

Effect of Kangaroo Mother Care on Neonatal Temperature and Weight among Newborns

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Abstract

Taking into consideration multiple, long term benefits of Kangaroo Mother Care (KMC), a study was undertaken to compare the weight reduction and temperature of neonates on maternal kangarooing and professional mummification, and also correlate these with demographic variables. The sample consisted of 50 post-natal mothers with term neonates, both from experimental and comparison group. It is concluded that KMC leads to better weight gain, temperature and shorter hospital stay.

The benefits of Kangaroo Mother Care (KMC) for the baby are numerous: there stable heart rate (no bradycardia), regular breathing (a 75% decrease in apneic episodes), improved oxygen saturation levels, no cold stress, longer periods of sleep, rapid weight gain, rapid brain development, reduction of “purposeless” activity, decreased crying, longer periods of alertness, successful breastfeeding episodes and earlier hospital discharge.

Kangaroo Mother Care consists of placing a diaper clad premature & mature baby in an upright position on a mother's bare chest - tummy to tummy, in between the breasts. The baby's head is turned so that the ear is above the mother's heart (Larimer, 2004).

In rural Bangladesh, where postnatal mothers are community based, incidence of home delivery is high, birth weight low, neonatal and infant mortality rates are high and neonatal intensive care like KMC is unavailable. This trial tested and concluded that community-based Kangaroo mother care reduces the overall neonatal mortality rate by 27.5 percent, infant mortality rate by 25 percent, and low birth weight neonatal mortality rate by 30 percent.

Need for the study

- > KMC is a simple and feasible intervention; acceptable to most mothers admitted in hospitals. There may be benefits in terms of reducing the incidence of hypothermia and no adverse effects of KMC were demonstrated in the study (Kadam et al, 2005).
- > Warmth is one of the basic needs of a newborn baby; it is critical to the baby's survival and well being. Unlike adults, newborn babies are often unable to keep themselves warm particularly if the environmental temperature is low. This results in low temperature

or hypothermia.

- > The current global estimates put the number of neonatal deaths each year at four million and of stillbirths (beyond 22 weeks' gestation) at another four million. Neonatal mortality contributes nearly two-thirds of the infant mortality rate in countries like India, where each year an estimated 1.1 million neonates die. Neonatal mortality and stillbirths pose a global problem of enormous proportion.
- > The global neonatal mortality of 28/1,000 live births is unacceptably high. Furthermore, the huge difference in mortality between high- and low-income countries and regions is presently one of the most burning human rights issues. The decline in neonatal mortality has been slow and is a main reason the Millennium Development Goal 4 does not seem to have been reached. Several countries have shown it is possible to reduce neonatal mortality quickly and dramatically without much cost. It is important to learn from the successful countries and focus on the 3-4 major causes of neonatal death: asphyxia, infection, low birth weight/prematurity and congenital malformations.
- > An article 'Kangaroo Mother Care can bring down infant mortality rate' (2010) shows that in eight low and middle income countries, about 15 cases were studied including three randomised controlled trials, and found a 51 percent reduction in newborn mortality when stabilised babies weighing less than four pounds (2,000 gm) received warmth and breast milk through continuous skin-to-skin contact on the chest of their mothers. According to the findings, up to half a million newborn deaths due to preterm birth complications could be prevented in each year if Kangaroo Mother Care were available for all preterm babies, particularly in low-income countries, where newborn mortality rates are highest.
- > 'Thermal control of the newborn: a practical guide' (2009) says, maintaining a normothermic state in a

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newborn is an essential basic need in the early days of life. All efforts must be made to maintain the warm chain, detect hypothermia early and take prompt remedial measures to correct it. This will significantly reduce the mortality and morbidities in the newborn period.

Objectives

The current study was conducted with two objectives: (i) to compare the weight reduction and temperature of neonates who were on maternal kangarooing and professionally mummifying; and (ii) to associate the temperature and weight reduction of maternal kangarooed and professionally mummified with neonatal demographic variables.

