

Utility of kangaroo mother care in preterm and low birthweight infants

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Keywords: kangaroo mother care, low birthweight, preterm birth, breastfeeding, hypothermia

Abstract

Preterm birth (< 37 completed weeks of gestation) is the largest direct cause of neonatal mortality, accounting for an estimated 27% of the 4-million neonatal deaths every year. Kangaroo mother care (KMC) is a type of care for preterm and premature infants whereby the infant is placed in an upright position against the parent's chest, with early skin-to-skin contact between the parent and infant. Mothers who practise KMC exhibit less maternal stress and fewer symptoms of depression, and have a better sense of the parenting role and more confidence in meeting their babies' needs than those who don't. Despite the apparent feasibility of KMC, currently, only a few preterm babies in low-income countries have access to this intervention. Knowledge of the effectiveness and safety of KMC in the community and home setting, and its effects on growth, is still incomplete. Only one study has examined KMC initiation at home. There is an immense need for the promotion of research to improve the delivery of existing cost-effective interventions in low-resource settings and to address key gaps in knowledge. KMC improves growth in low birthweight and preterm infants, and has a significant role to play in protecting them from hypothermia and sepsis, as well as promoting exclusive breastfeeding. KMC helps to reduce neonatal mortality, and inculcates confidence and a better sense of parenting in mothers with regard to their babies' needs.

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S Afr Fam Pract 2013;55(4):340-344

Introduction

The United Nations Millennium Development Goal 4 states that childhood mortality should be reduced by two thirds between 1990 and 2015, but an assessment had indicated that the progress regarding mortality reduction has been disappointing in some countries.^{1,2} The main proposed reason for the slow progress is insufficient knowledge of the implementation of existing cost-effective interventions and inadequate achievement regarding greater intervention coverage in low-resource settings.³

Preterm birth (< 37 completed weeks of gestation) is the largest direct cause of neonatal mortality, accounting for an estimated 27% of the 4-million neonatal deaths every year.⁴⁻⁶ In high-income countries where tetanus, neonatal infection and intrapartum-related neonatal deaths are rare, preterm birth is the dominant cause of neonatal mortality and morbidity, and a major contributor to long-term impairment. In low-income countries, deaths that are directly due to preterm birth are a small proportion of overall deaths, but the cause-specific mortality rate is sixfold greater than that in high-income countries. This reflects a lack of even basic care.^{4,6} Each year, 60-million babies are born outside of facilities. Of those born within facilities in low-income countries, few babies who need it receive basic care, let

alone intensive care with ventilator support.⁷ This challenge largely remains invisible in low-income countries, but is actually of great magnitude as preterm birth rates are higher, and the available resources, fewer. In addition, understaffed hospitals and ill-equipped or nonexistent neonatal care units ultimately result in higher neonatal mortality rates.⁸

Separation of mothers from their newborn infants at birth has become standard practice, despite mounting evidence that this may have harmful effects. The delivery room and postpartum hospital routines may disrupt early maternal-infant interaction and breastfeeding to a significant extent.^{9,10} Also, a concurrent widespread decline in exclusive breastfeeding has been observed.¹¹

The purpose of this review was to examine the available evidence of the effects of early skin-to-skin contact in kangaroo mother care (KMC) on the growth, development and survival of preterm and low birthweight infants, breastfeeding exclusivity and its impact on the health status of the mother, and the importance of its implementation as a cost-effective strategy in preventing neonatal mortality on a wider scale.

Kangaroo mother care: inception and components

Newborn care has greatly benefited from major technical advances in the last four decades, with substantial improvements in the mortality and morbidity of the high-risk neonate.¹² In addition, there has been heightened awareness of the psychological and emotional burden encountered by parents of the premature neonate. Moreover, the neonatal unit can constitute an environment of sensory overload and deprivation for the infant, which may have a negative impact on mother-infant interaction, on the infant's development and the psychological well-being of the parents and the infant.^{13,14}

