

# Kangaroo Mother Care an alternative to conventional care

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**Abstract:** The term kangaroo mother care ( KMC ) is derived from practical similarities to marsupial care-giving, i.e. the premature infant is kept warm in the maternal pouch and close to the breasts for unlimited feeding. It is a gentle and effective method that avoids agitation routinely experienced in a busy ward with preterm infants. An important main stay of kangaroo mother care is breastfeeding encouragement. Observational studies have shown reduction in mortality after institution of KMC. Preterm babies exposed to skin to skin contact showed a better mental development and better results in motor tests. It also improves thermal care and with a lesser risk of hypothermia. All stable LBW babies are candidate for KMC. Often this is desirable, until the baby's gestation reaches term or the weight is around 2500 g. The mother and family members are encouraged to take care of the baby in KMC and should be counseled to come for follow-up visits regularly.

**Key Words:** Kangaroo mother care, skin to skin contact, thermal care low birth weight, skin contact and breast feeding

Kangaroo mother care (KMC) is care of preterm or low birth weight infants carried skin-to-skin with the mother. KMC was initially conceived as an alternative to the usual minimal in-hospital care for stable low birth weight infants. Low birthweight, defined as weight at birth of less than 2500 g irrespective of gestational age, has an adverse effect on child survival and development. World-wide, twenty-five million LBW infants are born each year, the great majority (96%) of them in developing countries. Conventional neonatal care of LBW infants is expensive and needs both trained personnel and permanent logistic support. In developing countries, financial and human resources for neonatal care are limited and hospital wards for LBW infants are often overcrowded. Thus, interventions for LBW infants that reduce neonatal morbidity and mortality and costs would be an important advance in care.

KMC was first suggested in 1978 by Dr Edgar Rey in Bogotá, Colombia. The term kangaroo care is derived from practical similarities to marsupial care-giving, i.e. the premature infant is kept warm in the maternal pouch and close to the breasts for unlimited feeding. The mothers are used as "incubators" and as the main source of food and stimulation for LBW infants while they mature enough to face extrauterine life in similar conditions as those born at term. The method is applied only after the LBW infant has stabilized. Introduction of KMC results in early hospital discharge of low birth weight infants.

In the last few decades, several health services have adopted KMC, thus showing that it is possible to adapt this practice to different contexts of access to neonatal care technology. The first experiments conducted in industrialized countries demonstrated that KMC was safe in terms of physiological response of newborns and that the method brought benefits regarding the breast feeding practice and decreased the number of hospitalizations, in addition to reduced infant crying at six months of life.<sup>1, 2</sup> Experiments carried out in developing countries have shown that KMC is safe in terms of mortality and may reduce severe morbidity and avoid hospital readmissions.<sup>3, 4</sup> Therefore, KMC can potentially improve the health and survival of LBW newborns, especially in those places where resources are scarce.<sup>5</sup>

The major components of KMC are: (1) skin-to-skin contact. Babies are kept, day and night, between the mother's breasts firmly attached to the chest in an upright position, (2) frequent and exclusive or nearly exclusive breast feeding and (3) early discharge from hospital regardless of weight or gestational age. Respiratory, thermal and feeding stabilization are crucial for the success of this intervention. The definition of stabilization is not precise, and has been defined as independent of gestational age and weight, which are the main variables associated with those vital functions.

## Components of KMC

### Kangaroo position

The kangaroo position consists of skin-to-skin contact (SSC) between the mother and the infant in a strictly vertical position, between the mother's breasts and under her clothes. SSC should be started as early as possible after birth and can be of two types depending upon the duration: continuous or intermittent.<sup>1</sup> The continuous modality is usually employed as an alternative to minimal care in an incubator for infants who have already overcome major problems while adapting to extra-uterine life, are able to suck and swallow properly and are thriving in neutral thermal environment. To replace incubators the kangaroo position should be maintained as long as possible, ideally 24 hr/day. The provider must sleep in a semi-reclining position to avoid the reflux in more preterm infants. The kangaroo position is maintained until the infant no longer tolerates it- he sweats and refuses the Kangaroo position. When continuous care is not possible, the kangaroo position can be used intermittently, providing the proven emotional and breastfeeding promotion benefits. The kangaroo position must be offered for as long as possible (1-2 hrs at least), provided the infant tolerates it well. This 1-2 h span is important as it provides the stimulation that the mother needs to increase the milk volume and facilitate milk let-down. This is initiated in the hospital and continued at home.

