



EFFECTS OF FACILITATION OF ORAL REFLEXES ON BIRTH WEIGHT GAIN AND VITAL PARAMETERS IN PRETERM LOW BIRTH WEIGHT NEONATES

Physiotherapy

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ABSTRACT

Background: Nutrition of a preterm low birth weight neonate is of vital importance in Neonatal Intensive Care Unit (NICU) where survival of the neonate is most important. Lack of development of oromotor control contributes significantly to the inability to breast feed orally. There is a paucity of evidence regarding the benefits of peri-oral stimulation on birth weight gain and vital parameter stability in specifically preterm low birth weight neonates. **Aim:** To find out the effects of different facilitatory techniques on birth weight gain and vital parameter stability. **Method:** A randomized control trial was carried out where the experimental group was delivered a specialized intervention programme for facilitation of oral reflexes for 15 min, thrice a day for 7 days. The outcome measures like birth weight, heart rate, respiratory rate, blood pressure and oxygen saturation was recorded pre and post intervention. **Results:** 88 preterm low birth weight neonates fulfilling the inclusion criteria were selected. A significant difference in overall weight gain ($p < 0.001$) and vital parameter stability in experimental group was noted. **Conclusion:** Facilitation of oral reflexes in preterm low birth weight neonates showed significant effect on birth weight gain and vital parameter stability.

KEYWORDS

Preterm, facilitation, oral reflexes, birth weight gain

INTRODUCTION

Preterm birth has been defined by the WHO as any live birth before 37 completed weeks of gestation or fewer than 259 days since the first day of a women's last menstrual period. Preterm births occur due to a variety of reasons^[1]. According to the WHO statistics, India contributes about 23.6% of the total world preterm births^[2]. Low birth weight infants are infants born with a birth weight less than 2500 gm^[3]. Prematurity is a leading cause of low birth weight in infants.

Preterm low birth weight infants most commonly require an admission to the neonatal intensive care units (NICU). NICUs provide the appropriate care required by these infants for airway support, breathing support, improving circulatory functions through fluid transfusions, maintaining good core temperature and monitoring of vital physiological parameters and the weight of the infants^[3].

The Preterm low birth weight infants are small in size, they have a weak cry, low muscle tone, reduced limb movements compared to the full term healthy infant. These infants sleep for most part of the 24 hours of the day hence cannot be relied upon to demand feeds. Also, the oral motor development in these infants is poor. They have a small mouth, low facial muscle tone, undeveloped or poorly developed rooting and sucking reflex. They show an uncoordinated suck-swallow – breathe pattern. Owing to the challenges with oral motor maturation and feeding difficulties the Preterm low birth weight infants have poor nutrition^[4].

Nutrition ensures physiological stability. Based on the synactive theoretical framework which used to manage the infants in the NICUs, physiological stability serves as a pillar for motor behavioral state organization and self-regulation in the Preterm low birth infants^[3]. It is imperative from these correlations that birth weight and physiological stability are good predictors of growth and development of these infants.

The NICU Physiotherapists are a part of the interdisciplinary team. The techniques used by the NICU Physiotherapist involve both chest physiotherapy as well neuromuscular physiotherapy. Chest physiotherapy involves airway clearance techniques including percussion, vibration, postural drainage and airway suction. In neuromuscular physiotherapy is focused on parent education and passive range of motion exercise, therapeutic handling as well as positioning^[5].

Several studies suggest that oral stimulation techniques shorten the hospital stay, hasten the feeding progression in Preterm infants^[6]. There is a paucity of literature that studies the effects of oral

stimulation and neuro – modulatory techniques together on birth weight of Preterm low birth weight infants^[6].

The aim of this study was to determine the effect of a specialized oral stimulation protocol with appropriate dosage on birth weight gain and vital parameter stability in Preterm low birth weight neonates compared to a control group of Preterm low birth weight neonates.

METHOD:

Ethical approval to carry out this research work was obtained from the institutional ethical committee, the head of the institute, the Medical Supervisor of Navi Mumbai Municipal Corporation hospital; the head of the Pediatrics Department of Navi Mumbai Municipal Corporation Hospital. A written consent was obtained from the mothers of preterm neonates.

