

Effect of Tactile, Kinesthetic Stimulation and Kangaroo Mother Care on Low Birth Weight in Preterm Infants

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ABSTRACT

Background: 85% of preterm births are largely concentrated in developing countries. Low birth weight is still a major concern in these countries. Tactile-Kinesthetic Stimulation and Kangaroo Mother Care (KMC) are two techniques other than the medical intervention which, if given as early as possible to the infant, would aid to prevent morbidities and mortality, enhance growth, early discharge from hospital thus cutting down on cost of the hospital stay.

Aim: The aim of the study was to determine the effect of KMC and stimulation on weight gain in preterm infants when administered together.

Method: Two groups with 10 preterm infants in each group of weight between 1000- <2500 g and born between 28-37 weeks were included in the study. In Group A (intervention group) 10 minutes of tactile-kinesthetic stimulation followed by 1 hour of supervised KMC was given for 5 days. The Group B (control group) practised unsupervised KMC as guided by the medical team. The outcome measure was infant weight.

Result: This study showed that no significant weight gain was observed after a period of 5 days. There was no significant difference in weight of infants between Group A and Group B.

Conclusion: Though significant weight gain was not seen in infants after 5 days, the infants did gain weight on the basis of which they were discharged earlier than expected. The study suggests these techniques have still proved to be effective and beneficial to the infants and their families especially when administered together.

Keywords: Preterm infants, low birth weight, tactile-kinesthetic stimulation, kangaroo mother care.

INTRODUCTION

Neonatal period is regarded as evolution to extra uterine life, rapid growth and development. It is the most crucial period for long-term physical and neurocognitive development. A preterm neonate is the one born before 37 weeks of gestation irrespective of the birth weight. ^[1] Of all preterm births occurring around the globe, 85% are largely concentrated in developing countries like Africa (31%) and

Asia (54%). ^[2] For half the preterm births taking place at home or even in facilities, there is often lack of essential care. ^[3] On an average 45%-50% of preterm births are idiopathic, 30% are due to preterm rupture of membrane (PROM), 15%-20% are due to medically indicated or elective preterm deliveries. Certain other factors include medical conditions of mother or foetus, environmental exposure, genetic influences, behavioural socio-economic factor and

iatrogenic prematurity. Hence preterm birth is a prime reason for neonatal mortality and morbidity, which results in large amount of physical, psychological and economic costs extending to later life. [2,4] Some of the problems faced by preterm babies are hypothermia, perinatal asphyxia, bacterial sepsis, apnoea, hypoglycemia, feeding problems and poor weight gain. [1]

Vitamin D is thought to have an essential role in processes such as bone mineralization, contraction of muscles, nervous system activities and cellular function. Maternal vitamin D levels are important for child's vitamin D levels during infancy as breast milk is a poor source of vitamin D. [5] Exclusive breast feeding for the first 6 months along with proper fortification of food, condiments and complementary foods including vitamin A to the diet to boost the immune system, zinc to treat diarrhoea and iron and iodine supplements to improve cognition should be done to prevent infant morbidity and mortality. [6]

For live births, birth weight should ideally be measured within the first hour of life before significant postnatal weight loss occurs. Birth weight is a substantial determining factor of newborn survival. [7] Birth weight between 2500 g-4500 g is considered to be normal for term babies. [8] World Health Organization defines low birth weight as birth weight of less than 2500 g, which can be subdivided into very low birth weight i.e. less than 1500 g and early low birth weight (less than 1000 g). [7,9] Preterm birth and intra-uterine growth retardation are two of the main causes of low birth weight. Mothers living in low socio-economic areas, poor nutrition, physically challenging work, very young age, short height or medical conditions can all contribute and affect the growth and development of the foetus. [9] Low birth weight (LBW) accounts for 20-30% of all live births in India. [10] Resuscitation problems, poor temperature control, prone to infection, metabolic derangements, jaundice, haematological abnormality and

prolonged hospital stay are some of the concerns for LBW neonates. The causes of inadequate weight gain are increased demands (cold stress, chronic illness, medications) and inadequate intake (incorrect feeding methods and not feeding at night for breastfed infants; excess spilling of milk, incorrect quantity, infrequent feeding and not fortifying the milk for infants on spoon or paladai). [1]

