

Original article

Successful 'Kangaroo Mother Care': A Necessity for Preterm Low Birth Weight Babies in Rural Hospital Settings in Bangladesh

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Abstract

Kangaroo Mother Care (KMC) is a cost-effective solution in taking care of pre-term low birth weight neonates not only in developing countries with scarce resources, but also in developed countries with easy accessibility to technological advances like incubators. It provides an easy solution where the mother herself acts as an incubator and keeps the baby close to her in skin-to-skin contact, and provides the baby the warmth, food, shelter and love that the baby needs to ensure its survival. In this paper we described the successful management of a preterm baby born at 29th gestational weeks weighing only 980 gm in a rural setting without any incubator and other technological equipment. The baby was in a critical condition since birth and despite adequate medical therapy she remained hypothermic. The KMC was initiated to keep her warm and marked improvements were noticed in the baby. The baby was discharged at day-14 with a body weight of 1100gm. Baby was in regular follow up and subsequently at 2-months 24days, she reached a desired body weight of 2100gm with improvement in feeding, movement and vital signs. It is concluded that, in a limited resource setting, KMC can act as a very effective measure in preventing neonatal morbidity by adequate heat regulation, exclusive breastfeeding and promoting early discharge from hospital.

Keywords: Preterm, low birth weight; hypothermia; Kangaroo mother care; exclusive breastfeeding.

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Introduction

Death of newborns within 28 days of birth pose a major challenge to improving the survival rate of children <5 years in developing countries.¹ Bangladesh is a country burdened with a neonatal mortality rate (NMR) of 30/1000 live births, infant mortality rate (IMR) of 38/1000 live births and under-5 mortality rate of 45/1000 live births.² Neonatal death alone accounts for two thirds of all infant and under 5 deaths.^{2,3,4} Among

others, preterm low birth weight (LBW) is one of the major contributors to neonatal mortality.^{1,5,6} It is estimated that around 15 million babies are born preterm each year.⁶

Preterm birth is defined as all live births occurring before 37 completed weeks of pregnancy.⁷ The LBW is defined as any baby with a weight at birth less than 2500gm,⁸ irrespective of the gestational age⁹ and it can be subdivided into very LBW (less than 1500gm), extremely LBW (less than 1000gm) and incredibly

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LBW (less than 750gm).³ Preterm LBW can occur due to many factors including maternal, foetal, placental or a combination of these.¹⁰ Availability and usage of quality antenatal care, maternal direct or passive smoking,^{10,11} socioeconomic status of the mother,^{10, 12} early inductions of labour, maternal infections, anaemia, chronic conditions such as hypertension, and, gestational diabetes, and multiple pregnancies,^{7,10} all play a part. Multiple pregnancies, such as twins and triplets, increases the risk of LBW babies by nearly 10 times when compare to singleton babies.^{7,9} Placental factors such as placental insufficiency or inadequate uterine blood flow may also contribute LBW babies.¹⁰ Maternal zinc deficiency also plays a part in causing LBW.¹³ Preterm LBW babies are especially prone to suffer from perinatal asphyxia,¹⁰ hypothermia, hypoglycaemia, respiratory distress and a higher risk of infection,^{10,14} and ultimately a higher risk of death and non-communicable disease such as diabetes and hypertension later in life.⁸

While the neonatal mortality on account of LBW has been significantly reduced in developed countries due to the availability of excellent healthcare service and high-quality newborn management tools,¹⁵ this kind of services are scarcely available in a developing country like Bangladesh.¹⁶ It is in such scenarios that 'Kangaroo mother care' (KMC) can play a major role as a safe, easy and a really effective method of taking care of LBW babies at a very low cost to prevent mortality and thus combating neonatal deaths due to LBW.¹⁷

World Health Organization (WHO) has recommended this method as a powerful and easy-to-use method for the health and well-being of preterm and full-term baby. Its main components are early, and continuous skin-to-skin contact between baby and mother or care-giver with exclusive breastfeeding and early discharge. This method allows baby to be discharged early, thus avoiding the agitation routinely experienced in a busy ward and to continue the method at home. However, mothers at home require adequate support and follow-up.¹⁸ This method of caring for preterm and LBW babies ensures thermoregulation and optimal growth by ideally exclusive breastfeeding.^{19,20,21} Early initiation of KMC and early discharge from hospital is one of the major criteria of successful KMC.^{18,21}

In a peripheral hospital in Bangladesh with low resource setting, this KMC method can be an excellent way to manage the LBW babies. This paper

describes the successful management of 980 grams extremely LBW(ELBW) baby in a rural setting of Magura District Hospital, Bangladesh.

