

Kangaroo Mother Care: Using Appropriate Technology for the Care of Premature and Low Birth Weight Infants - A review

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Summary

Ibe OE. Kangaroo Mother Care: Using Appropriate Technology for the Care of Premature and Low Birth Weight Infants - A review *Nigerian Journal of Paediatrics* 2003;30:71. Kangaroo mother care (KMC) was developed in 1978 in Colombia by the duo of Rey and Martinez in order to cope with the overcrowding, recurrent nosocomial infections and scarcity of resources in hospitals caring for low birth weight (LBW) infants. Currently, this method of care consists of three components: (a) Kangaroo position (skin-to-skin contact between a mother's bare breast and her nearly naked infant – except for a diaper, and woollen cap) which provides adequate warmth for the infant; (b) Kangaroo nutrition (exclusive or nearly exclusive breastfeeding) and (c) Kangaroo discharge policies (early discharge in Kangaroo position irrespective of weight or gestational age) with strict follow-up. In some settings, a fourth component namely, Kangaroo support, has been introduced. This describes the physical and emotional support given to mothers and their families when KMC is practised. Numerous studies both in developed and developing countries exist that highlight the practice of KMC in diverse settings, its benefits and limitations. KMC offers an appropriate technology for developing countries as well as the benefits of safety, in terms of physiologic response. In addition, the practice of KMC increases the prevalence and duration of breastfeeding, reduces hospital readmissions with shorter periods of hospitalisation. There is also reduced mortality among these patients. The previous recommendation was that KMC should be practised for preterm/LBW infants who are already stabilised, but there is now data which suggests that KMC itself helps stabilise preterm infants within the first six hours of life. This paper reviews the components, benefits, limitations and possibility of the practice of KMC in Nigeria.

Introduction

NEONATAL mortality rate (NMR) is very high in most developing countries. About 98 percent of the almost five million annual neonatal deaths worldwide, are recorded in developing countries.¹ Two thirds or more of these deaths take place in the early neonatal period and are mostly due to prematurity and low birth weight (LBW).² Other causes include severe birth asphyxia, severe hyperbilirubinaemia and congenital malformations, conditions that are common in the LBW infant.³ In Nigeria, the 1990 report of the

Demographic Health Survey (DHS) quoted the national neonatal mortality rate as 42 per 1000, a figure that may well be an underestimate, as most neonatal deaths were not documented.⁴ Hospital-based data from Nigeria also indicate that LBW in addition to birth asphyxia, severe infections and respiratory disorders constitute the commonest causes of neonatal mortality and morbidity.⁵ It is known that good quality care for the LBW infant has greatly reduced NMR in industrialised countries but the technologies used in these rich countries are expensive and require highly skilled personnel, effective maintenance and logistic support such as reliable electricity supply. Yet, these expensive technologies tend to prevent early mother-infant contact and breast-feeding, two components of newborn care that are essential for optimal survival in low-income countries. Furthermore, the mothers may

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not become competent and confident in the care of their LBW infants.⁶ It is important to note that the phrase 'appropriate technology' as used here, refers to simple, innovative, cost-effective and sustainable alternative techniques that sometimes require no technology.³

In response to the problems highlighted above and others such as overcrowding of the neonatal units with attendant nosocomial infections, Drs Rey and Martinez⁶ of Instituto Materno Infantil (IMI) in Bogota, Colombia created a method of ambulatory care for the premature or LBW infant – the Kangaroo Mother Intervention (KMI). They developed this method based on the inspiration provided by marsupials such as the kangaroo or the koala.³ Since then, Drs Martinez and Navaretté with assistance from UNICEF, have implemented it not only at the IMI, but also in other busy hospitals in the South Americas.⁷ The practice of KMI has also become widespread in other developing countries.⁸⁻¹⁰ Kangaroo Mother Care (KMC) as it is now known, is defined as "early, prolonged and continuous (as allowed by circumstances) skin-to-skin contact between a mother and her diaper-clad newborn LBW infant both in the hospital and after early discharge (depending on circumstances) until at least the 40th week of post-conceptual age with ideally, exclusive breastfeeding (whenever possible) and proper follow-up".¹⁰ This method of care provides an appropriate and affordable, yet high quality alternative technology easily implemented in small hospitals of very low-income countries.^{11,12} In Nigeria, a developing nation with gross levels of poverty as depicted by a Gross National Product *per capita* of \$300 and deteriorating health infrastructure, KMC should prove effective in improving neonatal care for LBW infants.¹³ This paper reviews the components, benefits and practicability of KMC within the Nigerian context.

