

Comparative Effect of Massage Therapy versus Kangaroo Mother Care on Physiological Responses, Chest Expansion and Body Weight in Low Birthweight Preterm Infants

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ABSTRACT

Massage therapy (MT) and Kangaroo Mother Care (KMC) are both effective in increasing the weight of low birthweight preterm infants. However no comparisons have been made until now between the two.

Purpose: *The aim of this study was to compare the effectiveness of MT and KMC on body weight, physiological responses and chest expansion of low birthweight preterm (LBWPT) infants.*

Method: *Using convenience sampling, 20 LBWPT infants from the Neonatal Intensive Care Unit of VS Hospital were randomly divided into 2 groups of 10 each. Group 1 received MT and Group 2 received KMC for 15 minutes, thrice daily for 5 days. Medically stable babies with gestational age <37 weeks and birth weight <2500g were included. Those on ventilators and with congenital, orthopaedic or genetic abnormality were excluded. Outcome measures including body weight, physiological responses (heart rate, respiratory rate and body temperature) and chest expansion were taken pre-intervention on day 1 and post-intervention on day 5. Level of significance was kept at 5%.*

Results: *Data were analysed using SPSS version 16. Both MT and KMC were found to be effective in improving body weight ($p=0.005$, $p=0.007$), decreasing heart rate ($p=0.005$, $p=0.004$), respiratory rate ($p=0.018$, $p=0.004$) and body temperature ($p=0.005$, $p=0.007$), and improving chest expansion ($p=0.026$, $p=0.014$). However, while both were found to be equally effective for body weight ($p=0.341$), heart rate ($p=0.22$), respiratory rate ($p=0.969$) and chest expansion ($p=0.331$), MT was found to be better than KMC in decreasing body temperature ($p=0.003$).*

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Conclusion: MT and KMC were both found to be equally effective, though MT appeared better at decreasing body temperature.

Limitations: Factors that may affect the physiological responses and body weight were not monitored.

Implications: Massage Therapy and Kangaroo Mother Care can be used in the community for weight gain, improvement of chest expansion and regularisation of physiological responses among preterm infants.

Key words: Neonatal Intensive Care Unit, heart rate, respiratory rate, body temperature

INTRODUCTION

Preterm birth is defined as childbirth occurring at less than 37 completed weeks or 259 days of gestation (World Health Organisation, 1992).

Classification based on birth weight is as follows:

- Low birth weight (LBW) – birth weight <2500g
- Very low birth weight (VLBW) – birth weight <1500 g
- Extremely low birth weight (ELBW) – birth weight <1000g.

Children who are born prematurely have higher rates of cerebral palsy, sensory deficits, learning disabilities and respiratory illnesses compared to children born at term. The morbidity associated with preterm birth often extends to later life, resulting in enormous physical, psychological and economic costs (Petrrou, 2005).

Researchers have provided hospitalised preterm infants with various forms of supplemental stimulation in an effort to enrich the environment of the neonatal intensive care unit (NICU) or to accelerate development (Dieter & Emory, 1997; Feldman & Eidelman, 1998). Two of the most widely studied interventions are Massage Therapy and Kangaroo Mother Care.

Massage is referred to as “a methodological touch intended to stimulate the baby”. A number of studies have shown the positive effects of Massage Therapy on preterm infants. These include weight gain, improved sleep/wake states, decreased stress, early discharge from the NICU, improved skin integrity, increased development of the sympathetic nervous system, and enhanced parent-infant bonding (Leonard, 2008).

Kangaroo Mother Care is defined as “early, prolonged and continuous skin-to-skin contact between the mother and low birthweight infant, both in the hospital and after discharge, with exclusive breastfeeding and proper follow-up” (Rey & Martinez, 1983). Kangaroo Mother Care regularises heart rate and respirations, deepens sleep and alert inactivity, reduces crying, prevents infections, shortens the neonatal hospital stay, enhances weight gain, improves physical growth and breastfeeding rates, decreases pain from heel prick procedure and lessens maternal depression (Anderson, 1991; Alencar et al, 2009; Lawn et al, 2010; Conde-Agudelo et al, 2011; Nimbalkar et al, 2013).