Dr Edgar Rey originally started KMC in 1978 in Bogota, Columbia, as an alternative to traditional incubator care for low birthweight infants, because of overcrowding and the scarcity of resources in his country's hospitals.^{15,16} It has since been demonstrated that, from a physiological point of view, the KMC procedure does not increase the risk of mortality in premature infants.^{17,18} KMC is a type of care for preterm and premature infants whereby the infant is placed in an upright position against the parent's chest, with early skin-to-skin contact between the parent and infant.^{19,20} KMC has three main components: thermal care, support for exclusive breastfeeding, and early recognition and response to complications.¹⁹ In addition, it is postulated that the baby is colonised by the mother's commensal organisms, reducing the risk of nosocomial infection, especially in a hospital environment. Acceptance of the KMC method is increasingly widespread and it is considered to be equivalent to conventional neonatal care.^{15,19}

Kangaroo mother care: a blessing for mother and infant

Advantages for the infant

KMC has been associated with a reduction in several clinically important adverse infant outcomes, including mortality and nosocomial infection on hospital discharge and severe infection or sepsis at the most up-to-date follow-up.^{18,21}

Compared to infants who are not offered KMC, those who receive it were found to:^{18,37}

- Have improved growth and development.^{22,23}
- Have a higher daily weight gain.^{18,22,24}
- Have higher weekly increments in head circumference and length.²²
- Have more time in quiet sleep.²⁵
- Have a lower and more stable heart rate.²⁵
- Suffer less from apnoea and bradycardia.²⁶⁻²⁸
- Have a better ability to maintain body temperature.^{18,27,29,30}
- Have better oxygen saturation.²⁶
- Have more physiological stability.^{23,31}

- Experience an analgesic effect during painful medical procedures.^{23,32-34}
- Have good stress regulatory capacity.^{35,36}
- Be discharged from hospital earlier.

The literature has also shown that the impact of KMC is not only limited to the period of hospitalisation. KMC also has a positive long-term impact on breastfeeding,^{18,23,24,28,30,38} crying,^{28,39} being alert and responsive,³⁹ the sleep-wake cycle and arousal,³⁹ as well as the infant's overall development during the first two years of life.

KMC is considered to be equivalent to conventional care in terms of safety, thermal protection, morbidity, mortality and development. It appears to promote the humanisation of infant care and facilitates mother-child bonding in very low birthweight and preterm infants.⁴⁰⁻⁴² It was found that infants who were held using skin-to-skin contact were more likely to breastfeed successfully during their first feeding post-birth than those who were held while being swaddled in blankets by their mothers.⁴³⁻⁴⁵ Different studies have established the safety of KMC in intubated neonates under 1500 g and in extremely preterm infants.⁴⁶⁻⁴⁸

Advantages for the mother

All mothers can provide KMC, irrespective of age, parity, education, culture and religion.⁴⁹ Studies have demonstrated the impact of KMC on the mother-infant relationship, as well as on the mother's psychological well-being.

Compared to mothers who do not utilise KMC, those who practise it:

- Report more positive feelings towards their infant.³⁹
- Perceive their infant to be less abnormal.⁵⁰
- Have increased parental sensitivity to infant cues.²³
- Experience the positive effects of infant-parent interaction.²³
- Exhibit less maternal stress.⁵⁰
- Have fewer symptoms of depression.^{23,50,51}
- Have a better sense of the parenting role.
- Feel more confident and competent in meeting their babies' needs.^{29,52}
- Have a more cohesive family.⁵³

Oxytocin antagonises the flight-fight effect, decreasing maternal anxiety and increasing calmness and social responsiveness.^{54,55} It was found that mothers who experience skin-to-skin contact have reduced chances of bleeding and more rapid delivery of the placenta.^{56,57} Even in Caesarean births, mothers in the skin-to-skin contact group reported less postoperative pain than those who were separated from their infants.⁵⁸ KMC was also found to be acceptable to most mothers and families at home.^{22,24,37,59}

Expansion of kangaroo mother care

Based on increasing evidence of the positive effects and outcomes of KMC, and the emerging understanding of

the complexity of the physiology involved, KMC practice has been rapidly accepted worldwide, in both high- and low-resource countries. KMC has also been introduced in countries such as Ethiopia,⁶⁰ Ghana,⁶¹ Madagascar,⁶² Malawi,^{63,63} Nigeria⁶⁵ and South Africa.³¹ The safety, feasibility, acceptability and cost-effectiveness of KMC has been demonstrated in all these countries.