### Kangaroo nutrition

Kangaroo nutrition is the delivery of nutrition to "kangarooed" infants as soon as oral feeding is possible. It is based on exclusive breastfeeding by direct sucking, whenever possible. Goal is to provide exclusive or nearly exclusive breastfeeding with fortification if needed. Breastfeeding is an integral component of KMC and it might contribute to significant gains in neurological development and IQ.

### Kangaroo discharge and follow up

Early home discharge in the kangaroo position from the neonatal unit is one of the original components of the KMC intervention. If not safely possible, the mother-infant dyad can room-in together in a minimal care facility (kangaroo wards) until safe discharge is possible. Mothers at home require adequate support and follow up hence a follow-up program and access to emergency services must be ensured.

Finally it is a gentle and effective method that avoids agitation routinely experienced in a busy ward with preterm infants.

## Benefits of KMC

### *Physiological benefits*

Heart and respiratory rates, respiration, oxygenation, oxygen consumption, blood glucose, sleep patterns and behavior observed in preterm/LBW infants held skin-to-skin

tend to be similar to or better than those observed in infants separated from their mothers.<sup>2,3</sup>

### *Clinical benefits*

#### **Effect on breastfeeding:**

An important mainstay of kangaroo mother care is breastfeeding encouragement. Although evidence shows countless benefits of breastfeeding for preterm babies, the prevalence of breastfeeding in this group is quite low.<sup>6-11</sup> Studies carried out in areas where KMC is done show that mothers who establish skin to skin contact with their preterm babies have a significantly higher milk production than their control group. Furthermore these studies have also revealed that interruption of breastfeeding was more frequent among mothers who were not submitted to this method. Whitelaw et al carried out a randomized trial among babies less than 1500 gm and found higher breastfeeding rates at 6 weeks in KMC group (55% vs. 28%).<sup>2</sup>

Ramanathan et al conducted a randomized control trial to study the effect of Kangaroo Mother Care (KMC) on breast feeding rates, weight gain and length of hospitalization of very low birth neonates and to assess the acceptability of Kangaroo Mother Care by nurses and mothers.<sup>12</sup> Babies whose birth weight was less than 1500 grams were included in the study once they were stable. Neonates in the KMC group demonstrated better weight gain after the first week of life (15.9 +/- 4.5 gm/day vs. 10.6 +/- 4.5 gm/day in the KMC group and control group respectively) and earlier hospital discharge (27.2 +/- 7 vs. 34.6 +/- 7 days in KMC and control group respectively). The number of mothers exclusively breastfeeding their babies at 6 week follow-up was double in the KMC group than in the control group (12/14 vs. 6/14). Rao et al also found higher rate of exclusive breastfeeding in KMC group.<sup>13</sup>

In a meta-analysis by Neonatal Review Group of the Cochrane Collaboration randomized trials comparing KMC and conventional neonatal care in LBW infants were analyzed.<sup>14</sup> Three studies, involving 1362 infants, were included. All the trials were conducted in developing countries. KMC was found to decrease probability of not exclusively breastfeeding at discharge (relative risk 0.41, 95% confidence interval 0.25 to 0.68).

Finally, studies of the effect of KMC on breast feeding show that, where KMC is practiced, the duration of breast feeding is prolonged, breast milk production is more stable, the number of feeds per day is increased, breast feeding competence is increased, and more premature infants are discharged on exclusive breast feeding. Mothers expressed a clear preference for KMC and health workers found it safe and convenient. KMC was cheaper in terms of salaries and other running costs.

### **Mortality and morbidity:**

Observational studies have shown reduction in mortality after institution of KMC but interpretation of their results is difficult because of remarkable difference in KMC group from historical controls.<sup>15</sup>

A systematic review conducted by Cochrane Library<sup>14</sup>, concluded that although KMC does not improve survival, it reduces the incidence of respiratory tract infections and decreases the rate of nosocomial infections. The author's concluded that although KMC seemingly reduces infant morbidity, evidence is still insufficient to recommend it as a routine practice. They also pointed out that more randomized; controlled and well designed trials should be carried out.

Recently, a randomized control trial conducted in 2 hospitals in South Africa<sup>16</sup> revealed that babies who were kept skin to skin contact had better outcome as regards physiological stabilization compared to those babies who were kept in incubators.

