follow up and were recorded in WHO growth charts.

At 6 months of corrected gestational age, developmental assessment was done by using Ages and Stages 3 (ASQ3) questionnaire; this contains 5 divisions - communication, gross motor, fine motor, problem solving and social. Each division has a set of questions and cutoff value. Developmental assessment for all babies was carried out by two persons to avoid observational bias.

Control group

Babies who were born during the study period and admitted previously in either of these NICUs without kangaroo mother care due to some reasons were included. The follow up of the control group babies was same as that of their counterpart.

Morbidity

Baby illness which required hospital admission for more than 5 days was considered as morbidity.

Statistical analysis

Data was analysed using SPSS version 22 software. Descriptive statistics like frequency, percentages, measures of central tendency, measures of dispersion and inferential statistical tests like chi-square test, t-test were used. The statistical significance was evaluated at 95% confidence level ($p<0.05$).

RESULTS

In this present study, males were high in number in both case (51%) and control (53%) group. The mean gestational age of the mothers in case and control was 34.1±2.3 and 33.2±2.12 weeks respectively. The mean age of the mothers in case and control group was 24.2 and 22.5 years respectively. 99% were literate in cases and 96% were literate in control group. In both the groups most mothers were primi gravida. In KMC group, 62% of the children delivered by LSCS and 48% in controls. In both the groups around 75% study participants had SGA, followed by AGA. In both the groups, more than 90% of the study participants had Apgar score >7 (Table 1).

The mean birth weight of the babies in cases and controls was1700 and 1580 gr respectively. The mean duration of stay in hospital in case and controls was nearly similar. 90% were exclusively breast fed in cases and 72% in control, with significant difference between the groups. 35% had health problems in cases and 65 % in control with significant difference. 50% of infants had respiratory distress with oxygen requirement among case group and 40% in control.

Table 1: Demographic variables of control and Kangaroo mother care (KMC) groups.

	Demographic variables	Control	KMC	p
Maternal profile	Age (years)	22.5±2.45	24.2±1.95	0.08
Socioeconomic status	Class 1	6%	20%	0.04
	Class 2	33%	36%	
	Class 3	38	36	
	Class 4	23%	8%	
Educational status	Illiterates	4%	1%	0.09
	literates	96%	99%	
Gravida	Primi	65%	57%	0.215
	Multi	35%	43%	
	Single ton pregnancy	96%	97%	0.24
	Multiple ton pregnancy	4%	3%	
Type of delivery	LSCS	48%	62%	0.08
	Normal vaginl	52%	38%	
Birth characteristics	Mean GA (wks)	33.2±2.12	34.1±2.3	0.8
Distribution of GA	28-30 wks	5%	7%	0.07
	30-32 wks	26%	24%	
	32-34 wks	37%	34%	
	34-36 wks	28%	30%	
	>36 wks	4%	5%	
Sex	Male (%)	53%	51%	0.08
	Female (%)	47%	49%	
	Mean birth weight (grams)	1580 ± 450	1700 ± 630	0.001
Distribution of birth weight	1200-1399 g	15%	18%	0.001
	1400-1599 g	30%	32%	
	1600-1800 g	55%	50.%	
	Head circumference (cm)	30.5 ± 1.45	31.2 ± 1.53	0.12
	Length (cm)	40.9 ± 2.5	42.5 ± 2.1	0.09
	APGAR 1 MIN	4±0.87	4.2±0.9	0.14
	APGAR 5 min	6.5±0.8	6.3±0.7	0.71
Segregation of new-born according to Fenton 2013 premature infants	AGA	23%	24%	0.245
	LGA	3%	0%	
	SGA	74%	76%	

AGA appropriate for gestatinal age, SGA small for getational age, GA gestational age, significant ($p>0.05$)

NEC was observed in 38% and 30% of cases and control group. The incidence of apnea was found in 24% and 25% in cases and controls. At final follow up, the mean weight of the babies in the case group was 5.2 with mean difference of 3.9. The mean HC at the final follow up was also similar with no statistical significance (59.1 vs 58.5 cm) (Table 2).

Table 2: Variables in KMC and conventional care.