Hypothesis

- * There was a significant difference between weight reduction and temperature of neonates who were on maternal kangarooing and professionally mummifying.
- * There was a significant association between temperature and weight reduction of maternal kangarooed and professionally mummified with neonatal demographic variables.

Theoretical framework

Theoretical framework selected for this study was based on General System theory by Bertalanffy (1968). In this theory main focus is on the discrete part and their inter relationship which make up and describe the whole. Input is assessment of neonatal parameters such as weight and temperature, crying state and frequency of breast feeding. Throughput is Application of Kangaroo Mother Care for experimental group and professional mummification for control group newborns. The output is Post assessment of experimental and control group newborns.

Review of Literature

To assess the impact of the introduction of kangaroo mother care (KMC) in hospitals using the Perinatal Problem Identification Programme (PPIP) in South Africa, a survey was conducted for 40 hospitals. Of these, eight hospitals had not initiated KMC, 21 hospitals had PPIP data for a period after KMC had commenced and 11 hospitals had PPIP data for periods before and after the introduction of KMC. The neonatal death rate (NNDR) for all hospitals with no KMC or before the introduction of KMC was 88.14/1000 live births, whereas the NNDR for hospitals with KMC or after the introduction of KMC was 71.43/1000 live births [relative risk (RR) 0.81; 95% confidence interval (CI) 0.72-0.91]. For the 11 hospitals that had reliable PPIP data for periods before and after the initiation of KMC, the NNDR was 87.72/1000 live births

before KMC and 60.76/1000 live births after KMC had been introduced (RR 0.62; 95% CI 0.53-0.73). The large and significant reduction in the NNDR of neonates weighing between 1000 and 1999 gm was associated with the introduction of KMC (Pattinson, Bergh, Malan & Prinsloo, 2006).

A randomised controlled trial was performed over one year period in which 89 neonates were randomized into two groups kangaroo mother care and conventional method of care (CMC) in a tertiary care hospital in India. Forty-four babies were randomised into KMC group and 45 to CMC. There was significant reduction in KMC vs CMC group of hypothermia (10/44 vs 21/45, $p < 0.01$), higher oxygen saturations (95.7 vs 94.8%, $p < 0.01$) and decrease in respiratory rates (36.2 vs 40.7, $p < 0.01$). There were no statistically significant differences in the incidence of hyperthermia, sepsis, apnea, onset of breastfeeding and hospital stay in two groups; 79 percent of mothers felt comfortable during the KMC and 73 percent felt they would be able to give KMC at home. KMC is feasible, as mothers are already admitted in hospitals and are involved in the care of newborn (Kadam, Binoy, Kanbur et al, 2005).

A quasi-experimental study was conducted to evaluate the benefits of KC on neurobehavioral responses in term infants. Out of 47 healthy mother-infant pairs 25 of the pairs were in the treatment group and 22 pairs were in the control group. Data were collected through observation for a 60-minute period 4 hours after birth using a behavioral recording tool. The findings of this study support the positive benefits of KC on term infants and their efforts in self-regulation, neurobehavioural responses, motor system balance, sleep organisation after delivery, and ease of transition to the external environment from the comforts of the womb. The study concluded that when the baby got cold, the mother's body temperature would increase to 'warm' the baby up. Kangaroo care performed in a quiet, low light environment with ANY baby has been proven to reduce crying and help the baby learn to transition from one sleep state to another. It shows a significant increase in sleep time for the neonates during Kangaroo Care (Asher & Brooke, 2006).

A randomised controlled trial was performed to evaluate the earlier continuous KMC for relatively stable low-birth-weight (LBW) infants in Madagascar. A total of 73 infants (intervention 37, control 36) were included. Earlier continuous KMC had higher but no statistically different mortality in the first 28 days post birth (1 vs. 2; risk ratio, 1.95; 95% CIs, 0.18-20.53; $p = 1.00$). There were no differences in incidence of morbidities. Body weight loss from birth to 24 hr post-birth was significantly less in earlier KMC infants compared with later KMC infants. (-34.81 gm vs. -73.97 gm; mean difference, 39.16 gm; 95% CIs, 10.30-68.03; $p = 0.01$; adjusted $p = 0.02$). Adverse events

and duration of hospitalisation were not different between the two groups (Nagai et al, 2010).