### **Growth:**

Mixed results are reported about long term growth following KMC. A RCT from India has shown higher increments in weight, length and head circumference in kangaroo infants in neonatal period.<sup>12</sup> In another RCT KMC infants showed a slightly larger daily weight gain while they were cared for in hospital, but in the overall period of study their growth did not differ from that of the control group.<sup>13</sup> In a meta-analysis by Neonatal Review Group of the Cochrane Collaboration randomized trials<sup>14</sup> comparing KMC and conventional neonatal care in LBW infants, KMC infants had gained more weight per day by discharge than controls (weighted mean difference 3.6 g/day, 95% confidence interval 0.8 to 6.4) and had a larger head circumference at 6 months' corrected age than controls (weighted mean difference 0.34 cm, 95% confidence interval 0.11 to 0.57) although these differences are of low clinical significance. Sloan 1994 reported "there were no significant differences between the groups in growth indices during the 6-month follow-up". No differences were seen in weight, length, or head circumference at 41 weeks' corrected gestational age or at 12 months' corrected age or in weight at discharge.

### **Other effects:**

Prolonged skin-to-skin contact between the mother and her preterm/LBW infant, as in KMC, provides effective thermal control and may be associated with a reduced risk of hypothermia.<sup>12,13, 17,18</sup>

In 1989, Affonso et al<sup>19</sup> in a study involving 33 mothers who had skin to skin contact with their babies and a control group, observed a greater tendency towards emotional stability in mothers exposed to KMC. They also reported a more intense feeling of reliability and competence in these mothers as compared with those mothers whose babies received conventional care. In a study involving 488 mothers of preterm babies Tessier et al<sup>20</sup> observed that those submitted to KMC felt more competent and had an increased perception of baby's competences. Moreover they felt less stressed even when the hospital stay was longer. These subjective feelings may be seen as positive indirect signs of establishment of parent and child bonding favored by KMC and could be positive signs of greater participation of parents in baby care and stimulation, allowing them a more comprehensive and individualized care.

Brazelton<sup>21</sup> in a careful study with babies asserted that a preterm baby's nervous system becomes more easily organized while in calm environment without excessive stimuli. By observing the physiological pattern during intrauterine life it is generally noted that baby's experiences occur in a cyclic rhythm of activity and are determined by the possibility to rest and sleep whenever necessary, which according to Korrones<sup>22</sup> occurred 80% of the time. Mann et al<sup>23</sup> regard sleep as a positive influence on the development of the brain.

Preterm babies exposed to skin to skin contact showed a better mental development and better results in motor tests. The presence of parents facilitates skin to skin contact which in its turn allows tactile proprioceptive stimulation and protects against an overload of aversive stimuli, being an acceptable method for proper stimulation of the baby's neurobehavioral development.

### *Cost-effectiveness*

Cost-effectiveness of KMC as compared to conventional care has not been studied well and there is a need to conduct such studies especially in low-resource settings.

### **Use of KMC in different settings**

KMC may be used in three different scenarios:

1. Settings with a very low level of development and severely restricted access to any level of neonatal care. Premature infants who are born at home with no assistance or with the assistance of a traditional birth attendant and preterm infants who are born at first level unit with no specialized care and no possibility of being transferred to a healthcare unit with specialized care. In such cases, KMC including skin-to-skin contact, breastfeeding and the best possible health-care follow-up represents the best means for ensuring the survival of non-sick premature infants who have no

significant conditions other than being premature. Safety, efficacy and applicability of KMC in such a setting needs to be further investigated.

2. Access to appropriate resources but which are insufficient for the number of premature births. Here KMC represents an effective alternative which allows better utilization of available resources.
3. Little or no restriction on access to high-technology neonatal care. KMC is used mainly during hospitalization to establish healthy bonding between mother and infant and to increase the breastfeeding rates. The intermittent kangaroo position in hospital is the most widely used component in such a setting.

### Requirements for KMC implementation

KMC is feasible everywhere, because it is not based on equipment, and it presents advantages for the organization of health services provided the following requirements are met:

- The health facility (the hospital or the neonatal ward) should have an open doors policy for parents at all times. A room near to or at the neonatal unit, furnished with comfortable seats for the mothers, is needed for conducting the kangaroo adaptation and for teaching and training mothers. The presence of a nurse available full time, trained in the kangaroo technique, is indispensable.
- Breastfeeding must be the official feeding policy of the hospital for all newborn infants.
- Staff should receive adequate training on KMC, including the special breastfeeding and feeding needs of LBWI. Extra training is usually needed on stimulation of breastfeeding, expression and conservation of breast milk, mode of administration of expressed breast milk, and daily monitoring of growth.
- Whenever good quality follow-up (including initial daily follow up visits) can not be warranted, early discharge in kangaroo position should be not attempted. On the contrary, KMC should be provided as an in-hospital activity, allowing mothers and infants to room together for as long as needed.