A systematic review by Conde-Agudelo and Belizan in 2003 concluded that KMC appears to reduce severe infant morbidity without any serious deleterious effect reported; however there is still insufficient evidence to recommend its routine use in LBW infants (Conde-Agudelo et al, 2011).

Literature is scarce regarding the effects that Massage Therapy and Kangaroo Mother Care have on chest expansion. This is a new area to be studied and researched.

Massage Therapy (MT) and Kangaroo Mother Care (KMC) are both effective in increasing the weight of low birthweight preterm infants, though their effectiveness on the physiological responses and chest expansion is still unclear.

Objectives

To compare the effectiveness of MT and KMC on physiological responses, chest expansion and body weight among low birthweight preterm infants.

The study was approved by the Institutional Ethics Committee of S.B.B College of Physiotherapy, V.S General Hospital, Ahmedabad, Gujarat.

METHOD

A quasi-experimental study was conducted with a convenience sample of 20 infants at the NICU of V.S. Hospital, in 2013. Infants born at a gestational age of <37 weeks, of low birth weight and medically stable were included, while those who were medically unstable, had any congenital, orthopaedic or genetic abnormality, or were on ventilators were excluded. Informed consent was taken from the parents.

The infants were randomly divided into 2 groups, with 10 in each group. Group 1 received 15 minutes of MT, thrice daily for 5 days. Group 2 received 15 minutes

of KMC, thrice daily for 5 days. Outcome measures including body weight, chest expansion and physiological responses (heart rate, respiratory rate and temperature) were taken pre-intervention on day 1 and post-intervention on day 5. Level of significance was kept at 5%.

MT was given according to the Field Massage therapy protocol. Infants were massaged for 15 minutes, 3 times a day, at least 1 hour after being fed. Each massage session consisted of 5 minutes of tactile stimulation, 5 minutes of kinesthetic stimulation, and another 5 minutes of tactile stimulation. During the tactile stimulation, the infant was placed in a prone (face down) position and given moderate pressure stroking with fingertips of both hands. During the kinesthetic massage, the infant was placed in a supine (on back) position and led through passive flexion/extension actions (Dieter & Emory, 1997).

During KMC the infant, wearing only a diaper, was placed between the mother's uncovered breasts. The mother was seated on a standard rocking chair, tilted at an angle of approximately 60°.

RESULTS

Data were analysed using SPSS version 16. Wilcoxon test was applied to determine whether there was significant difference within the groups. Mann-Whitney U test was applied to determine whether there was any significant difference between both the groups. Both MT and KMC respectively were found to be effective in improving body weight ($p=0.005$, $p=0.007$), decreasing heart rate ($p=0.005$, $p=0.004$), respiratory rate ($p=0.018$, $p=0.004$) and body temperature ($p=0.005$, $p=0.007$), and improving chest expansion ($p=0.026$, $p=0.014$) as shown in Table 1. Both were found to be equally effective for body weight ($p=0.341$), heart rate ($p=0.22$), respiratory rate ($p=0.969$) and chest expansion ($p=0.331$) as shown in Table 2. However, MT was found to be better than KMC in decreasing body temperature ($p=0.003$).

DISCUSSION

The findings show that MT and KMC promote weight gain and regularise heart rate, respiratory rate and body temperature. Both MT and KMC also improve chest expansion.