Trends in Kangaroo Mother Care (KMC)

Following the early reports from Bogotá⁶ of dramatic improvement in infant survival and parental outcome, which were at first, discounted because of questionable study methodology, the scientific community nevertheless became attracted to the various components of the intervention. Schmidt and Weitrich,¹⁴ in a paper presented at the WHO Inter-Regional Conference on Appropriate Technology following birth, reviewed most of the studies that had been carried out on KMC. They concluded that most of the investigators called for randomised controlled trials (RCT) so as to facilitate rigorous comparison and evaluation of the intervention as a whole, and each of its components.¹⁵⁻²⁵ Since 1989, Fundacion Canguro, a research group in Bogotá, with a primary focus of

promoting KMC, has been evaluating all components of the intervention. The studies carried out have included firstly, a cohort study describing the programme in detail and comparing its results with traditional LBW infant care, and secondly, a RCT which was commenced in 1993 following standardisation and refinement of KMC, based on the results of the first study.^{26,27} Other workers have also applied KMC in various settings to study its effectiveness, feasibility, acceptability and cost, when compared with conventional or traditional methods of care.^{12,16-19} Currently, there are three distinct applications and two variants of KMC.^{10,28,29} The classification of the applications is based on the settings in which the intervention is being used and consists of the following:

1. In places with very limited or no appropriate neonatal care facilities, where KMC is the only alternative owing to lack of incubators such as Mozambique and Zimbabwe,
2. In places where technical and human resources are of good standards but are limited and unable to cope with the demand, with KMC replacing minimal care units such as in Colombia, Bolivia, Ecuador and Peru; and
3. In places with ample human and technical resources and easy access to all levels of neonatal care, where the early skin-to-skin contact between infant and mother, a component of KMC, may enhance the quality of mother-infant bonding and encourage successful breastfeeding, such as South Africa, France and Denmark.

The two variants are based on the duration of skin-to-skin contact between a mother and her LBW infant. Continuous KMC describes a situation in which the mother provides KMC all the time, both day and night, while intermittent KMC is applied in situations where the infant is nursed in an incubator and only placed in skin-to-skin contact when the mother visits the infant. This type of KMC is commonly practised in the setting described in (3) above.²⁹

Description and Components of KMC

KMC is characterised by three components:²⁸

- A. Kangaroo position i.e. prolonged skin-to-skin contact between a mother (or any other caregiver) and her diaper-clad LBW infant with the baby placed vertically between the mother's breasts and under her clothes. (Fig. 1).
- B. Kangaroo feeding policy: exclusive or nearly exclusive breastfeeding.
- C. Kangaroo discharge policy: early discharge while in kangaroo position and kangaroo feeding, as soon as the infant has overcome all major adaptation problems to extra-uterine life.



Fig. 1 Mother with her low birth weight infant in Kangaroo Care

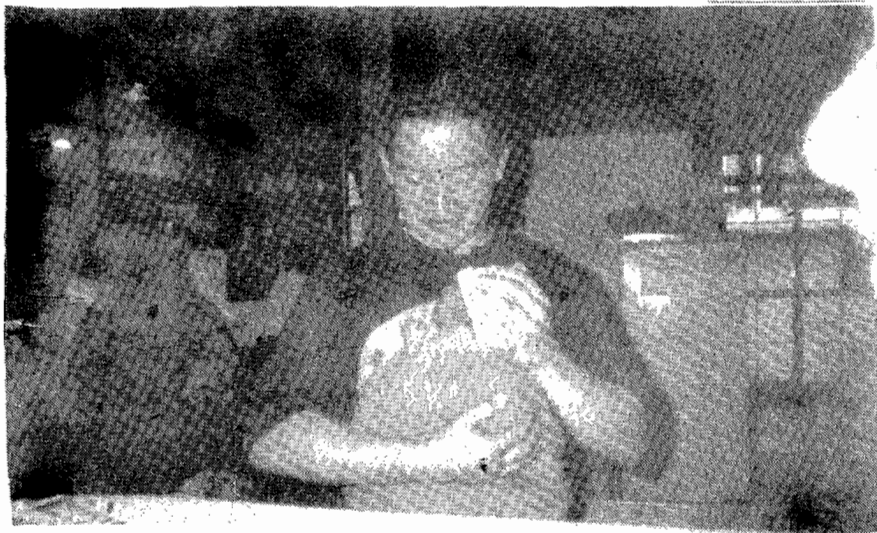


Fig. 2 A father providing skin-skin-contact for his infant.