Ninety-nine percent of the 4 million neonatal deaths per year occur in developing countries. The World Health Organization (WHO) Essential Newborn Care (ENC) course sets the minimum accepted standard for training midwives on aspects of infant care (neonatal resuscitation, breastfeeding, kangaroo care, small baby care, and thermoregulation), many of which are provided by the mother. The mothers were categorised into 2 groups, those who had completed 7 years of school education (primary education) and those with 8 or more years of education. ENC training is associated with decreases in early neonatal mortality; rates decreased from 11.2 per 1000 live births pre-ENC to 6.2 per 1000 following ENC implementation ($p < 0.001$). Prenatal care, birth weight, race, and gender did not differ between the groups. Mortality for infants of mothers with 7 years of education decreased from 12.4 to 6.0 per 1000 ($p < 0.0001$) but did not change significantly for those with 8 or more years of education (8.7 to 6.3 per 1000, $p = 0.14$). ENC training decreases early neonatal mortality, and the impact is larger in infants of mothers without secondary education. The impact of ENC may be optimized by training health care workers who treat women with less formal education (Chomba, 2008).

Methodology

The study had comparative quasi experimental repeated measure time series design, and its setting was PSG Hospitals, Coimbatore. The population consisted of postnatal mothers with newborns. The sample size was 50 postnatal mothers with term newborns (25 each in experimental and comparison groups). Sampling technique employed was convenient sampling.

Inclusion Criteria: Both primi and multipara mothers; and mothers who delivered normally and were having term newborn babies.

Method of Data Collection

- Observation of measuring parameters of Neonates (recording of temperature and weight), crying state of newborn and frequency of breast feeding.

- Steps of Kangaroo Mother Care.

Comparison of mean, standard deviation of neonatal weight after implementation of Kangaroo mother care and professional mummification shows that in experimental group gained 30 gm of weight but in comparison group shows weight reduction of 40 gm on day 3 of post observation. It concludes that rapid weight gain was observed in Kangarooed infants.

- * In neonatal temperature, paired 't' test shows that the experimental group newborns have highest

significant ($t' = 3.27, 3.89 \& 3.05$) thermal controlling in all 3 consecutive days when compared to comparison group newborns. In 'Z' test shows both groups had highest significant on thermal controlling (Table 2).

- * In neonatal weight recording, the both Paired 't' test and 'Z' test shows that the experimental and comparison groups had non-significant in weight reduction (Table 3).
- * There is no significant association between thermal control and weight reduction with neonatal variables.

Data Collection Procedure

- * Neonatal temperature and weight was checked morning and evening before and after implementation of Kangaroo mother care. Crying state and frequency of breast feeding was checked every 2 hrs a day after implementation of initial KMC.
- * Kangaroo Mother Care was given 4 times a day for experimental group newborns and mummification of the baby at the same time for comparison group newborns.
- * Observation of neonatal parameters, crying state of newborn and frequency of breast feeding and Kangaroo Mother Care was done for 5 days to the newborn babies.

Validity and reliability: Split-half method was used to find the reliability of the tool.

