

## Effect Of Oromotor Stimulation In Preterm Infants In Intensive Care Unit

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Details of Contribution of each authors:

Alice Jeba, PrathapSuganthirababu,ShivaprakashSosale: conceived and designed the study; Alice Jeba, Shivaprakash Sosale: associated in care of patient; collected the data; Alice Jeba, Prathap Suganthirababu: analyzed and interpretedthe data, drafted the manuscript; All authorsendorsedthe final version of the manuscript.

**ABSTRACT:**

**Purpose:** Oromotor interventions are used to stimulate the feeding process orally among infants of preterm. To find the impact of oral motor mediation among preterm infants along with suckling of non-nutritive and kangaroo mother care from tube feeds to spoon feeding of partial/full and breast feeds of partial in pre-term infants.

**Methods:** This study of randomized controlled trial was directed in the neonatal unit of level III at Tertiary Care hospital, Bangalore, from May 2019 - August 2019. One hundred infants (28-37 weeks) were randomized as intervention group (n=50) and control (n=50) group. Both the groups were further subdivided into very preterm (28.0-31.6 weeks) (n=25) and moderate to late preterm infants (32.0- 36.6 weeks) (n=25) regarding their gestational age. Preterm newborn who were in intervention group received five minutes of premature infant oral motor intervention (POMI), two times consecutively for ten days along with routine care and in control group with routine care only, which includes nonnutritive sucking and kangaroo mother care. Then transition duration was evaluated between both the groups from gavage to spoon feed of partial or full and partial breast feeds.

**Results:** Mean (SD) days to attain spoon feeding of partially among exceptionally preterm and moderate to late preterm infants were markedly lower in PIOMI group than control group 6.36(0.387) vs 11.04(0.590) and 4.56(0.164) vs 5.56(0.164), p=0.001 respectively. Furthermore, the significant decrease in mean (SD) days to reach full spoon feed in PIOMI group than control group 8.48(0.421) vs 13.36(0.605) and 5.60(0.163) vs 6.52(0.154) p= 0.001, was found respectively. Besides the above result, the study also found that there is a significant decrease in mean (SD) days to reach partial breast feed in PIOMI group likened to control group 13.20(0.374) vs 17.88(0.488) and 7.72(0.169) vs 8.48(0.154), p=0.001 respectively.

**Conclusion:** Our results confirmed that premature infant oral motor intervention along with nonnutritive sucking and kangaroo mother care lowers the transition duration from gavage feeding.

**Keywords:** Feeding; Infants; Non-nutritive suckling; Prematurity; Oral motor intervention

Trial Registration: Registered in [www.ctri.in](http://www.ctri.in) CTRI/2019/07/020291, “prospectively registered”.

**Declaration:**

Funding- No funds, grants or other support was received.

Competing interests- None

Ethical Clearance- Approved by Institutional Ethics Committee of Saveetha Medical College (002/05/2019/IEC/SMCH; Dated 07 May 2019).

Consent to Participate: The informed consent signed by the parents was gotten for the infant's enrolment in this research.

Consent for Publication: The informed consent was signed by the parents prior to enrolment of their infants in this study for publication.

## **INTRODUCTION:**

Oral feeding is a multifaceted task which involves the coordination of breathe, suckle and swallow (Anderson et al. 2010; da Costa et al. 2010). Preterm infants experience feeding difficulties due to various reasons such as gut immaturity, feeding skill incoordination as a result of inefficient action of oral motor (Lau et al. 2003). Chronic feeding difficulties, problems in oral ingestion, prolonged hospital stays can impact the ability of infant to attain independent oral feeding [Comrie et al. 1997; Harris 1986; Schanler et al. 1999; Vandenberg 1990; Amaizu et al. 2008]. Similarly, in preterm newborns, the change from tube feed to oral feeding poses a major obstacle for safe swallowing as this requires coordination of jaw muscles, tongue, lips, palate, pharynx, respiratory systems and upper trunk (Bingham et al. 2010; Dodrill et al. 2008; Neiva et al. 2007; Bu'Lock et al. 1990). The problems with initial oral feeding impacts the attainment of bottle/breast feeding which emphasizes the facilitation for the progression of normal oral motor skills (Harris 1986; Schanler et al. 1999; Bazyk. 1990; Bosma 1967). Oral stimulation is described as a stroke and pressure being applied to the inner and surroundings structure of mouth (Gaebler et al. 1996). Many studies reported that oromotor stimulation (OMS) effect on improving the pattern and abilities of sucking among the preterm newborn during gavage feeding (Lessen. 2011). Premature infant oral motor intervention (PIOMI) is an adaptation of Beckmen oral motor intervention which enhances the oral feeding ability in premature infant's (Pimenta. 2008). Additionally, stimulation of oromotor and sucking of non-nutritive (NNS) helps the premature infants to reach the breast feeding during discharge (Bala et al. 2016). The current research intended to conclude the effectiveness of PIOMI as well NNS along with kangaroo mother care (KMC) during conversion duration from gavage to half/full filled spoon and partial breast feeding in preterm infants.