Case report

A 20-years-old lady, G2+P1, gave birth to a set of twin babies by spontaneous vaginal delivery in Magura District Hospital in Bangladesh at 29th weeks of gestation due to sudden onset of induction of labour pain. The mother was on poor antenatal checkup and had only gone through one antenatal visit at the 16th week, throughout her entire pregnancy period. In that visit, she had performed the one and only ultrasonography of pregnancy profile during her gestational period which revealed a twin pregnancy, and had also undertaken the routine antenatal blood tests and urine exam, the results of which were normal. She had a previous history of abortion two months before this current pregnancy. The first of the twins was a male stillborn baby while the second twin, the case in discussion, was a female baby delivered shortly after the first twin. The baby was delivered in vertex presentation, and had only cried very feebly immediately after delivery. APGAR score on 1st minute was 2, and she was immediately brought to the paediatrics ward for management.

On admission in the paediatrics ward, the baby was weighed at 980 gm. On examination, she was found to be extremely lethargic with minimal tone and severely diminished primitive reflexes. Her heart rate was around 100bpm, and the respiratory rate was around 26/minute. Temperature was suboptimal. She was assessed and a provisional diagnosis of preterm ELBW with perinatal asphyxia (PNA) with respiratory distress syndrome (RDS) was made. Primary resuscitation involved immediate nasopharyngeal- oropharyngeal (NP-OP) Suction, oxygen inhalation, administration of IV fluid and parenteral broad-spectrum antibiotics. After primary management, the baby was referred to a higher center on the same day within 2-3 hours of admission for further management and possible NICU support which was not available in our hospital.

However, after 6 hours on the same day, her attendants had again returned to our hospital with the baby due to lack of availability of NICU seats in the referral hospital. A decision was made to treat her in our hospital with the limited resources available. On the second time admission in the paediatric ward, the colour was blackish and the baby was again found to be severely lethargic with a

heart rate around 90bpm and respiratory rate around 28/minute. The baby had passed urine by that time but not stool. She was started with 5% Dextrose in Aqua to correct circulatory deficit and also to prevent hypoglycaemia. The provisional diagnosis was modified to Preterm ELBW twin with PNA with RDS and early onset neonatal sepsis (EONS). Urgently NP-OP suction was performed, and she was immediately started with oxygen inhalation and kept nothing by mouth (NPO) till further order. The initial IV Cefazidime was replaced with IV Meropenem, and IV Aminophylline was added. Dopamine was added in drip to prevent circulatory shock. The baby was kept in a baby cot with warm clothing to combat hypothermia.

From day-2, she was occasionally fed a few drops of colostrum from her mother via dropper, but kept NPO otherwise. No vomiting incidence was seen. The IV fluid was changed from 5%Dextrose-in-Aqua to 5% Dextrose-in-Baby Saline. Throughout the second day slight improvements, despite suboptimal, were seen in the baby's vitals-heart rate and respiratory rate had reached 110bpm and 30breaths/minute respectively, but the baby still needed the supplemental oxygen. She continued to remain lethargic and hypothermic despite the warm clothing. She had passed blackish stool on the second day. The reflexes were weak.

As the baby was not managing to maintain normal body temperature, it was agreed upon to start KMC on the third day. No separate KMC chair or specific KMC dressing was used due to lack of availability in our hospital. From day-4 to day-5, after initiation of KMC, the baby started to show marked improvement in tackling hypothermia, and was able to maintain normal body temperature. Despite some occasional fluctuations, her heart rate had reached around 130bpm and respiratory rate at 40/minute. Day-6 onwards, the baby displayed rapid signs of recovery with heart rate and respiratory rate had reached satisfactory level of around 140 bpm and 45/minute respectively and remained stable. On the mother's bare skin, the baby was able to sustain a warm temperature by herself. Spontaneous movement of the limbs had started. No irregularities were noticed in her bowel movements, and she was passing urine frequently. Sucking reflex had become strong, and thus dropper feeding was discontinued and trial breast feeding initiated. Under strict supervision and upon proper positioning and attachment, the baby was able to suckle milk by herself. The amount of IV fluid was lowered gradually till it was totally stopped

on day-9. This plan of treatment continued till the baby was discharged on day-14. Throughout her whole stay from day-3 onwards, she was continually kept on KMC.

On day-14, she weighed at 1100 gm. Her appearance was pink, and she was having no trouble breathing on room air. She was moving spontaneously and breast feeding on her own frequently. Heart rate and respiratory rate were within normal range and bowel and bladder movements were regular. Consequently, the baby was discharged from the hospital that day. On the day of discharge, the parents, especially the mother, were exclusively trained on how to look after the baby. She was counselled to continue the KMC until the baby reached a weight of at least 2000 grams, and her husband was also encouraged to take part in KMC to reduce the burden on the mother. The importance of exclusive breast feeding, i.e., not giving the baby any kind of food or drink other than breast milk²² was reinforced to the mother, and she was demonstrated the technique of proper positioning and attachment once again since she was no longer going to be under the supervision of the nurses during feeding. Both the parents were advised to avoid feeding the baby using a feeder or formula milks. They were taught how to wash their hands properly using soap and water before handling the baby, and counselled on the importance of minimum handling of the baby by their relatives till the baby reached a suitable weight. The follow up plan was weekly for one month, and then monthly for six months. The average rate of weight gains from day of birth to 2-months 24 days has been shown in Table-1.

