

# A Quasi Experimental Study to Evaluate the Effect of Prefeeding Oral Stimulation Program on Oral Feeding Skills among Preterm Infants in Selected Hospitals, Punjab

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## ABSTRACT

### Background

Premature infants are defined as neonates born before 37 weeks gestational age a newborn infant, or neonate, is a baby under 28 days of age. During these first 28 days of life, the baby is at highest risk of dying. It is thus crucial that appropriate feeding and care are provided during this period, both to improve the infant's chances of survival and to lay the foundations for a healthy life.

**Objective:** To evaluate the effect of prefeeding oral stimulation program on oral feeding skills among preterm infants.

**Material and Methods:** A quasi experimental approach and pretest-posttest control group design was adopted. Purposive sampling technique was used to select 40 preterm infants i.e. 20 in each experimental and control group. In experimental group, intra and peri-oral stimulation was given for 3 minutes and 2 minutes on pacifier, 2 times a day at 2 hours intervals for the duration of 4 days and in control group routine care was done. Data collection was done using oral feeding skills assessment scale. The collected data were analyzed by calculating frequency, percentage, mean, standard deviation, chi-square, and 't' test.

**Findings:** The results revealed that in pre-test, there was no statistically significant ( $p < 0.05$ ) difference in all levels of feeding skills among preterm infants between experimental and control group but in post-test there was statistically significant ( $p < 0.05$ ) difference found in mean score of all levels of feeding skills among preterm infants in experimental and control group. The difference between the pre-test and post-test mean scores of all levels of feeding skills among preterm infants in experimental group was statistically more significant in comparison with control group after provision of 4 days of prefeeding oral stimulation programme. Hence prefeeding oral stimulation programme was found to be effective in improving the oral feeding skills among preterm infants.

### Conclusion

The effect of prefeeding oral stimulation program on oral feeding skills among preterm infants is effective and it helped in the improvement of preterm infants feeding skills.

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**KEYWORDS:** Prefeeding oral stimulation program, feeding skills, preterm infants

**INTRODUCTION**

**“A baby is born with a need to be loved and never outgrows it”**

**-Frank. A. Clark**

Premature infants are defined as neonates born before 37 weeks gestational age, and a newborn infant, or neonate, is a baby under 28 days of age. During these first 28 days of life, the baby is at highest risk of dying. It is thus crucial that appropriate feeding and care are provided during this period, both to improve the infant's chances of survival and to lay the foundations for a healthy life.<sup>1</sup>

Across 184 countries, the rate of preterm birth ranges from 8% to 21% of babies born. In India, out of 29 million babies born every year (2018 data), 3.5 billion babies born are premature. Though occurrence of preterm birth is a global problem, but more than 68% of preterm births occur in Africa and South Asia.

For infants born preterm, one of the greatest concerns for discharge from the NICU to the home is the maturation of oral feeding skills. The risk for developing feeding complications in preterm infancy is high due to weak oral and laryngeal musculature needed for sucking and safe swallow, as well as immature neural substrate to coordinate the suck-swallow-breath. Due to their underdeveloped central nervous system and oral musculature, preterm infants frequently experience oral feeding difficulties, with coordination lacking for the suck swallow-breath mechanism. Preterm infants rely on administered feedings and parenteral nutrition to ensure proper nutritional requirements are met. Adverse effects, however, are increased due to the lack of stimuli from the gastrointestinal tract. Safe and successful suckle feeding, via breast or by bottle, is one requirement for hospital discharge and an ultimate goal for preterm infant feeding. Thus, facilitating oral feeding skills and helping preterm infants transit to full oral feeding are a key focus for the medical staff of neonatal intensive care units (NICUs).<sup>2</sup>

Oral feeding problems in preterm infants are of growing concern over the world. Cases of breast or bottle feeding failures often result in delayed hospital discharge, maternal stress and long-term health problems. Oral feeding is a complex task for preterm infants. It depends upon brainstem central pattern generators whose activity is increasingly influenced by chemosensory and oral tactile input. Unlike full-term neonates, the majority of infants born prematurely are not able to begin feeding from bottle or breast immediately after birth due to low muscle tone, immature oral-motor control, and poor coordination of suck, swallow, and breathing. Attainment of independent oral feeding is one of the

criteria recommended by American Academy of Pediatrics for hospital discharge of preterm infants.<sup>4</sup>