Besides human and physical resources, implementing a KMC program needs institutional, social and health care workers support. During the II International Workshop about KMC, problems faced while implementing KMC programs were discussed and possible solutions were suggested. The basic strategy for facilitating the implementation and success of KMC programs can be summarized in three words: communication, sensitiveness and education.

Nurses, physicians and other staff involved in the care of the mother and the baby should be trained. This training may best be done by exposing them to units

already practicing KMC. Educational material such as information sheets, posters, video films on KMC in local language should be available to the mothers, families and community. If possible, reclining chairs in the nursery and postnatal wards, and beds with adjustable back rest should be arranged. Mother can provide KMC sitting on an ordinary chair or in a semi-reclining posture on a bed with the help of pillows.

### Criteria for eligibility of KMC

#### *Baby*

All stable LBW babies are eligible for KMC. However, very sick babies needing special care should be cared under radiant warmer initially. KMC should be started after the baby is hemodynamically stable. Short KMC sessions can be initiated during recovery with ongoing medical treatment (IV fluids, oxygen therapy). KMC can be provided while the baby is being fed via orogastric tube or on oxygen therapy. Guidelines for practicing KMC include:

**Birth weight >1800 g:** These babies are generally stable at birth. Therefore, in most of them KMC can be initiated soon after birth.

**Birth weight 1200-1799 g:** Many babies of this group have significant problems in neonatal period. It might take a few days before KMC can be initiated. If such a baby is born in a place where neonatal care services are inadequate, he should be transferred to a proper facility immediately after birth, along with the mother/ family member. He should be transferred to a referral hospital after initial stabilization and appropriate management. One of the best ways of transporting small babies is by keeping them in continuous skin-to-skin contact with the mother/family member during transport.

**Birth weight <1200 g:** Frequently, these babies develop serious prematurity-related morbidity, often starting soon after birth. They benefit the most from in-utero transfer to the institutions with neonatal intensive care facilities. It may take days to weeks before baby's condition allows initiation of KMC.

#### *Mother*

All mothers can provide KMC, irrespective of age, parity, education, culture and religion.<sup>24</sup> The following points must be taken into consideration when counseling on KMC:

- **Willingness:** The mother must be willing to provide KMC. Healthcare providers should counsel and motivate her. Once the mother realizes the benefits of KMC for her baby, she will learn and undertake KMC.
- **General health and nutrition:** The mother should be free from serious illness to be able to provide KMC. She should receive adequate diet and supplements recommended by her physician.

- Hygiene: The mother should maintain good hygiene: daily bath/sponge, change of clothes, hand washing, short and clean finger nails.
- Supportive family: Apart from supporting the mother, family members should also be encouraged to provide KMC when mother wishes to take rest. Mother would need family's cooperation to deal with her conventional responsibilities of household chores till the baby requires KMC.
- Supportive community: Community awareness about the benefits should be created. This is particularly important when there are social, economic or family constraints.

### Initiation of KMC

**Counseling:** When baby is ready for KMC, arrange a time that is convenient to the mother and her baby. The first few sessions are important and require extended interaction. Demonstrate to her the KMC procedure in a caring, gentle manner and with patience. Answer her queries and allay her anxieties. Encourage her to bring her mother/mother in law, husband or any other member of the family. It helps in building positive attitude of the family and ensuring family support to the mother which is particularly crucial for post-discharge home-based KMC.<sup>25</sup> It is helpful that the mother starting KMC interacts with someone already practicing KMC for her baby.

**Mother's clothing:** KMC can be provided using any front-open, light dress as per the local culture. KMC works well with blouse and sari, gown or shawl. Suitable apparel that can retain the baby for extended period of time can be adapted locally.