Various researchers have studied the effects of various types of supplemental stimulation in order to prevent the immediate adversities and developmental deficits associated with prematurity. The different forms of stimulation are vestibular, tactile, kinesthetic, auditory, oral and various multi - modal combinations. Supplemental tactile stimulation has included extra holding, cephalocaudal rubbing, gentle stroking, and passive touching. Kinesthetic stimulation, in the form of passive limb movements is usually administered conjointly with massage. [11] It is believed that tactile stimulation stimulates the mechanoreceptors and baroreceptors of the skin in the digestive tract that is supplied by efferent vagal fibres. These afferent and efferent fibres have parasympathetic control over gastro intestinal and cardiovascular systems. [12]

Kangaroo mother care (KMC) is an early, continuous and prolonged skin-skin contact between mothers and preterm babies, exclusive breast feeding, early discharge after hospital initiated KMC with continuation at home and adequate support and follow up for mothers at home; as defined by WHO. [13] Similar to marsupial care giving it helps to improve heart rate, respiratory rate, prevent infection, deepens sleep, increases weight, enhances physical growth, increases milk production, reduces hospital stay and prevents maternal depression. [1,2] It has been found to be cost-effective, feasible and potent in improving various physiological parameters in premature babies. [14] KMC can be discontinued once the weight crosses 2500 g

or when the baby shows signs of wriggling or crying. [1]

Since the prevalence of LBW due to preterm births in developing countries has been increasing, kangaroo mother care a conventional method of care for preterm babies, is the most feasible way and cost effective care for the babies and can be used in the rural areas. Tactile stimulation also known as massage, an age old therapy has been used in newborns to enhance their physical well-being and proved to be effective in preventing various morbidities in preterm infants in rural and urban areas through various studies. If both the methods are given together in preterm babies it can help reduce neonatal morbidity and mortality and help cut down on the huge amount of costs required in hospitals for early discharge of the infants. Hence the aim of the study was to find out the effect of tactile-kinesthetic stimulation along with kangaroo mother care over kangaroo mother care only on low birth weight in preterm infants.

MATERIALS AND METHODS

The study was conducted in the Mother Care Unit of the Paediatric Ward of Pravara Rural Hospital, Loni, Maharashtra, India. The ethical clearance was obtained from the Institutional Ethical Committee. The study was an analytical study carried over a period of 5 months. The inclusion criteria was preterm infants delivered with lower segment caesarean section or vaginal delivery, delivered within Pravara Rural Hospital, both male and female infants, infants born at 28 weeks-37 weeks and infants with weight between 1000 g- <2500 g. Infants with Congenital malformations like club foot, cystic fibrosis, down syndrome, spina bifida, turner's syndrome, haemophilia, etc, genetic anomalies like sickle cell anaemia, chromosomal disorders, Huntington's disease, etc and those requiring surgery or who had undergone surgery were excluded from the study.

Procedure

30 infants were screened (i.e.16 infants in Group A and 14 infants in Group B) for this study. On the basis of inclusion criteria 10 infants in each group were selected. The method of stimulation given was according to that given by Diego M A and Field T with modifications done in the treatment. Pre intervention assessment i.e. weight of the infant was measured on the baby weighing scale. The treatment given was; tactile stimulation with small amount of coconut oil taken on the palms of the hand and rubbed together, the infant was first placed in supine position.10 moderate pressure strokes, starting from scalp, on forehead from mid-sideways, on upper limbs then flexion/extension range of motion to shoulder joints and elbow joints was given, abdomen and lower limbs, then simultaneous range of motion at hip joints was given. Stimulation was given in proximal to distal direction and 10 repetitions for range of motion were performed. The baby was then turned to prone position and moderate pressure stroking with fingers was given in proximal to distal direction. Tactile-kinesthetic stimulation was given for 10 minutes/day for a period of 5 days. The stimulation was given either 30-45 minutes after the feed or just before the feed was given to the infant. After this the mother was made to sit on a chair (designed for KMC) present in the ward with her baby in frog position placed in between her breasts wearing diaper and cap and the mother wearing loose hospital clothing. The therapist waited for 1 hour with the mother. The mother was also advised to sit for KMC at least twice a day other than the one included in the intervention as KMC can be done for as long as it is feasible for the mother. This data was also collected and considered in weight gain. Post this body weight was measured on 5th day. The discharge weight was also noted down. The other group did not receive any intervention but the mother was asked whether she had been given proper knowledge regarding KMC. If the mother was acknowledged with the

importance of KMC then data was collected regarding how many times and for how long did she sit per day over the period of 5 days. Later, the discharge weight was also noted down.