		Control	KMC	p
Personal social scores	<25.34	32%	28%	
	>25.34	68%	72%	0.06
Problem solving scores	≤27.72	20%	17%	0.6
	>27.72	80%	83%	
Fine Motor	<25.14	42%	23%	0.05
	>25.14	58%	77%	
Gross Motor	≤22.25	38%	21%	0.002
	>22.25	62%	79%	
Communication scores	≤29.65	12%	10%	0.04
	>29.65	88%	90%	
At 6 months of corrected gestational age (Increase)	Weight (in kg)	3.4±0.45	3.9±0.04	0.04
	Length (in cm)	18.5±2.9	17.5±1.6	0.004
	HC	8.9±1.4	8.2±1.2	0.03
6 months of corrected gestational age	6 months of corrected gestational age -Weight (in kg)	4.78±0.7	5.2±0.9	0.000
	6 months of corrected gestational age -Length (in cm)	40.5±1.5	41.2±1.6	0.813
	6 months of corrected gestational age -HC	58.5±2.9	59.1±3.2	0.67
	health problems during follow-up	65%	35%	0.015
	Feeding Mixed	68%	33%	0.002
	exclusive breast feeding	72%	90%	0.000
	Mean hospital stays	23%	3.1%	0.77
	Percentage of IVH	12%	12%	0.05

Table 3: Factors affecting the initiation of breast feeding in LBW and VLBW babies.

	Control	KMC	p
NNHPT	39%	56%	0.015
NNHET	7%	4%	0.176
NEC	30%	38%	0.09
Not secreted milk	22%	29%	0.132
Respiratory distress with oxygen requirement-yes	40%	50%	0.03
Apnea	25%	24%	0.89
Seizures	14%	20%	0.320
Sepsis	13%	20%	0.07
LSCS	48%	62%	0.08

A 90% and 88% of the infants in cases and control group had communication score >29.65. In both the groups, most of the study participants' (Case-79%, Controls-62%) gross motor score was >22.25.

In both the groups, most of the study participants' fine motor score was >25.14 (Case - 77%, Control - 58%) (Table 3).

DISCUSSION

In the present study, the factors affecting the initiation of breast feeding in LBW, VLBW babies were studied. In the present study, males were high in number in both case (51%) and control (53%) group. Similar presentation of high frequency of male babies was noted in other studies.[18,19] The mean gestational age of the mothers in case and control was 34.1±2.3 and 33.2±2.12 weeks respectively. Similar significance was found in the study done by Gathwala G et al.[19]

The mean age of the mothers in case and control group was 24.2 and 22.5 years respectively. In another study, the mean age of the mothers was 27.75±5.45 and 28.10±6.03 years among KMC given and not given group20. In this study, 99% were literate in cases and 96% were literate in control group.[19] Similar state of literacy was observed in other study by Narayan SCS et al.[21] In both the groups most mothers were primi gravida. This is in contrast with the study by Narayan SCS et al, where majority of the mothers were primigravida.[21] In KMC group, 62% of the children delivered by LSCS and 48% in controls.

In both the groups around 75% study participants had SGA, followed by AGA (around 23% in each group). Similar high representation of SGA was found in the study by RPN Suman et al, in contrast, AGA babies were more than SGA in a study conducted by Swarnkar K et al.[20,22]

In both the groups, more than 90% of the study participants had Apgar score >7. There was no significant association of Apgar score between the groups.[20] This is in contrast with the study by Heidarzadeh M et al, where there was no significant difference found between the Apgar score at 5 min and the groups.[23]

The mean birth weight of the babies in cases and controls was1700 and 1580 gr respectively. There was significant difference between the mean birth weight and the groups. In contrast, the mean birth weight was less (around 1.3 kg) in a study by Jayaraman D et al, with no significant difference between the groups.18 Similar no significant difference between birth weight of the babies was found by Tessier R et al.[24]

The mean duration of stay in hospital in case and controls was nearly similar. In another study, though similar non significance was found by Swarnakar K et al, (Case - 11.49+1.7, Control-12.59+2.63) and RP Suman et al, (Case - 12.78±6.27 and control - 12.86±5.77), the duration of stay was found to be less.[20,23,24] 90% were exclusively breast fed in cases and 72% in control, with significant difference between the groups. Similar significance was found in other study.[20-24]

In this study, 35% had health problems in cases and 65 % in control with significant difference. Similarly, nearly 45% of the infants had health problems in a study conducted by Lakew W et al.[25] 50% of infants had respiratory distress with oxygen requirement among case group and 40% in control.[25] In contrast, only around 9% and 18% needed CPAP in a study conducted by Jayaraman D et al, with no significance.