A randomized control trial was undertaken (Figure 1). Incidental sampling technique using lucky draw method was used to allot the neonates fulfilling the inclusion criteria into two groups.

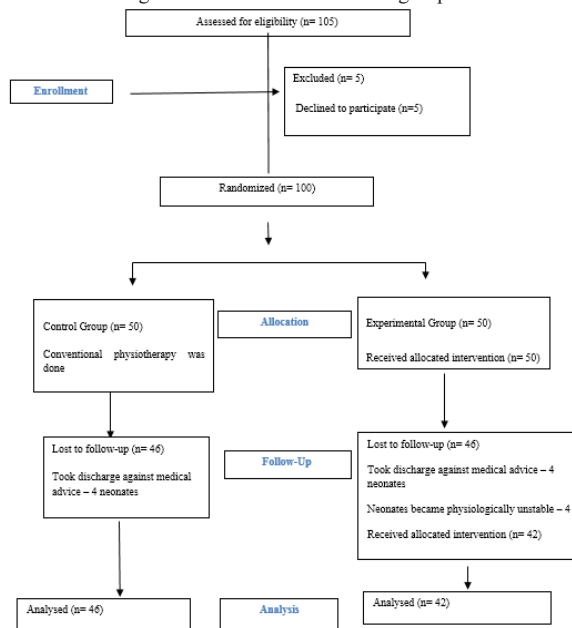


Figure. - 1

Participants**The inclusion criteria were:**

Preterm low birth weight neonates identified and approved by the pediatrician stable to participate in the study.

Preterm low birth weight neonates on Rille's tube feed, spoon feed and breast feed.

The Exclusion Criteria were:

Neonates requiring ventilator support due to birth asphyxia, meconium aspiration and other causes

Neonates with unstable cardio-vascular conditions

Neonates with congenital oral malformations and disorders.

Intervention

Before beginning the study in the neonatal intensive care unit, all the aseptic precautions which are a part of routine NICU protocol at NMMC hospital ie. hand washing, wearing a mask, a cap for the covering the head were followed.

Both the control and experimental neonates received the conventional physiotherapy in form of chest physiotherapy. Chest physiotherapy included techniques like percussion, vibrations, positioning and airway suctioning.

The timings of the intervention were co-ordinated with the feeding timings in the neonatal intensive care unit, an hour before the feed was the time chosen, a behavioral state ranging from awake and attentive to light sleep was chosen to deliver the intervention to the experimental group. The mother was asked to stand near the neonate during the duration of the intervention. The vital parameters - Heart rate, respiratory rate, blood pressure, oxygen saturation were closely monitored while administering the intervention. The intervention was given for approximately 15 minutes, thrice a day for 7 days.

For the experimental group, the following facilitatory techniques were used:

1. Fast finger stroking of peri-oral muscle and deep pressure to the masseters for 5 minutes^{[4][7]}.
2. Fast brushing with a finger brush to the peri-oral muscle and quick stretches to upper and lower lips for 5 minutes.
3. Stroking of whole body in supine and prone, passive range of motion exercises to all the limbs for 5 minutes^{[8][9]}.

Outcome Measures

Birth weight

Vital parameters: heart rate, respiratory rate, blood pressure, oxygen saturation

RESULTS

The data was analyzed using SPSS, version 19.0 at 0.05 level of significance.

Total of 88 neonates were included in this study.

12 dropouts – 4 from control group and 8 in experimental group. The reasons for dropping out from the study were discharge of the neonates against medical advice, few neonates became physiologically unstable during the course of intervention

Descriptive statistics:**Table-1**

	CONTROL	EXPERIMENTAL
No. of neonates	46	42
Range (min-max) (days)	1-33	2-33
Baseline birth weight (Mean) (grams)	1399	1240

The means of weight gain in control and experimental groups from day 1 to day 7 were compared by the Mann-Whitney U test. The weight gain was significant on day 2, day 3 and day 5 and it was non-significant on day 4, day 6 and day 7. (Table 2) (Figure 2)