**Baby's clothing:** Baby is dressed with cap, socks, nappy, and front-open sleeveless shirt.

### Time of initiation

KMC can be started as soon as baby is stable and receiving oral feeds. Babies with severe illness and those requiring special treatment must wait until recovery before KMC can be started. Short KMC sessions can be initiated during recovery with ongoing medical treatment (iv fluids, low concentration of additional oxygen)

### KMC procedure

**Kangaroo positioning:** The baby should be placed between the mother's breasts in an upright position. The head should be turned to one side and in a slightly extended position. This slightly extended head position keeps the airway open and allows eye to eye contact between the mother and her baby. The hips should be flexed and abducted in a "frog" position; the arms should also be flexed. Baby's abdomen should be at the level of the mother's epigastrium. Mother's breathing stimulates the baby, thus reducing the occurrence of apnea ( Fig 1 ). Support the baby's bottom with a sling/binder.



Fig 1 : **Kangaroo positioning**

**Monitoring:** Babies receiving KMC should be monitored carefully especially during the initial stages. Nursing staff should make sure that baby's neck position is neither too flexed nor too extended, airway is clear, breathing is regular, color is pink and baby is maintaining temperature. Mother should be involved in observing the baby during KMC so that she herself can continue monitoring at home.

**Feeding:** The mother should be explained how to breastfeed while the baby is in KMC position. Holding the baby near the breast stimulates milk production. She may express milk while the baby is still in KMC position. The baby could be fed with *paladai*, spoon or tube, depending on the condition of the baby.

**Privacy:** KMC unavoidably requires some exposure on the part of the mother. This can make her nervous and could be de-motivating. The staff must respect mother's sensitivities in this regard and ensure culturally acceptable privacy standards in the nursery and the wards where KMC is practiced.

**Duration:** Skin-to-skin contact should start gradually in the nursery, with a smooth transition from conventional care to continuous KMC. Sessions that last less than one hour should be avoided because frequent handling may be stressful for the baby. The length of skin-to-skin contacts should be gradually increased up to 24 hours a day, interrupted only for changing diapers. When the baby does not require intensive care, she should be transferred to the post-natal ward where KMC should be continued.

### Can the mother continue KMC during sleep and resting?

The mother can sleep with baby in kangaroo position in reclined or semi recumbent position about 15 degrees from horizontal. This can be done with an adjustable bed or with pillows on an ordinary bed. A comfortable chair with an adjustable back may be used for resting during the day ( Fig 2 ) .



Fig 2 : Kangaroo mother care being provided in postnatal ward

### Discharge criteria

The standard policy of the unit for discharge from the hospital should be followed. Generally the following criteria are accepted at most centers:<sup>26</sup>

- Baby's general health is good and no evidence of infection
- Feeding well, and receiving exclusively or predominantly breast milk.
- Gaining weight (at least 15-20 gm/kg/day for at least three consecutive days)
- Maintaining body temperature satisfactorily for at least three consecutive days in room temperature.
- The mother and family members are confident to take care of the baby in KMC and should be asked to come for follow-up visits regularly.

*When to discontinue KMC?*

When the mother and baby are comfortable, KMC is continued for as long as possible, at the institution & then at home. Often this is desirable until the baby's gestation reaches term or the weight is around 2500 g. She starts wriggling to show that she is uncomfortable, pulls her limbs out, cries and fusses every time the mother tries to put her back skin to skin. This is the time to wean the baby from KMC. Mothers can provide skin-to-skin contact occasionally after giving the baby a bath and during cold nights.

*Post-discharge follow-up*

Close follow up is a fundamental pre-requisite of KMC practice. Baby is followed once or twice a week till 37-40 weeks of gestation or till the baby reaches 2.5-3 kg of weight. Thereafter, a follow up once in 2-4 weeks may be enough till 3 months of post-conception age. Later the baby should be seen at an interval of 1-2 months during first year of life. The baby should gain adequate weight (15-20 gm/kg/day up to 40 weeks of post-conception age and 10 gm/kg/ day subsequently). More frequent visits should be made if the baby is not growing well or his condition demands.