In some settings like in South Africa, a fourth component, Kangaroo support has been introduced. This comprises emotional, physical and educational support given to the mother and her family, thus empowering her to meet her infant's needs whilst practising KMC.

A. Kangaroo Position

This is the first component of KMC. It involves managing the stabilised, nearly naked (except for a nappy and woollen cap) LBW infant in an upright position in almost continuous or prolonged skin-to-skin contact (except for bathing, toilet and medical procedures) between the mother's breasts and under

her clothes. Other caregivers such as the father, grandmother or aunt may share the role of being a kangaroo position provider (Fig. 2). In such instances, the nomenclature KMC is still retained because of the importance of the mother's breast milk for nourishing the LBW infant. The kangaroo position is maintained throughout the day and night for continuous KMC and even during sleep, the care provider must be in a semi-recumbent position.^{10,29} Skin-to-skin contact is the most extensively reviewed component of the KMC.^{15-28,30-34} Eligibility criteria for placement of a LBW infant in the kangaroo position include clinical stability in terms of the cardio-respiratory system. Low birthweight infants can be placed in the skin-to-skin contact position immediately after birth in settings

where incubators are not available, while full term babies may also be similarly treated for a few hours after delivery, to promote bonding, encourage breastfeeding and prevent hypothermia.²⁹

Anderson,³⁰ in her exhaustive review of skin-to-skin contact mainly in developed countries, highlighted the following major findings in the infants:

1. Temperature regulation was at least, as good as obtained in an incubator. Some evidence suggests that it was even better.³⁵
2. Regular breathing patterns with a decrease of episodes of apnoea and periodic breathing patterns occurred more commonly with KMC than in non-exposed infants.
3. Transcutaneous oxygen levels did not decrease.
4. Improved regulation of infant's behavioural state – longer periods of alertness and less crying
5. Higher rates and longer duration of breastfeeding
6. No additional risk for infection

The effects of skin-to-skin contact on the parents were that of feelings of self-confidence, fulfilment and less stress. The mothers also felt more confident in breastfeeding.^{25,30} Other benefits observed included a tendency toward reduction of hospital stay associated with a limited skin-to-skin contact and a positive change of attitude among health personnel.⁹

Reports from developed countries support the notion that skin-to-skin contact in newborn intensive care units (NICU) is safe and promotes the process of healthy adaptation of the fragile infant.^{21-25,28,30,31} Similarly studies from developing countries suggest that in centres without incubators, early skin-to-skin contact can be used to stabilise preterm babies and that survival in these newborns especially from the 31st week of gestation, is encouraging.^{8,12,19,34} Premature infants can be transferred in kangaroo position to a higher care centre and this is particularly advantageous in developing nations where transport incubators for such transfers are in short supply.^{36,37}

B. In-patient kangaroo mother care and kangaroo feeding

This is exclusive or nearly exclusive breast-feeding. Initially, a strict schedule for feeding is followed but subsequently relaxed when infant's growth is shown to be adequate. The goal is to obtain a rate of weight gain similar to that occurring during the third trimester of pregnancy (15-20g/kg/day) until 40 weeks post-conception age. If infant growth is not satisfactory, breastfeeding is supplemented with premature formula where available, or in some instances, coconut oil.⁶ With regard to the Kangaroo feeding, Collonna *et al*,³⁴ tried to compare their results with the 'traditional care'

available locally and claimed a mortality reduction from 18 to 5 percent. Unfortunately, their data is difficult to interpret as mortality under traditional care included infants prior to their being stabilised while kangaroo infants were survivors of the stabilisation period (excepting deaths before eligibility). The kangaroo group also included infants heavier than 1500gm. Although the average daily weight gain of 12.8gm may be considered inadequate, the data showed that in the absence of alternatives, KMC might alleviate the lack of minimal technical resources. Furthermore, adequate follow up was not conducted in the study and was cited as a limitation.