The increased survival of sick and preterm neonates may be associated with long-term problems which must be recognized and managed if outcome is to be optimized. In a prospective study of 35 neonates (median gestational age at birth 34 weeks) admitted to a neonatal intensive care unit over a 3 month period, documented a high incidence (14 of 35) of immature or abnormal feeding patterns when infants were assessed at 36 to 40 weeks postmenstrual age. Neonates with prolonged respiratory support and delayed enteral and oral feeding were most affected. Compared with neonates who have normal initial feeding assessments, neonates with disorganised or dysfunctional feeding were six times more likely to vomit and three times more likely to cough when offered solid food at 6 months of age. At 12 months of age significant differences were also found in tolerating lumpy food and enjoying mealtimes. These feeding problems contribute to failure to thrive and psychosocial distress after discharge from the neonatal unit and propose potential neonatal measures to reduce their incidence.<sup>16</sup>

Oral feeding behavior emerges from nonlinear and dynamic interactions of multiple system involved in oral feeding. These systems include, but are not limited to, the oral –motor, neurological, cardio respiratory and gastrointestinal systems. Self-organization occurs continuously both within and between system to establish stability in response to internal and external inputs. This Self-organization process creates functional feeding coordination, that is, suck swallow breathe pattern, in which the infant should be able to suck sufficiently to meet is or her nutritional needs for growth, swallow swiftly and efficiently to minimize the disruption of breathing and prevent aspiration, and breathe with adequate depth and frequency to maintain physiological stability. Optimal and mature feeding occurs when the infant is able to integrate sucking, swallowing and breathing during sucking burst and requires only brief catch-up breathing periods between sucking periods.<sup>4</sup>

Preterm infants develop the skills necessary to begin oral feeding as their health stabilizes and as they reach a postconceptional age that supports coordination of breathing and swallowing with oral-motor functioning. The time from initiation of oral feeding to full oral feedings (with adequate intake for growth and maintenance of physiologic stability) can vary from days to months for the preterm infant. The approach to feeding the infant during this transition period must be developmentally supportive and tailored to meet the needs of the individual. To

accomplish this, caregivers--notably nurses and parents--need to communicate about the specific skills that the infant has gained, about skills that are emerging, and about skills that the infant has not yet developed. The Early Feeding Skills (EFS) Assessment is a checklist for assessing infant readiness for and tolerance of feeding and for profiling the infant's developmental stage regarding specific feeding skills: the abilities to remain engaged in feeding, organize oral-motor functioning, coordinate swallowing with breathing, and maintain physiologic stability.<sup>5</sup>

Oral stimulation is used as an effective treatment strategy to enhance oral feeding performance of preterm infants with feeding problems to attain total oral feeding as soon as possible. The applied perioral stimulation increases oral motor organization, improve muscle contractility and sucking rate as a result increases oral intake and minimize fluid loss, while applied intraoral stimulation and non – nutritive sucking (NNS) enhance the salivary secretions and facilitate swallowing. Across all studies, there is considerable evidence that oral stimulation through non – nutritive sucking (NNS) or sensorimotor input to the oral structures has beneficial effects on performance then applied before or during oral feeding in medically stable preterm infants. Thus, facilitating oral feeding skills and helping preterm infants transit to full oral feeding are a key focus for the medical staff of neonatal intensive care unit (NICUs).<sup>6</sup>

As we all are human beings we cannot escape from diseases the preterm infants are also the part of this population. Many kinds of problems are faced by a preterm infants, starting from the time of birth and any of the body system or systems may get affected by these diseases. The common problems occurring during preterm infants period are levels of feeding skills, sepsis, jaundice, vomiting, respiratory distress syndrome, hypoglycemia, pneumonia and urinary tract infections and among these levels of feeding skills has been identified as a momentous problem for the preterm infants. It is one of the most significant contributors to growth failure in preterm infants. The inability to sustain enteral feedings also contributes to extended periods of parenteral nutrition, which often lead to infection and in turn it leads to longer hospital stay and suboptimal nutrition.<sup>20</sup>

The common factors attributing to levels of feeding skills in preterm infants are: conditions such as sepsis, necrotizing enterocolitis, inappropriate feed volume, and administering hyperosmolar medications/ feedings. It may also be caused by any kind of allergy with breast feed or lactose intolerance.<sup>2</sup>