## **MATERIALS AND METHODS:**

This study got approval of Institutional Ethical Committee and was carried on level III neonatal unit for a period of four months from May 2019- August 2019. Babies who were born between 28- 37 weeks of gestation and were medically stable, admitted to neonatal unit, does not require any respiratory support were eligible for the study. Babies with congenital anomalies, neonatal asphyxia whose APGAR score by 5<sup>th</sup> minute is 6 or less, mechanical life support depended neonates and those with necrotizing enterocolitis were excluded.

The informed consent prior to enrolling was acquired from the parents and then eligible babies were randomized into two groups, intervention group received PIOMI with routine care and control group received only routine care that includes five minutes of NNS before each feed

and KMC for three hours in a day. NNS and KMC were given to both groups. Both the groups were further subdivided into extremely preterm infants (28.0-31.6 weeks) and moderate to late preterm(32.0- 36.6 weeks) in accordance with gestational age.

A computer-generated randomization arrangement was used, and the envelopes were sealed, opaque, and sequentially numbered. Envelopes were opened by the nursing in-charge and randomly sorted the preterm infants into the groups respectively. The intervention was given by the senior occupational therapist, who was blinded about the study in the PIOMI group, and administered the precise technique in a correct order and in the exact timing of each step. With gloved fingers, these babies were treated for five minutes of PIOMI intervention twice daily, ten days followed as aseptic procedure. The five minute oral motor intervention of PIOMI aids and promotes muscular strength by provides contraction against resistance. It includes cheek C- stretch, lip role, lip curl, massage over gums, tongue/cheek focusing lateral borders, tongue/ palate's midblade, eliciting a suck and supporting the sucking of non-nutritive (Pimenta. 2008). The two trained nursing assistants, who were also blinded about the study had monitored the NNS and KMC duration for both the groups.

The time was recorded to achieve partial or complete spoon feed and a half or full breast feed. From the total volume of milk intake, half-filled spoon feeding can be calculated by the child acceptance of the entire milk by spoon as fifty percent and the remaining fifty percent by nasogastric tube at each feed and 1-2 complete spoon feeds per day. Calculation of breast feed partial of baby by complete breastfeed acceptance of five to six times per day and remaining feeds by spoon (Bala et al. 2016). There were no occurrences to record the physiological or behavioral cues of adverse effects in the infants.

The size of the sample is 100 infants with 25 in each group on detection basis, a mean difference of 4 days in the transition time among both groups by two sided alpha error of 0.05, beta error of 0.2 (power 80%) and standard deviation of 4. A two-sample t-test was used to examine baseline characteristics and outcome variables on continuous scales. The intention to treat principle application done for the statistical analysis, and statistical significance was considered, if P value is less than 0.05.

## **RESULTS:**

One hundred twenty-five preterm newborns were evaluated for selection, with ten of them failing to satisfy the inclusion requirements, ten of their parents declining to participate in the study, and five of the infants died. Only 50 newborns within intervention group and control group with 50 newborns continued and completed throughout current study which is illustrated in Figure 1. The baseline demographic characteristics of both the groups were compared (Table 1). All covariates were found to be equally distributed between both the groups. When compared to the conventional group, the transition time (d) of mean from the day of enrolment to completion of partial/complete spoon feed, and partial breast feed was considerably shorter in the experimental group of PIOMI. So the PIOMI group infants achieved oral milestones faster significantly ( $p=0.001$ ) than their conventional group. Results of the transition duration to each milestone is presented in Table 2. There were no adverse

consequences such as hypoxia, choking, cessation of breathe, decrease in heart rate, or infections.