Table 2

Weight gain	Mean		p-value
	Control	experimental	
Day 2	-4.57	12.86	0.006

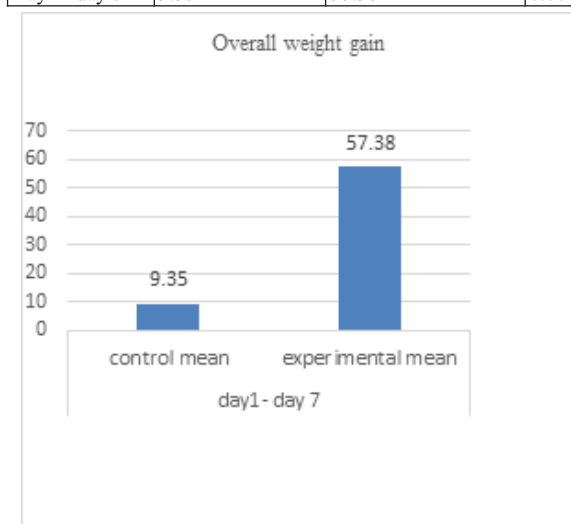
Day 3	-6.41	3.10	0.012
Day 4	-3.15	3.10	0.59
Day 5	3.78	14.05	0.001
Day 6	10.80	14.05	0.39
Day 7	8.89	10.24	0.66

**Figure 2**

The comparison of overall weight gain during 7 days in control & experimental groups showed that there was a significant difference in overall weight gain in experimental group as compared to the control group ($p=0.001$) (Table 3) (Figure 3)

Table 3

Weight gain	Mean		p-value
	Control	Experimental	
Day 1- day 7	9.35	57.38	0.001

**Figure 3**

The comparison of mean heart rate on the 7th day in control and experimental groups using the Mann-Whitney U test showed a significant difference ($p = 0.02$). The mean heart rate decreased comparatively in the experimental group on the 7th day (Table 4)

Table 4

Day 7	CONTROL			EXPERIMENTAL		
	Mean	Standard deviation	p value	Mean	Standard deviation	p value
Heart rate	150.54	5.48	0.02*	147.47	5.99	0.02*
Respiratory rate	53.15	4.87	0.01*	46.71	8.93	0.01*
Systolic Blood Pressure	53.28	1.70	0.03*	54.52	2.54	0.03*
Diastolic Blood Pressure	35.78	6.29	0.63	35.90	4.09	0.63
Oxygen saturation	100	0	1	100	0	1

*p value <0.05 is statistically significant

The comparison of mean respiratory rate on the 7th day in control and experimental groups showed a significant difference ($p = 0.001$). The mean respiratory rate decreased comparatively in the experimental group on the 7th day (Table 4) (Figure 4)

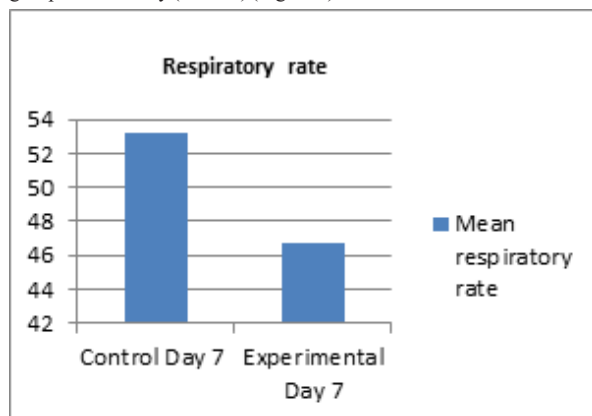


Figure 4

A significant difference ($p=0.03$) was found in the mean systolic blood pressure. The mean systolic BP increased comparatively in the experimental group on the 7th day. (Table 4)

A non-significant difference ($p=0.63$) was found in the mean diastolic blood pressure on the 7th day in the experimental group. (Table 4)

No change was noted ($p=1$) in the oxygen saturation on the 7th day in control and experimental groups. (Table 4) (Figure 5)