Despite the high impact and apparent feasibility of KMC, currently only a few preterm babies in low-income countries have access to this intervention. No systematic data on global coverage are available. South Africa has multiple KMC sites in almost every province, and has employed a low-cost KMC model for lower levels in the health system.^{42,66} In most African countries, there are few KMC units, if any, and these are mainly in capital cities. A few countries, notably Malawi, Tanzania and Ghana, now have plans in place to expand KMC to district hospital, or even health centre, level.⁶⁷

Some countries have no guidelines to support the implementation of KMC. On the other hand, a strong, committed national team of dedicated persons, working in union with professional trainers, facilitates the expansion of KMC. It has been recommended that a multidisciplinary team should be established to develop the implementation, education and training committees or task forces at different levels to extend KMC.

Six implementation phases have been identified in South Africa to implement the expansion of KMC at hospital level: increasing awareness, adopting the concept, mobilising resources and delivering evidence of practice, including evidence of routine, integration and sustainable practice.⁶⁶ This scale was used to compare different implementation strategies, including provision of a standard implementation package with, and without, visits, from a facilitator⁶⁸ and on-site, versus off-site, facilitation.⁶⁹

Community-based kangaroo mother care

Knowledge on the effectiveness and safety of KMC in the community and home setting, and its effects on growth, is still incomplete.⁷⁰ Only one study has examined KMC initiation at home, in a challenging setting in rural Bangladesh. This study demonstrated a substantial mortality benefit for babies < 2 000 g, but not for normal birthweight babies.⁷¹ At this stage, community initiation of KMC cannot be recommended based on evidence from this one trial, and larger trials in different settings are required.

Barriers and facilitators in kangaroo mother care

In a study that assessed the perception of parents about supportive factors and barriers to KMC, it was concluded that interventions to enhance parents' ability to perform

KMC should address the attitudes and practices of staff in the hospitals and the neonatal intensive care environment.⁷² Important barriers regarding the implementation of KMC were identified at follow-up with the trainees at a KMC centre in Colombia.⁷³

Experience with KMC implementation at community level is much more restricted than that using hospital-level initiatives.⁷⁴ A randomised controlled trial that was carried out in Bangladesh was inconclusive in terms of KMC impact. Thus, a recommendation was given for the need for "additional experimental research" to determine whether or not community KMC benefits newborn and infant survival".⁷¹ In another study, mothers reported that the infants' feeding process was the main obstacle to KMC.⁷² In an Indian trial, the main barrier to the expansion of KMC was identified in the establishment phase, which meant that doctors and nurses needed to change their practices to allow mothers access to neonates throughout the day.⁷⁵

Need for future research

Unfortunately, research interest and investment in preventing neonatal deaths resulting from preterm births and low birthweight have not been commensurate with the importance of low birthweight as the leading child killer.^{76,77} Investment in global health research today would benefit from consensus on context, appropriate investment strategies and co-ordination in achieving a significant reduction of the disease burden in the foreseeable future. Simultaneously, research to improve the delivery of existing cost-effective interventions in low-resource settings, as well as epidemiological research to address key gaps in knowledge, should be considered as significant priorities. The ultimate aim of health research should be to improve efficiency, effectiveness and equity in the implementation of child survival interventions in low- and middle-income countries.

Conclusion

Preterm and low birthweight infants should be regarded as extero-gestational foetuses who need skin-to-skin contact to promote maturation. Intranatal and postnatal care in all settings should adhere to a paradigm of non-separation of infants and their mothers, and families. We conclude that KMC improves growth in low birthweight and preterm infants, has a significant role to play in protecting them from hypothermia and sepsis, as well as in promoting exclusive breastfeeding. KMC helps to reduce neonatal mortality, and also inculcates more confidence and a better sense of parenting in mothers with regard to their babies' needs.

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