**Table 1. Demographic variables of the infants**

Variables	PIOMI group(Mean/SE)		Control group(Mean/SE)	
	Verypreterm	Moderate to Late preterm	Very preterm	Moderate to Late preterm
Gestational Age(weeks)	30.5(0.171)	33.34(0.149)	30.4(0.169)	33.4(0.126)
Birth Weight(gms)	1154.8(11.32)	1499.1(38.559)	1161.8(9.018)	1457.5(27.97)
Apgar at 1st minute	7.4(0.1)	7.76(0.087)	7.4(0.1)	7.68(0.095)
Apgar at 5th minute	8.76(0.087)	9.44(0.101)	9.44(0.101)	9.68(0.095)
Age at enrolment(days)	2.6(0.182)	2(0.05)	2.3(0.108)	2.08(0.055)
PMA at enrolment(weeks)	30.84(0.169)	33.7(0.154)	30.8(0.190)	33.7(0.131)
Weight at enrolment(gms)	1074.6(14.479)	1380.9(36.120)	1088.6(13.846)	1336.4(22.210)

**Table 2. Transition time from gavage feeding**

Type of feeding		28-31.6 weeks	28-31.6 weeks	32-36.6 weeks	32-36.6 weeks	One way ANOVA F-test
		PIOMI group Mean/SE	control group Mean/SE	PIOMI group Mean/SE	control group Mean/SE	
Partial spoon feed(d)		6.36/0.387	11.04/0.590	4.56/0.164	5.56/0.164	F=59.69 P=0.001***
Full spoon feed(d)		8.48/0.421	13.36/0.605	5.60/0.163	6.52/0.154	F=80.73 P=0.001***
Partial breast feed(d)		13.20/0.374	17.88/0.488	7.72/0.169	8.48/0.154	F=96.56 P=0.001***

\*\*\*Highly

Significant;

d-

days

## **DISCUSSION:**

The survival of preterm infants is extended with the understanding that these infants are at hazard of having feeding troubles (Comrie et al. 1997;Bazyk. 1990;Pineda et al. 2020). Hence, it is significant to give early oral motor stimulation and assistanceto this infant population. The current study results supported the assumption of PIOMI combination with routine care such as NNS and KMC, as effecting for reduction of the feeding transition duration of the PIOMI group babies. The conversionof duration from nasal tube feeding to half/ full spoon feeding or to half of breast feeding among PIOMI group which is less significant than conventional counterpart.

The demographic characteristics of babies of both the groups were similar. However, the PIOMI group babies attained partial spoon feeding, full spoon feeding and partial breast feeding quicker thanconventional group. This finding reveals similar findings from premature newborn research.(Lessen. 2011; Bernbaum et al. 1983; Field et al. 1982; Measel et al. 1979; Rocha et al. 2007; Lau et al. 2012).

In this study, the decision of oral feedtreatment was handed to the neonatologist and when introduced to oral feeding, the infants of PIOMI group were successfully achieved oral feeding milestones faster than the other group. Such improvement in the performance of orally feeding was noted among PIOMI group in turn of numerous factors. Stroking to the structures of mouth was the first factor given as oral motor intervention, must have strengthened the muscles which are essential for passable sucking. Non-nutritive sucking must have facilitated the newborns for the neuromuscular structures involvement more proficiently with better endurance. It also facilitates the achievement of earlier oral feeds by improving the feeding pattern of neonates and reduces hospital stay. It also reduces theconversion duration from nasal tube to feeding orally (Field et al.1982; Sehgal et al. 1990).

Overall, oral motor stimulation must have accelerated the neural development of central and/or peripheral structures, resulting in increased suckling abilities and suck-swallow-breathe coordination.According to this research, feeding transition time was influenced not only by physiologic maturation but also by learning actions(Lau et al. 1997;Lipsitt et al. 1985; Sameroff. 1968).It also expedites the transition from nasal tube to spoon fed (Sameroff. 1968; Arora, K et al. 2018; Fucile et al. 2002), further confirmed in the current study.

## **CONCLUSION:**

Considering only the age of the preterm babies as a deciding factor to initiate the oral feed is rudimentary since it ignores other factors that influence for feeding. Many neonatal intensive care units are adopting the family-centered progressive care pattern. This stimulation programinspires parents to participate in their newborn's clinical treatment and promotes mother-baby bonding. In sight of the results obtained, it is recommended that the practice of this premature infant oral motor stimulation can be implemented in neonatal intensive care units as a standard of care because it is, simple and cost effective. Such intervention not only reduces the transition duration of feeding in prematurity as well facilitate many opportunities

to parents/ caretakers for development of bond with the babies in an encouraging evocative way.

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No funds, grants or other support was received.

**CONFLICT OF INTEREST:**

Nil

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\*\*\*Highly Significant;d- days

Figure-1: Study flow chart