There was an increase in body weight in the MT group, similar to the findings of Dieter et al (2003) who studied that massage therapy leads to weight gain (Petrou,

Table 1: Comparison of means of Body weight, Heart rate, Respiratory rate, Temperature and Chest expansion in Groups A and B

Parameter	Group	Pre	Post	Z value	p value	Significance
Body Weight (kgs)	A	1.5+0.26	1.54+0.26	-2.805	0.005	Yes
	B	1.47+0.23	1.51+0.21	-2.705	0.007	Yes
Heart Rate (beats/min)	A	135.4+17.33	123.8+13.93	-2.814	0.005	Yes
	B	135.1+6.77	128.1+6.12	-2.844	0.004	Yes
Respiratory Rate (breaths/min)	A	49.8+17.62	42.4+8.53	-2.363	0.018	Yes
	B	51.8+9.4	45+3.80	-2.848	0.004	Yes
Body Temperature (°F)	A	98.25+1.35	97.6+1.1	-2.812	0.005	Yes
	B	98.68+0.29	98.44+0.34	-2.687	0.007	Yes
Chest Expansion (cms)	A	0.45+0.08	0.56+0.05	-2.232	0.026	Yes
	B	0.43+0.07	0.49+0.7	-2.449	0.014	Yes

Table 2: Comparison of difference of means of Groups A and B

Parameter	Group A	Group B	U value	p value	Significance
Body Weight (kgs)	0.04+0.02	0.04+0.03	37.5	0.341	NO
Heart Rate (beats/min)	11.6+7.17	7+1.33	34.00	0.22	NO
Respiratory Rate (breaths/min)	7.4+10.29	6.8+7.67	49.5	0.969	NO
Body Temperature (°F)	0.65+0.51	0.24+0.13	10.5	0.003	YES
Chest Expansion (cms)	0.11+0.11	0.06+0.05	38.00	0.331	NO

2005). Dieter et al in 2003 examined the effects of 5 days of Massage Therapy on the weight gain and sleep/wake behaviour of hospitalised stable preterm infants. They concluded that even 5 days of Massage Therapy was effective in improving weight and reducing sleep, instead of the earlier practice of 10 days (Dieter et al, 2003). Also, there was a decrease in heart rate and respiratory rate, as observed by Smith et al in 2013. They speculated that it could be due to improved autonomic nervous system function, as most preterm infants suffer from ANS dysfunction.

However there was a decrease in temperature, as opposed to the findings of Diego et al (2008) who concluded that Massage Therapy brings about an increase in infants' temperature.

In the KMC group there was an increase in body weight and decrease in heart rate and respiratory rate similar to the findings of Moore et al (Smith et al, 2013). However, no studies were found that stated that MT or KMC had an effect on chest expansion. The present study shows that both MT and KMC are statistically significant in increasing chest expansion.

The weight gain seen in both the groups may be attributed to increase in release of digestive enzymes and gastric motility due to stimulation of vagal activity (Moore et al, 2012; Smith et al, 2013). Also, the decrease in heart rate and respiratory rate may be due to inhibition of heart and constriction of bronchi (Diego et al, 2008; Moore et al, 2012). The increase in chest expansion seen in the MT group might be due to the chest strokes applied during therapy, which could facilitate the respiratory muscles. However, the drop in temperature in both groups and the improvement in chest expansion in Kangaroo Mother Care group cannot be explained.

Limitations

Several factors could have had an effect on the outcome measures in this study. Factors such as the feeding amount and urine and stool output for body weight, and Basal Metabolic Rate measures were not monitored. Also, though required, measures like electroencephalography, electrogastrography, etc., to monitor vagal activity, were beyond the scope of physiotherapy.

CONCLUSION

Massage Therapy and Kangaroo Mother Care are both effective in improving weight and chest expansion, and decreasing heart rate, respiratory rate and temperature. MT is more effective in reducing body temperature compared to KMC. MT and KMC can be used interchangeably as both are equally effective. In settings where professionals are not available to apply MT, KMC can be used in its place. KMC is also more community-friendly as it does not require any special set-up or training. It can be given at any time, according to the mother's wish. Moreover, in the mother's absence, the procedure can be performed by any other family member.

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