In preterm infants, there are short sucking attempts that may be precede or followed by swallowing. In the immature infant periodic breathing may occur soon after the feeding is completed. The immature infant also has poor muscle tone of the cardiac sphincter and feeding is regurgitated easily into the esophagus.<sup>6</sup>

All these events lead to levels of feeding skills. Also the relative immaturity of peristaltic waves, combined with decreased lower esophageal sphincter pressure, inappropriate relaxation of the lower esophageal sphincter and delayed gastric emptying can contribute to increased incidence of oral feeding skills. The establishment and tolerance of adequate enteral nutrition is difficult among preterm infants due to the immaturity of the preterm infants gastrointestinal system; however, it is important for their normal growth, infection resistance, and long-term cognitive and neurologic development.<sup>22</sup>

Oral feeding is a complex physiological process. Several scales have been developed to assess the ability of the neonate to begin suck feedings and assist caregivers in determining feeding advancement. Feeding premature neonates remains an ongoing challenge and depends above all on caregivers feeding expertise. In this evaluate the effect of a nurse training programme on the achievement of full oral feeding with premature neonates.<sup>25</sup>

Poor oral-motor developments in preterm infants are common and the prevalence of feeding dysfunctions in former premature infants is twice that of full-term born infants. Oral feeding is a complex physiological process that depends primarily on the coordination of sucking, swallowing and respiration. Prefeeding oral and perioral stimulations (cheeks, lips, jaw, gums and tongue) result in earlier achievement of full oral feeding without noticeable impact on length of hospital stay.<sup>28</sup>

Feeding premature infants remains an ongoing challenge and relies on caregivers feeding expertise, often requiring multidisciplinary guidance. Negative oral stimulation as well as over-zealous feeding practices may include oral-motor disorganization, potentially causing defensive feeding behaviour, and hinder the differentiation of feeding skills.<sup>21</sup>

Oral feeding is a complex task for preterm infants. Unlike full-term neonates, the majority of infants born prematurely are not able to begin feeding from bottle or breast immediately after birth due to low muscle tone, immature oral-motor control, and poor coordination of suck, swallow, and breathing. 1-3 Preterm infants generally need a period of full gavage feeding and then initiate oral feeding between 32 and

35 wk of age.<sup>4,5</sup> However, at this age, preterm infants may be unable to take in all prescribed formula orally for each feeding. They usually take days or wks in the transition period of combined gavage/oral feeding, before reaching full oral feeding.<sup>23</sup>

An oral stimulation program consisting of stroking the oral structures, provided before or after the introduction of oral feeding, led to earlier attainment of full oral feeding, greater weight gain, and earlier hospital discharge (Gaebler and Hanzlik 1996, Fucile et al. 2002); an auditory-tactile-visual-vestibular program accelerated the transition from tube to full oral feeding and shortened the length of hospitalization.

Preterm infants has improved with the advances in neonatal special care, as well as the enhanced quality of the treatments of fetal diseases. However, many of these newborns are faced with several medical issues, such as respiratory disorders, instable body temperature and nutritional compliance. Oral feeding problems are among the most common issues in preterm infants, which occur due to underdeveloped oral-motor skills and lack of coordination in sucking, swallowing and respiration. Suckling and swallowing abilities develop by week 28 of the fetal period and are coordinated by weeks 32-34. Suckling and eating abilities of infants are essential their survival and maintainence of their growth aspects.<sup>31</sup>

An oral stimulation program (peri- and intraoral stimulation, with or without nonnutritive sucking) applied to preterm infants for at least 10 days in the period of full gavage feeding can facilitate their oral feeding progress. Similar stimulation program conducted just before oral feeding is a common type of intervention used in the neonatal intensive care unit (NICU) to facilitate feeding success of preterm infants after the introduction of oral feeding. The effects of a prefeeding oral stimulation program on the sucking and feeding ability, behavioral states, and feeding-related physiological changes of preterm infants who were in the feeding transition time defined as the period from first attempt at oral feeding to taking all nutrition by mouth.<sup>33</sup>

### Need of the study

**“Every baby born into the world is a finer one than the last”**

- Charles Dickens

Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. There are sub-categories of preterm birth, based on gestational age:

According to WHO,

**Very low birth weight (VLBW) babies:** Babies with a birth weight of less than 1500 g (up to and including 1499 g).

**Extremely low birth weight (ELBW) babies:** Babies with a birth weight of less than 1000 g (up to and including 999 g).