## References

1. Ludington-Hoe SM, Hadeed AJ, Anderson GC. Physiological response to skin to skin contact in hospitalized premature infants. *J Perinatol*.1991; 11: 19-24
2. Whitelaw A, Heisterkamp G, Sleath K, Acolet D, Richards M. Skin to skin contact for very low birthweight infants and their mothers. *Arch Dis Child* 1988; 63(11): 1377-81.
3. Sloan NL, Camacho LW, Rojas EP, Stern C. Kangaroo mother method: randomized controlled trial of an alternative method of care for stabilized low-birthweight infants. Maternidad Isidro Ayora Study Team. *Lancet* 1994; 344(8925): 782-5.
4. Charpak N, Ruiz-Pelaez JG, Charpak Y. Rey-Martinez Kangaroo Mother Program: an alternative way of caring for low birth weight infants? One year mortality in a two cohort study. *Pediatrics* 1994; 94(6 Pt 1):804-10.
5. Cattaneo A, Davanzo R, Worku B, et al. Kangaroo mother care for low birthweight infants: a randomized controlled trial in different settings. *Acta Paediatr* 1998; 87(9):976-85.
6. American Academy of Pediatrics. Workgroup on breastfeeding and use of human milk. *Pediatrics*1997;100:1035-9
7. Amin SB, Merle KS, Orlando MS, Dalzell LE, Guillet R. Brain stem maturation in premature infants as a function of enteral feeding type. *Pediatrics* 2000;106:318-320
8. Carlson SE, Cooke RJ, Rhodes PG. Long term feeding of formulas high in linolenic acid and marine oil to very low birth weight infants: phospholipids fatty acids. *Pediatr Res* 1991; 30:404-12
9. Carlson SE, Werman SH, Cooke RJ, Rhodes PG, Peeples JM, Tolley EA. Visual acuity development in healthy preterm infants: effect of marine oil supplementation. *Am J Clin Nutr*. 1993; 58: 35-42
10. Lucas A, Morley R, Cole TJ, Lister G, Leeson Payne C. Milk and subsequent intelligent quotient in infants born preterm. *Lancet*. 1992; 339: 261-264
11. Hurst NM, Valentine CJ, Renfro L, Burns P, Ferlic L. Skin-to-skin holding in the neonatal intensive care unit influences maternal milk volume. *J Perinatol* 1997; 17(3):213-7.
12. Ramanathan K, Paul VK, Deorari AK, Taneja U, George G. Kangaroo Mother Care in very low birth weight infants. *Indian J Pediatr* 2001; 68(11):1019-23.
13. Rao PN, Udani R, Nanavati R. Kangaroo mother care for low birth weight infants: a randomized controlled trial. *Indian Pediatr* 2008; 45(1):17-23.
14. Conde-Agudelo A, Diaz-Rossello JL, Belizan JM. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev* 2003(2):CD002771.
15. Bergman NJ, Jurisoo LA. The 'kangaroo-method' for treating low birth weight babies in a developing country. *Trop Doct* 1994; 24(2):57-60.
16. Bergman NJ, Linley LL, Fawcus RR. Randomized controlled trial of skin to skin contact from birth vs. conventional incubator for physiological stabilization in 1200to 2199 gram newborns. *Acta Paediatr*. 2004; 93: 779-885

17. Charpak N, Ruiz-Pelaez JG, Figueroa de CZ, Charpak Y. Kangaroo mother versus traditional care for newborn infants  $\leq 2000$  grams: a randomized, controlled trial. *Pediatrics* 1997; 100(4):682-8.
18. Kadam S, Binoy S, Kanbur W, Mondkar JA, Fernandez A. Feasibility of kangaroo mother care in Mumbai. *Indian J Pediatr* 2005; 72(1):35-8
19. Affonso DD, Wahelber V, Persson B. Exploration of mothers reactions to the kangaroo method of prematurity care. *Neonatal Netw* 1989; 7:43-51
20. Tessier R, Cristo M, Velez S et al. Kangaroo mother care and the bonding hypothesis. *Pediatrics* 1989; 102: 17-23
21. Brazelton TB. Early intervention. In: Fritzgerald HE, Lester BM, Yogman MV, editors. *Theory and research in behavioral pediatrics*. New York: Plenum Press; 1982. p104-19
22. Korones SB. Disturbance and infants rest. In Moore TD, editor. *Iatrogenic problems in intensive care*. Report of 69<sup>th</sup>. Ross conference on Pediatric research. Columbus, OH: Ross laboratories; 1976. p94-97
23. Mann NP, Haddow R, Stokes L, Goodley S, Rutter N. effect of night and day on preterm infants in newborn nursery: randomized trial. *BMJ*.1986; 293: 1265-7
24. Udani RH, Nanavati RN. Training manual on Kangaroo mother care. Published by the Department of neonatology. KEM Hospital and Seth GS medical college Mumbai. September 2004.
25. Website of KMC India Network .Guidelines for parents and health providers are available online at [www.kmcindia.org](http://www.kmcindia.org)
26. World Health Organization. Kangaroo mother care: a practical guide. Department of Reproductive Health and Research, WHO, Geneva.2003.

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