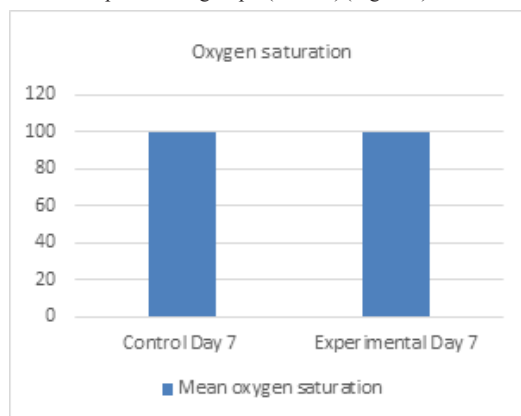


Figure 5

DISCUSSION

This randomized control trial shows that the facilitation of oral reflexes in preterm low birth weight neonates has a significant effect on birth weight gain and vital parameter stability. The comparison of the means of weight gain in control and experimental groups from day 1 to day 7 showed that the weight gain was significant on day 2 and day 3 but there was a steep decrease in weight gain on day 4. However, on the 5th day the weight gain started rising and a plateau effect was seen on day 6 and day 7. This effect can be attributed to the physiological weight loss which may occur during the first week of life^[10].

It was also found that the overall weight gain was significant in the experimental preterm low birth weight neonates compared to the control preterm low birth weight neonates. This could be because of the facilitation techniques given to the peri-oral muscles like fast finger stroking and fast brushing of peri-oral muscle and deep pressure to the masseters and quick stretches to upper and lower lips helped to improve the oro - motor tone and oro - motor control in preterm low birth weight neonates. Techniques like stroking of whole body and passive range of motion exercises provided the preterm low birth weight neonates with appropriate sensory and movement experience. The sensory experience in form of touch provided a tactile- kinesthetic awareness of the neonate. Indirectly, these techniques encouraged the feeding behavior in experimental preterm low birth weight neonates which led to significant birth weight gain in them.

These findings were similar to the study by John Arvedson, et al where he found that non-nutritive sucking alone and with oral or peri-oral stimulation showed strong positive finding for improvement in some feeding or swallowing physiology variables^[7]. Also, Lesson B S studied the premature infant oral motor intervention that provided assisted movement to activate muscle contraction and provides movements against resistance to build strength. It was concluded that these interventions enhance oral feeding skills and decrease the length of stay in neonatal intensive care units^[4]. These findings correlate with the present study.

The other objective of this study was to determine the changes in the stability of the vital parameters. It is important to ensure physiological stability in NICU as physiological stability serves as a pillar for motor behavioral state organization and self-regulation in the preterm low birth infants^[3]. There was significant lowering of heart rate and respiratory rate within the normal ranges. This is suggestive of regulation and modulation of the autonomic nervous system through activation of parasympathetic system which occurred as a result of increased awareness and a sense of security provided through techniques like stroking of whole body, passive range of motion exercises. Thus, these facilitatory techniques had an overall calming effect on the experimental preterm low birth weight neonates.

Systolic blood pressure directly proportional to the body weight of the neonates. Hence, with birth weight gain the systolic blood pressure also increased. The diastolic blood pressure & oxygen saturation were relatively stable. All these factors reflect physiological stability.

Lastly, the discharge of the preterm low birth weight neonates from the NICU requires the neonate to feed orally, gain optimal weight and regulate physiological stability. Different techniques of facilitation of oral reflexes can be used as adjuvant therapy on daily basis, in NICU setup, for stable preterm neonates. Mothers can be trained to use these techniques on daily basis as they are simple, safe, cost effective and consume relatively less time.

Study limitation

The main limitation of the study was that the specific gestational age and the corrected age of the neonates was not taken into consideration. For the preterm neonates the gestational age is a good predictor of good outcome. A consideration to this factor would have helped to streamline the results to a specific group.

Secondly, no measure was used to assess the transition of feeding from gavage feeding to spoon feeding and breast feeding. This could not be done because of the limitation of the study duration.

CONCLUSION

From this study it can be concluded that facilitation of oral reflexes in preterm low birth weight neonates has a significant effect on birth weight gain and vital parameter stability. In future, effect of such techniques on the behavioral state organization and regulation can be studied in detail.

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