Table-1: Average rate of weight gain from day of birth to 2-months 24 days

Age	Weight(gm)	Average rate of weight gain(gm/day)
Day 0 (day of birth)	980	-
Day 14(day of discharge)	1100	8.6
Day 24	1200	14.2
1-month 20days	1355	6.0
2-months	1565	21
2-months 24days	2100	22.3

Discussion

In this case report, we highlighted the management of an ELBW baby by KMC method. This ELBW baby showed a great improvement in weight gain with parameters such as feeding, movement and other vital signs. Managing such babies is a daunting

task, especially in rural settings where high quality neonate management services such as incubators are unavailable. In such limited resource settings, KMC can act as very effective measure in preventing neonatal morbidity by thermoregulation, exclusive breastfeeding and promoting early discharge from hospital²³ as shown in our case.

Maintenance of a constant core body temperature is crucial for the survival of a neonate, especially more so for preterm low birth weight babies.²⁴ Thermoregulation is a critical factor for successful KMC management. Neonates have a higher body surface area to weight ratio resulting in a higher heat loss by evaporation, and deficient subcutaneous adipose tissue which acts as insulators.²⁴ As a result, neonates, especially preterm low birth weight babies, have poor capacity of thermoregulation and lose heat rapidly, resulting in hypothermia.^{23,24} Preventing hypothermia is vital for the survival of the baby and its future.²³ Since newborn babies are not able to maintain a core body temperature on their own without external help,²⁴ the mother takes up the role of an incubator²⁰ and keeps the baby warm. Moreover, when the baby is placed on the mother, the mothers breathing movement itself stimulates the baby, reducing its chance of apnea.²¹

During our KMC, according to guidelines, the neonate was placed directly on the mother's bare chest between her breasts in prone position, with the head turned right in a slightly extended manner.¹⁸ This posture kept the airway open and prevented apnoea. The hips were kept flexed and abducted in a frog like manner known as the kangaroo position.²¹ The baby wore nothing except her diaper. The mother's orna, a traditional piece of scarf worn by the mother, was used to gently wrap the baby to the mother's skin, and her loose gown was worn over the orna. The orna was tied in such a manner as to not cause the baby any breathing difficulty, neither was it tied in a very loose manner so as to allow the baby to slip down when the mother stood up. It was ensured that the head was neither too extended nor too flexed, and the baby did not have any breathing difficulty.

During the initial few days of starting KMC the baby was still receiving IV fluid, and the mothers clothing over the baby's cannula was adjusted accordingly under proper supervision while the baby was receiving IV fluid. We found that KMC posed

no obstacle to the IV fluid administration. When sleeping, the mother was placed in a semi reclined posture at a 45-degree angle by placing three pillows on the bed. When the mother needed to visit the bathroom or take a bath, the orna was loosened and the baby removed from the mother's chest. During the absence of the mother, the baby was placed under warm blanket, and upon the return of the mother the same procedure was followed.

Several obstacles were faced during the KMC of this baby. Initially, the mother and other guardians were skeptical about the whole procedure because they had never heard of it before. After proper counselling and describing all the pros, they agreed to the KMC. However, the mother was anxious about sleeping in the KMC position, worrying that she might suffocate her child accidentally while sleeping. She was properly briefed about the importance of semi recumbent position, and was also supported by the grandmother who used to stay awake for the first few days while the mother was sleeping to assure the mother that the whole procedure was extremely safe.

The mother herself being very young and having her first baby, was in a very ill condition both physically and mentally. With a history of previous abortion, and the first of the twins succumbing to death soon after birth, she was completely distraught and was unsure whether she could perform what we asked of her. It is well known that postpartum period itself can bring about changes in the mother both mentally and physically, and adequate support should be given to her during this time to prevent the occurrence of any psychological incidents such as postpartum depression.²⁵ In this case, the mother was already in a traumatic state with the loss of one child as well as due to her physical weakness and mentally debilitated state. She was counselled appropriately, and was in regular checkup from us as well as by the obstetricians. Special care was taken regarding her diet to ensure her speedy recovery. An additional problem faced was the mother's privacy in such an overcrowding neonatal ward. Since no separate KMC room was available at the facility, this was solved by taking extra precautions against unnecessary visitors, and other patients in that ward were informed about the delicate situation and their cooperation was well received and very much appreciated.