Data Analysis

Statistical analysis was done using the 3.06 version of Graph Pad InStat software. Paired 't' test was used to compare the difference in values between pre-intervention and post-intervention within each group. Unpaired 't' test was used to compare the difference in values between Group A (i.e. intervention group) and Group B KMC group). The results were concluded to be statistically insignificant with $p > 0.0001$.

Groups	Mean of age in months and days	SD of age in months and days
Group A	0.1 and 10.4	0.31 and 7.98
Group B	0 and 11	0 and 3.91

The mean age of infants in Group A was 0.1 ± 0.31 months and 10.4 ± 7.98 days and the mean age of infants in Group B was 0 ± 0 months and 11 ± 3.91 days.

Table 1.2: Female: Male Ratio

Groups	Female	Percentage	Male	Percentage
Group A	7	70%	3	30%
Group B	3	30%	7	70%

The gender ratio in Group A was 7:3 (female: male) and in Group B was 3:7 (female: male).

Table 1.1: Age Distribution

Table 1.3: Weight of infants on 5th day

Groups	Intervention	Mean	SD	'p' value	't' value	Result
Group A	Pre	1491.5 g	217.43	0.6211	0.5119	Not significant
	Post	1501.5 g	221.99			
Group B	Pre	1488.75 g	324.84	0.1564	0.18	Not significant
	Post	1518.75 g	319.09			

The 'p' value of Group A is 0.6211 and of Group B is 0.1564.

Table 1.4: Comparison of weight on 5th day between Group A and Group B

Groups	Intervention	Mean	SD	'p' value	't' value	Result
Group A	Post	44.54 g	36.90	0.7250	0.3595	Considered not significant
Group B	Post	37.5 g	18.48			

The 'p' value is 0.7250 and the mean difference is -7.045.

RESULT

The average weight gain of Group A was 1501.5 ± 221.99 g and of Group B was 1518.75 ± 319.09 g (table 1.3). The 't' value of post intervention weight in Group A was 0.5119 which is considered to be non significant, the 't' value of weight in Group B was 0.18 which is considered to be non significant (table 1.3). The difference in weight gain in Group A was 10 g and in Group B was 30 g. The 't' value after comparing the weight at 5th day of both the groups was 0.3595.

DISCUSSION

This study was done to see the combined effect of stimulation and KMC on preterm infants. Previous studies have compared the effect of stimulation and KMC on weight gain in premature infants in 2 different groups. Studies were also carried out to see the effect of KMC on various

physiological parameters such as heart rate, temperature, respiratory rate and oxygen saturation. Studies have proved that both the techniques i.e. stimulation and KMC are beneficial in increasing weight in low birth weight neonates. This was an analytical study to see if weight gain occurs at a rapid rate when both the techniques are combined as it will be advantageous to the patient and family in terms of both, health and cost.

Prematurity is one of the main causes of low birth weight which in turn leads to slower weight gain if proper care is not given to the infant. These infants must have gained weight due to the mechanism as described by Diego MA, Field T, Hernandez-Reif M., especially when the intervention was given after the feed, the ability of the infant to take in the amount of milk fed and the frequency of feeding. Tactile stimulation and practising KMC

were an aid to the infant's feeding patterns. The patients were discharged as there was a steady weight gain post intervention. It was also observed that the infants slept well post stimulation. KMC has multiple benefits; helps to improve mother-infant bonding, reduces chances of sepsis, maintains body temperature and changes in infant behaviour. Stimulation with oil also helps in overall growth of the baby. In a study done by K. Sankaranarayanan and colleagues showed that, the infants gained significant weight at a faster rate when coconut oil was used. [15]

Factors such as frequency and amount of feeding, if the infant was given any supplements, the amount and frequency of urine and faeces passed, etc. were not taken into consideration. The information given by the mothers of Group A and B regarding KMC could be unreliable as the therapist was not present to see if they really sat for the number of hours mentioned by them. It was also observed that mothers of 6 out of 10 infants in Group B were not educated about kangaroo mother care, how important it is for her child. The therapist advised all the mothers of Group A to continue with the stimulation and KMC at home as it does not require great skills or huge amount of expenditure. Hence giving tactile-kinesthetic stimulation and KMC together is beneficial, only it should be carried out for an ideal number of days.

CONCLUSION

This study concludes that no significant weight gain can be seen over a period of 5 days only, however the infants did gain weight on the basis of which he/she got discharged early.

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