Plan for data analysis: Descriptive Statistics - Percentage, Mean and Standard Deviation; Inferential Statistics - Paired 't' test and Independent 't' test

Results

- > The highest mean and standard deviation of neonatal temperature for experimental group newborns were observed in three consecutive days (Table 4). In mean and standard deviation for day 1 pre-observation was 35.4 ± 0.256 when in post-assessment it was

Table 1: Comparison of Mean, Standard Deviation of Neonatal Weight after implementation of KMC and Professional Mummification

Neonatal Weight Observation	Experimental Group			Comparison Group		
	Mean	Standard Deviation	't' Value	Mean	Standard Deviation	't' Value
Day I						
Pre Observation	3.003	0.280	2.5	3.04	0.287	0.116
Post Observation	3.016	0.279		3.04	0.289	
Day II						
Pre Observation	3.013	0.279	1.14	2.999	0.326	0.5
Post Observation	3.024	0.280		2.999	0.327	
Day III						
Pre Observation	3.024	0.281	0.004	2.96	0.351	0.104
Post Observation	3.039	0.275		2.966	0.351	

Table 2: Comparison of Neonatal Temperature after implementation of KMC and Professional Mummification for Experimental and Comparison group

Neonatal Temperature	Experimental and Comparison group
	Independent - 't' test value
Day I	5.755
Day II	7.33
Day III	6.13

Table 3: Comparison of Neonatal Weight after implementation of KMC and Professional Mummification for Experimental and Comparison group

Neonatal Weight	Experimental and Comparison group
	Independent - 't' test value
Day I	0.634
Day II	0.921
Day III	0.488

36.6±0.316. In day 1 the mean difference shows 1.2°C after implementation of Kangaroo mother care. On day 3 the mean and standard deviation of pre-observation shows, it was 36.4±0.197 and in post-test it was 37.4±0.168. The mean difference was 1°C. It shows that Kangaroo mother care is much effective.

- > In comparison group the temperature was slightly increased after professional mummification. In day 1, the pre-test mean was 35.4±0.249, and post-test was 36.1±0.165, the mean difference shows that 0.7°C after implementing of mummification. In same like in day 3, the pre-test mean was 36.3±0.195, the post-test was 36.4±0.2, and the difference in mean was 0.1°C. Hence, the comparison of groups shows that the effective thermoregulation is maintained by Kangaroo mother care group babies than the professional mummification babies.
- > In experimental group newborns, the number of crying state and frequency of breast feeding was observed

Table 4: Comparison of Mean, Standard Deviation of Neonatal Temperature after implementation of KMC and Professional Mummification

Neonatal Temperature Observation	Experimental Group			Comparison Group		
	Mean	Standard Deviation	't' Value	Mean	Standard Deviation	't' Value
Day I						
Pre-observation	35.4	0.256	3.27	35.4	0.249	2.25
Post-observation	36.6	0.316		36.1	0.165	
Day II						
Pre-observation	35.9	0.199	3.89	35.9	0.136	1.97
Post-observation	37.2	0.181		36.2	0.173	
Day III						
Pre-observation	36.4	0.197	3.05	36.3	0.195	1.29
Post-observation	37.4	0.168		36.4	0.2	

for 11-12 times a day for 3 consecutive days. Whereas in comparison group frequency of breast feeding was observed for 6-7 times a day and crying state was increased to 14 times a day for 3 consecutive days.

Conclusion

Retention of body warmth is higher among maternal kangarooed neonates 30 minutes post exposure, the effect size is the same at the level of $p < 0.05$ in all the final observations for the three consecutive days. Experimental group gained 30 gm of weight but in comparison group shows weight reduction of 40 grams on 3rd day of post observation, rapid weight gain was observed in Kangarooed infants. This increased weight gain also leads to shorter hospital stays. Maternal kangarooing promotes temperature control and weight maintenance effectively for preterm and term newborns.

Implications

Findings of the study imply that since mothers are not having adequate practice on Kangaroo mother care during early postnatal periods. The nurse educator should educate the peripheral level health-workers and also an mothers to improve the knowledge and motivate their practice on Kangaroo Mother Care immediately after delivery to save the baby lives.

Recommendations

- > A comparative study can be conducted on the effectiveness of kangaroo mother care over professional mummified on neonatal temperature and weight among Pre term newborns in selected community and hospitals.
- > A similar study can be conducted by using video teaching programme on Kangaroo mother care for educating the mother in government hospital.

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