There was a staggering lack of technical knowledge

about KMC among the supporting staffs due to lack of any formal training or education regarding KMC, and as such they had to be taught beforehand about the whole procedure of KMC. Lack of adequate nurses and other supporting staff to provide extra care to this baby only added to our problems. In a government hospital where the numbers of admitted patients often exceed the actual number of beds available by quite a margin, it became quite difficult for the healthcare workers to provide her the care she needed, especially during the initial phase. At the beginning frequent weight checks and supervised breastfeeding all required the presence of a healthcare worker. This problem exaggerated especially during the night shift. Subsequently the mother was taught how to take the weight of the baby herself and she also managed to breastfeed the baby without supervision.

The baby was discharged home early within 14 days of admission, which is one of the hallmarks of KMC. At the time of discharge, although baby weighed only 1100gm, she had considerably improved and achieved stable vital signs. Hence, we decided to discharge the baby to avoid the risk of acquisition of secondary infections from the overcrowding neonatal ward in our hospital. Early discharge is one of the major hallmarks of KMC.^{18,19} This ensures a decreased workload on the healthcare providers as well as a significantly lower financial burden on the parents.²⁶

The importance of regular post discharge follow-up is well established as it helps to lower the mortality rate, increase neonatal survival outcome and prevent unnecessary hospital admissions.²² In this case, a regular follow up schedule was planned to monitor the baby. On subsequent follow ups, the baby was carefully observed and her weight, vital signs (heart rate, respiratory rate, temperature) and general conditions were closely monitored. Her vitals were stable. At the first follow up after 10 days from discharge, she had reached a weight of 1200 gm, with an average gain in weight of 14.2 gm/day. However, after that the mother started to become irregular and stopped attending her regular follow ups. After 26 days, instead of her scheduled weekly follow up, she had to be called up by phone and persuaded to come for a visit. In that visit, the baby was noted to weigh at 1355gm. The rate of weight gain was only 6gm/day, a drastic reduction from before. Though she initially

denied, upon further queries, she confessed that she had no longer been continuing the KMC method that was taught to her. The father and the grandparents not being very supportive about the whole procedure was the main problem, further compounded by her responsibility of daily family chores. She was again briefed about the potential dangers of low birth babies, and the importance of KMC in tackling such dangers was reeducated to her.

Ten days after the second visit, she came back for the third follow up, where she said she had continued KMC at home for around 10 hours/day to the best of her ability. Weight had increased to 1565gm, and the average daily weight increment rate was substantially increased to 21gm/day. After another 22 days, she came for her fourth visit where she said she had been continuing the KMC. The baby weighed 2100 gm, with an average increment in weight of 22.3gm/day. During all the follow ups, limb movement was spontaneous, and feeding was on demand exclusive breast feeding. By reviewing the follow up, we can see that by following strict KMC at home, better weight gain is attained as mentioned in the literature.^{23, 26, 27}

KMC has many advantages when compared to the conventional system of neonate care. In conventional system, preterm LBW babies have to be kept in warmers or incubators, which requires technical expertise and are difficult to maintain. Such tools are costly and often require maintenance and repairing. Cleaning such instruments and maintaining proper hygiene is often a challenge in understaffed settings, and very frequently leads to nosocomial infections. Moreover, the baby has to be kept away from the mother, depriving the baby from the mother's care. All these problems can be solved if KMC is implemented.^{17, 20} For the parents, KMC promotes better bonding between the mother and the infant.^{20,23} The baby stays close to the mother and thus, the mother remains assured and confident and there is less chance of depression.^{26,27} Due to the provision of early discharge from the hospital, it decreases the financial burden on the parents, and lowers the workload on the healthcare providers.²⁶ KMC ensures that the neonate receives everything necessary for his survival-namely mothers warmth, nutrition, protection and love.²⁶ Among preterm LBW babies, KMC provides stable vital signs, increased weight gain and improved rate and efficiency of breast feeding

when compared to conventional methods.^{23,26,27} In general, KMC provides improved rate of neonatal survival.²⁰ There are also fewer occurrences of hospital acquired of nosocomial infections in KMC due to early discharge.^{21,23} Hence, while it was initially designed as a way to treat ill neonates in rural settings of mostly developing countries lacking conventional technologies, it is now considered as the standard method of managing such babies in both developed and developing countries.¹⁹

Conclusion

This case report showed a good example of KMC which is a feasible, cost efficient and effective method to combat mortality due to preterm LBW babies. However, for it to be successful, it requires complete dedication and adherence to the process from the parents as well as the healthcare providers. Regular training of the health care providers may encourage them to implement the KMC method

in rural hospitals more frequently which would be beneficial for the patients.

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Author's contribution:

Idea owner of this study: Md. Wasek Salam

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Data gathering: Md. Wasek Salam

Writing and submitting manuscript: Md. Wasek Salam

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