

Follow-Up Profile and Outcome of Preterms Managed with Kangaroo Mother Care

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Abstract

Background: Kangaroo mother care (KMC) is effective in preventing hypothermia, establishing breastfeeding, and reducing nosocomial infection in preterm babies in resource-limited areas. Relatively little is known about long-term morbidity and mortality outcomes among Ethiopian infants managed with KMC. **Aims:** To describe the follow up profiles and outcome of infants managed with KMC and discharged alive. **Methods:** This cross-sectional descriptive study examined outcomes among infants who were 1) managed by KMC at Black Lion Hospital, 2) discharged alive, and 3) available for follow-up. Structured, pretested questionnaires were administered to mothers. **Results:** Of the 110 infants included in the study, 9.1% died over the study period and 60% of the deaths occurred at home. Mortality was 100% in those babies with mothers aged less than 18 years. Thirty five percent of the deaths occurred in those from rural location. Common medical problems identified in study subjects were respiratory infections (10%), gastroenteritis (7%), rickets (7%), and anemia (6%). About 20% of infants were readmitted to hospital at least once. KMC initiation within one week was not found to be significantly associated with survival, but continued KMC after discharge significantly decreased mortality in our sample. **Conclusion:** Frequent follow up is very important especially those with teenage mothers and coming from a rural location. Follow up should be frequent in the first 2 months after discharge. Further research is needed to explore the determinants of mortality and morbidity after hospital discharge.

Keywords

Preterm, Very Low Birth Weight, Kangaroo Mother Care, Follow Up Profile

1. Introduction

Survival among neonates is directly related to birth weight, with approximately 20% surviving among those between 500 and 600 g and 90% among those between 1250 and 1500 g. In the US, where life-support technology

is readily available, VLBW infants account for >50% of neonatal deaths and 50% of disabled infants [1]. A study done in hospital setting in Ethiopia showed 32.8% mortality for low birth weight infants and many had hypothermia as a related cause of death [2]. Considering the high mortality related to hypothermia and prematurity, KMC is started as a way of reducing low birth weight mortality in black lion hospital. KMC is one of the interventions proven to be a safe alternative to conventional neonatal care in resource-limited settings [3]. However, little is known about long-term outcomes.

KMC is a package of care including skin-to-skin contact, exclusive breastfeeding, support to the mother child dyad, and avoiding mother-child separation [4]. Some centers also include early discharge in the definition but this approach is only warranted where good community support can be guaranteed. These activities are important to the medical, emotional, psychological, and physical well being of both the mother and the child [5] [6].

Black lion specialized general hospital is a tertiary level referral and teaching hospital which delivers comprehensive care to sick neonates. It has a 40-bed neonatal and 10 bed KMC unit. All preterm neonates weighing <1500 grams born in black lion hospital or in other district hospitals will be sent to KMC unit. KMC consisted of skin-to-skin contact on the mother's chest 24 hours/day, nearly exclusive breastfeeding, and early discharge, with close ambulatory monitoring.

The neonates are discharged once they are able to breast feed and show persistent increment in weight for 3 consecutive days. During discharge process, address and important data will be entered into a computer and appointment will be given to high-risk infant clinic at the same hospital.

Little research has explored how KMC affects the health and well being of infants after discharge from hospital. This study will assess the clinical condition, follow up profile and determinants of morbidity and mortality of infants treated with KMC and discharged alive from Black lion specialized hospital neonatal unit.

2. Methods

A descriptive cross sectional study was conducted. Children treated with KMC at Black Lion hospital from July 2009 to May 2010 and discharged alive were included in the study. We had managed 140 VLBW neonates in the neonatal unit through the study period. The neonates were referred from black lion maternity unit and other hospitals and health centers. Twelve neonates died before discharged from KMC. About 128 VLBW neonates were discharged alive. We were able to contact and retrieve 110 neonates who were discharged alive from the hospital. Eighteen children whose caretakers were not willing to come to the follow up clinic, or not willing to participate in the study were excluded.