Reporting from a rural hospital in Zimbabwe with almost no equipment for neonatal care, Bergman and Jurisoo⁸ observed a reduction in mortality from 90 to 50 percent in infants weighing 1500gm and less; the corresponding figure for infants weighing 1500-1999gm was 30 to 10 percent. They claimed that weight gain was within acceptable limits. These figures indicate that in cases of very limited or non-available technical resources, in-patient kangaroo position and nutrition are an acceptable alternative. Another study from Mozambique tended to support this finding.¹²

With respect to kangaroo feeding, an important group for consideration are LBW infants who are unable to suckle and swallow efficiently, either because they are still immature (less than 32 weeks) or just recovering from severe illness. For these infants, instillation of expressed breast milk via a nasogastric tube is the preferred method for enteral feeding. Gavage feeding can be used in KMC babies but a respiratory rate of above 80 breaths per minute contraindicates gavage or any other kind of enteral feeding. In such conditions, the LBW infant will need to be stabilised before continuing or being placed in KMC.³⁸

C. Kangaroo discharge

This involves early discharge of LBW infant while in the kangaroo position. Reports from Bogotá, Colombia on the two-cohort study, suggest that despite major baseline differences in the studied cohorts and the limitations of an observational study design, the survival of LBW infants in the study was similar between KMC and traditional care methods.²⁶ A latter RCT was able to show that KMC including early discharge, was useful as an alternative to a minimal care unit in hospitals with good but limited technology and resources. Kangaroo infants did better when reaching term i.e. 40 to 41 weeks of gestational age than babies under conventional care.²⁷ Other findings were that:

mortality and growth indices were similar
total episodes of infection were similar but

severity differed, favouring KMC infants (they had less severe infections including nosocomial infections)

total length of hospital stay from eligibility until the end of follow-up was shorter for the kangaroo infants, particularly for those with birth weights under 1500gm, and

there was a small but significant difference in early breastfeeding patterns.

Cattaneo *et al.*,⁹ confirmed that hospital based KMC for stabilised LBW infants weighing 1000-1999gm was at least, as effective and safe as conventional methods of care. Their study also showed that KMC was less costly as well as feasible in different settings, and was acceptable to mothers of diverse ethnic backgrounds.

Another component of KMC which has been introduced in countries like South Africa, is Kangaroo support which describes the physical and emotional support provided by the nursing and medical staff to the mother and other family members in order to enable her provide KMC for her LBW infant. This is part of what is practised as intrahospital kangaroo adaptation carried out in settings like in Colombia and other South American countries where ambulatory KMC is prevalent.³⁸ During this period, the mother and other members of her family, especially the husband, are informed about KMC so that they have a good understanding of the process of KMC and also accept it. Emotional support is provided by reassuring mothers, especially first-time mothers, that KMC is safe and meets her infant's needs. Physical support is achieved by providing the mother with help that will undertake household chores and manage her family, since most of her time will be taken up by the LBW newborn infant.²⁹

Benefits and Limitations of KMC

In addition to the evidence discussed above indicating the safety and effectiveness of KMC, other benefits are as follows:

- i. reduction of the need for expensive and sophisticated equipment that are often inappropriate in low-income countries. KMC's ease of application makes it usable almost anywhere, including peripheral maternity units such as are found in many first and second level health care facilities in Nigeria;
- ii. reduction of the need for skilled personnel in managing stable LBW infants such that the few available health professionals focus attention on essential components of newborn care other than thermal control, early mother-baby contact and breastfeeding;

- iii. contribution to the humanisation of neonatal care and to better bonding between the mother and her LBWI, and

- iv. allowing mothers to gain competence and confidence in the care of their newborn babies both in hospital and at home.

Early psychological outcomes of the study conducted in Bogotá,⁴⁰ indicate a change in the mother's perception of her child attributable to the skin-to-skin contact occurring during the kangaroo position. This is related to a subjective bonding effect, which may be readily understood by the 'empowerment like' nature of the KMC intervention. It was also observed that the mothers had behavioural patterns that were adapted to the child's health status and to the situation of a premature birth. Interestingly, the infants' health status appeared to be a prominent factor in explaining the mothers' sensitivity, thus overshadowing the kangaroo carrying effect. Furthermore, mothers who carried their babies in the kangaroo position felt more competent when the babies were ill than those in the control group who had practised traditional care. These findings tend to suggest that KMC should be actively promoted and mothers be encouraged to use it as soon as possible during the intensive care period and up to 40 weeks post-conception age.