In this study, NEC was observed in 38% and 30% of cases and control group. The magnitude of NEC in this study was found to be high due to the inclusion of the newborns born outside the centre and were referred to NICU unit of the study area within 24 hours of the birth. In a meta-analysis done by Boundy EO et al, KMC did not have any significant effect on risk of necrotizing enterocolitis (RR 0.96).[26]

The incidence of apnea was found in 24% and 25% in cases and controls. This percentage was less in the studies conducted by Swarnakar K (no cases in KMC group, 6.75 in CMC group) and RP Suman (4.3% in cases and 44.4% in controls.

The association between sepsis and the groups was not significant but the rate of sepsis in this study was seen to be high in cases (20%) as compared to control (13%). But in other studies, sepsis was found to be less in KMC given group by Swarnkar K (6.7%), KMC meta-analysis (RR 0.67;), RP Suman (3.9%). The explanation that can be given here for high rate of sepsis is due to referral of high-risk babies to NICU unit within 24 hours of the birth.

The association between the mean birth weight and the groups is significant. At final follow up, the mean weight of the babies in the case group was 5.2 with mean difference of 3.9 and was found to be significant. Similarly, there was significance found in the weight gain between case and control group22,23. The mean of the HC was almost similar in cases (31.2) and control (30.5). The mean HC at the final follow up was also similar with no statistical significance (59.1 vs 58.5 cm). But the mean gain in the HC was statistically significant with mean of 8.2 in case group and 8.9 in control group. Bera A in his study found that there was less physical development in KMC group than the control group because of their low gestational age. By the end of 6 months, the babies receiving KMC care had surpassed their study counterparts in physical growth.[16]

In this study, the areas like communication, problem solving, and personal-social areas are taken under cognitive area. 90% and 88% of the infants in cases and control group had communication score >29.65. Chi square result showed that there was significant association between communication and groups (p=0.04). With problem solving area and personal social area, there was no significance found between the groups. In line with these results, Ribeiro CC et al, found significant difference between the groups in areas of language, personal-social using DDST II scale.[27]

Teissier et al, used Griffiths test was used to determine the mental development in six areas-locomotor, personal-social, hearing and speech, eye and hand coordination, performance, and practical reasoning. The differences found between cases and controls was found to be significant.[28]

In both the groups, most of the study participants' (Case-79%, Controls-62%) gross motor score was >22.25. there was significant association between gross motor score and KMC (p value=0.002).

Denver Developmental Screening Test (DDST II) was used in a study by Ribeiro CC et al, to compare the performance of children born premature with Low Birth Weight (LBW) and Very Low Birthweight (VLBW) with that of children born at term. There were statistically significant results found between the groups.[27]

Ballot DE et al, found that there was no difference found in the mean composite score between the study group (VLBW) and controls for the motor (p=0.57) subscales.[29]

Ballot DE et al, in his study using Bayley Scales of Infant and Toddler Development Version 111 (BSID) to assess

development of the infants found that the mean motor subscale was 90.05 with 7.6% having score of less than 70.

In both the groups, most of the study participants' fine motor score was >25.14 (Case - 77%, Control - 58%). The result of Chi-Square test showed that there was significant association between fine motor score and KMC (p value=0.05). Similar to this study, statistically significant results were found in a study using DDST II scale.[27]

CONCLUSION

The main factors affecting the initiation of breastfeeding in LBW and VLBW babies are LSCS, RDS, not secreted milk and seizures. KMC care helps to reduce morbidity in infants, also helps to increase exclusive breastfeeding rates, better growth and developmental outcome.

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