Data about live infants were collected by using an interview based questionnaire and physical examination. Information about weight at KMC initiation, duration of KMC, and address, were extracted from a computerized registry and patient charts. Parents who were not bringing their children for follow up were contacted by phone and follow up was arranged. Senior paediatrician interviewed mothers at high-risk infant clinic after verbal consent was obtained. Parents of the study subjects were asked about and evaluated for presence of medical problems, history of health institution visit, type of feeding, and hospital admission. Delay in KMC initiation was calculated from the time of hospital admission to the first date of KMC. Type of feeding practiced during hospital admission and discharge was analyzed in relation to medical problems encountered during the study. Sick children who came to the follow up clinic at the time of the study were treated.

Parents whose infants had died were interviewed by phone after verbal consent was taken. Data were collected by a structured verbal autopsy questionnaire. Demographics, clinical problems and presumed causes of death as described by the parents are mentioned.

Data were processed with a Statistical package SPSS version 16 (SPSS Inc., 233 South Wacker Drive, 11th Floor, Chicago, IL 60606-6412). Measures of central tendency and dispersion with graphical presentation of data were used for summarising descriptive findings. Statistical associations between different variables and outcome were checked using chi-square and fisher's exact tests. A p-value of 5% was used for the statistical analyses used in this study.

Ethical clearance was obtained from department of Pediatrics and child health research and publication committee and from Addis Ababa University Medical Faculty, Institution Review Board, Addis Ababa, Ethiopia.

3. Results

A total of 110 infants and toddlers were included in this study. 57 (51.8%) study subjects were females. The

mean age at evaluation was 12.4 months with a standard deviation of 7.1. 96 (87.3%) study subjects lived in urban areas. 101 (92%) mothers were between 18 and 35 years of age. 3.6% of infants had mothers aged less than 18 years.

Spontaneous vaginal delivery accounted for 52.7% of the cases. The rest were delivered either by assisted vaginal delivery or caesarean section. Most of the babies were delivered at between gestational ages of 32 - 36 weeks (51%). The mean birth weight of the study subjects was 1336.2 grams with standard deviation (SD) of 211.5 grams. The mean duration of KMC given in the neonatal ward was 14 days with standard deviation (SD) 9. The mean delay in initiation of kangaroo mother care was 11 days.

KMC was continued at home for an average of 2 weeks in 83.6% of infants. Out of 110 infants, only 79 (71.8%) returned back to the follow up clinic at least once. The continuation of KMC after discharge was associated with reduced mortality (6.5% vs. 23.5%, $P = 0.046$) (Table 1). Non-significant increases in mortality were noted among children that failed to follow-up after discharge. After discharge, 12.7% of them were on exclusive breast-feeding, 15.5% on formula feeding, 34.5% on mixed feeding and 37.3% were on family diet. Age appropriate feeding was seen only in 40% of infants.

Out of 110 infants, 36.4% had a history of unscheduled hospital visit, and 20% have history of hospital admissions. The most common medical problems encountered in live infants during the study were respiratory infections (10%), rickets (7%), gastroenteritis (7%), anaemia (6%) and other problems account for 14% of the study subjects (Table 2).

Nine percent of the study subjects died. No difference in deaths existed between sexes (5 vs. 5, $P = 0.090$). Mortality after discharge was 100% in infants whose mothers were aged less than 18 years (4, $P = 0.01$). Mortality was found to be high (90%) within the first 2 months of age, which abruptly decrease after the age of 4 months. Out of the 10 deaths encountered, 60% of them were witnessed at home while the rest have died in health institutions. Higher percentage of deaths (35.7%) was encountered in those living in rural areas.

Respiratory problems were mentioned as possible causes of death by caretakers in 6 (60%) of the cases while sudden unexpected death in 3 (30%) of them. Mortality rates have shown to be higher in infants who were on feeding other than exclusive breastfeeding at discharge (OR 5.7, CI 1.05, 41.5. $P = 0.02$) (Table 3).

4. Discussion

The demographics of our population were comparable to those described in the African literature. Since our

Table 1. KMC continued at home and outcome during follow up of neonates who were admitted, managed with KMC, and discharged alive from Black lion specialized general hospital, neonatal unit from July 2008 and May 2010 G.C. (OR = 4.462, CI = 1.108 to 17.965, $P = 0.046$).