In spite of its effectiveness however, KMC has some limitations, and a note of warning is necessary. The KMC method is not intended to be a mere unsupported entrustment of the tiny baby to its mother, but a sort of intensive care which needs no sophisticated equipment but a great amount of dedicated and enthusiastic support from health personnel.³⁴ It is much more than just skin-to-skin care. The limitations mentioned in reports from developed countries where the kangaroo position component of KMC is mainly practised in neonatal intensive care units (NICUs) include:

- a. Occasional excessive warmth received by babies especially when fathers provide skin-to-skin contact in a warm environment. Such problems may be envisaged in the Nigerian context due to the tropical and humid climate.
- b. Obstructive apnoeas, which theoretically could occur in the kangaroo position, although none has been reported.³⁹
- c. Emotional crisis, as reported by Affonso *et al.*,³³ in their San Francisco sample of eight mothers of high-risk infants in the NICU. This experience of emotional crisis, which may seem like a limitation may in fact, be a necessary growth step for the mother. This is because it may result in increasing feelings of love for her infant and lead to her

acceptance of the reality of the preterm birth and its risks, as well as the responsibility she must assume for her infant.³⁹

- d. The labour intensive nature of KMC for the families. The need for the mother to be constantly available to be a kangaroo care provider cannot be overemphasized especially for the intra-hospital KMC. The mother would need a substitute when she cannot provide kangaroo care. In previous reports, fathers have increasingly been used as kangaroo care providers.^{18,30} The practicability of this in the Nigerian context could be questionable bearing in mind the cultural milieu. It would be more acceptable for the infant's grandmother or aunt to substitute for the mother.

Feasibility in the Nigerian Context

Owing to the fact that one of the essential components of care for the premature low birth weight infant is thermoregulation alongside optimum nutrition and that most incubators in our hospitals are non-functional and beyond repairs, more cost-effective, appropriate and yet scientifically proven alternatives should be considered. The initiators of the KMC in Bogotá, Colombia found themselves in the same dire circumstances facing most of our paediatricians even at tertiary level institutions namely, unreliable electricity supply, antiquated units with broken down equipments, lack of monitors, too few nurses, episodes of apnoea, infections, respiratory problems and subsequently, high neonatal mortality rates.^{3,36} These problems probably persuaded Ajayi,³ in a lecture at the 29th annual conference of the Paediatric Association of Nigeria, to conclude that 'it is obvious that KMC is the way to go not just because it is our best option but it should become our best choice'. The success of the KMC programme in Nigeria depends on the availability of a "baby-friendly" environment throughout the healthcare system in the country, one that encourages breastfeeding and rooming-in. There is evidence to show that when the prevailing healthcare environment encourages close contact between mothers and their infants, the practice of skin-to-skin care is only a small step away.⁴¹ With the adoption of the Baby Friendly Hospital Initiative in 1992 and its implementation in Nigeria, there would appear to be in existence, an enabling healthcare environment for the commencement of KMC. This is also reinforced by the National Breastfeeding Policy (1999).⁴²

For the acceptability of this method of care, the cultural context and beliefs and practices of Nigerian mothers need to be considered. The fact that there is no equivalent of the animal called kangaroo in Nigeria makes it difficult to explain the concept to the

uneducated person and as such, a more culturally appropriate terminology may be necessary. Furthermore, local methods of providing adequate warmth for the small neonate in various localities would have to be considered before introducing a new method, especially at the community level. These include "warm rooms" among the Ibos and swaddling among the Yorubas and Hausas.⁴³ Although it is a common practice among the Yorubas to place small newborn babies on the mother's back, this is not usually practised for the provision of warmth. Thus, the feasibility of KMC practice in Nigeria will consider among other things, the knowledge of the KMC skills among Nigerian healthcare professionals and their willingness to implement it as a method of care for LBW infants as well as cultural acceptability among mothers and the general population.

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