	Died during follow up period
KMC continued at home	6/93 (6.5%)
KMC not continued at home	4/17 (23.5%)
Total	10/110 (9.1%)

Table 2. Table showing type of feeding at discharge versus medical problems identified during the study of neonates who were admitted, managed with KMC, and discharged alive from black lion specialized general hospital neonatal unit from July 2009 and May 2011 G.C. (This table excludes dead subjects).

Types of medical problems	Number of patients	Percentage
Gastroenteritis	7	7%
Respiratory problems	10	10%
Anaemia	6	6%
Rickets	7	7%
Others	14	14%
No problems documented or reported	56	56%

Table 3. Table showing type of feeding at discharge of neonates who were admitted, managed with KMC, and discharged alive from black lion specialized general hospital neonatal unit from July 2009 and May 2011 G.C. (OR 5.7, CI 1.05, 41.5, P = 0.02).

Type of feeding at discharge	Died during follow-up period
Breastfed	2/61 (3.3%)
Formula fed or mixed	8/49 (16.3%)
Total	10/110 (9.1%)

hospital is located in the centre of a city, however, most of our patients originated from urban or per-urban areas.

Almost 84% of infants in our study continued KMC at home, and those that continued KMC were more likely to survive. Our study adds to the fact that KMC is still very important intervention survival after discharge in the low-income country setting. A longitudinal study done in Kumasi, Ghana showed that infants who were on either continuous or intermittent KMC at home showed an optimal increase in weight [7]. There is lack of adequate researches to compare our findings and see how KMC affects infants when it is done at home.

Our study described the common medical problems encountered after hospital discharge. Respiratory infections, rickets, gastroenteritis, anaemia were identified as main medical problems in these infants. Other problems like central nervous system disorders, surgical problems, and congenital heart diseases were also seen in the study subjects.

We have also shown that rickets was one of the problems encountered in these infants. To our knowledge this association has not been reported elsewhere in the literature concerning infants managed with KMC. The result in our study could be low because of missed-diagnosis, higher age range of the study subjects and lack of other diagnostic modalities like radiography. Rickets at a very early age is less likely to be associated with lack of sunlight exposure and subsequent Vitamin D deficiency. When premature babies are fed human milk, the supply of both calcium and phosphorus is low, but the critical factor leading to rickets is the lack of phosphorus. Serum phosphate levels decrease and there is not enough substrate for incorporation into the organic bone matrix [8].

This study also examined the rate of hospital visits and re-admissions. LBW infants have high risk of readmission shortly after discharge mainly related to the underlying medical problems they have. In a study done in Zimbabwe, rate of hospital readmission in infants who had been managed and discharged after KMC is 22.9%, which is comparable to our finding [8].

Nine percent of infants in our study died after discharge, and most deaths occurred at home. Careful follow up of infants born to mothers from a rural area and those born to teenage mothers should be prioritized.

There are several limitations in this study. The generalizability of the study may be affected as many study subjects were from Addis Ababa, the capital city of Ethiopia. In Addis Ababa, health care service is better accessed than other regions. We also have a lower sample size to do some statistical analysis like logistic regression. Further research with a larger sample size may allow for such calculations.

5. Conclusion and Recommendation

Among infants discharged from our hospital that have received KMC, 9.1% died before 2 years of age. Teenage mothers, rural origin, and lack of KMC continuation were associated with death. Particularly high rates of respiratory infection, gastroenteritis, rickets, and anemia were appreciated over a period of follow up. We recommend frequent follow up for babies after discharge from our center, especially those with teenage mothers. Further researches like case control studies are needed to explore the determinants of mortality and morbidity after hospital discharge.

Authors' Contribution

Wubishet Lakew was involved in all phases of the study and Bogale Worku was involved in supervision and data cleaning.

Wubishet Lakew, MD is an assistant professor of pediatrics at University of Gondar and Bogale Worku, MD is a professor of Pediatrics at Addis Ababa University Medical faculty.

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