**Small for dates (SFD) babies:** Babies with a birth weight of less than 10<sup>th</sup> percentile for their gestational age (SGA) or light for dates or intrauterine growth retardation.

**Appropriate for dates (AFD) babies:** Babies with a birth weight between 10<sup>th</sup> to 90<sup>th</sup> percentile for the period of their gestational age. They are also termed as appropriate for gestational age (AGA)

**Large for dates (LFD) babies:** Babies with a birth weight more than 90<sup>th</sup> percentile for the period of their gestational age. The neonates with a birth weight more than 97 percentile for their gestation are at high risk and should be monitored for hypoglycemia. They are also termed as heavy for dates or large for gestation age (LGA)

**Preterm baby:** A baby born with a gestational age of less than 37 completed weeks (or less than 259 days) is termed as preterm baby. These babies are also termed as immature, born early or premature.

In preterm infants, great efforts have been made to improve nutrition, many do not receive adequate nutrition intake and thus develop extra uterine growth restriction. Parental nutrition, which allows the infant's requirements for growth and development to be met, is indicated in infants for whom feeding via the eteral route is impossible, inadequate or hazardous. In the last few years, great attention has been given to high amino acid supply in preterm infants from the first day of life in order to avoid catabolism, establish anabolism, achieve in utero protein accretion rates, and promote linear growth. Whenever possible, enteral feeding should commence with human milk, which is the preferred feeding method for all infants, including those born preterm. In order to meet the unique nutritional requirements of preterm infants and preserve the singular benefit of breastfeeding, human milk should be fortified to allow adequate growth and bone mineralization. When feeding of preterm infants with human milk is impossible or extremely limited, cow-based formulas for preterm infants must be used.<sup>34</sup>

Suction is an important physiological function, which depends on coordination with swallowing and breathing, for safe and successful feeding. Together, these functions make up the “nutritional pathway” and are responsible for the rapid and safe transport of

milk from the oral cavity to the stomach. The PTIs present these functions still immature or uncoordinated, requiring parenteral or enteral nutrition until they are adequately prepared for effective oral feeding (OF). As a consequence of immaturity, preterm infants are deprived of oral experiences that favor their ability to co-ordinate suction-swallowing-breathing (SSB), since they feed by parenteral means or by gastric feeding tube.<sup>7</sup>

Oral stimulation is used as an effective treatment strategy to enhance oral feeding performance of preterm infants with feeding problems to attain total oral feeding as soon as possible. The applied perioral stimulation increases oral motor organization, improve muscle contractility and sucking rate as a result increases oral intake and minimize fluid loss, while applied intraoral stimulation and non – nutritive sucking (NNS) enhance the salivary secretions and facilitate swallowing. Across all studies, there is considerable evidence that oral stimulation through non – nutritive sucking (NNS) or sensorimotor input to the oral structures has beneficial effects on performance then applied before or during oral feeding in medically stable preterm infants. Thus, facilitating oral feeding skills and helping preterm infants transit to full oral feeding are a key focus for the medical staff of neonatal intensive care unit (NICUs).<sup>6</sup>

The increased survival of sick and preterm neonates may be associated with long-term problems which must be recognized and managed if outcome is to be optimized. In a prospective study of 35 neonates (median gestational age at birth 34 weeks) admitted to a neonatal intensive care unit over a 3 month period, we have documented a high incidence (14 of 35) of immature or abnormal feeding patterns when infants were assessed at 36 to 40 weeks postmenstrual age. Neonates with prolonged respiratory support and delayed enteral and oral feeding were most affected. Compared with neonates who have normal initial feeding assessments, neonates with disorganised or dysfunctional feeding were six times more likely to vomit and three times more likely to cough when offered solid food at 6 months of age. At 12 months of age significant differences were also found in tolerating lumpy food and enjoying mealtimes. These feeding problems contribute to failure to thrive and psychosocial distress after discharge from the neonatal unit and propose potential neonatal measures to reduce their incidence.<sup>32</sup>

Early oral motor interventions (OMIs) are beneficial for oral feeding in preterm infants. OMI is defined as sensory stimulation of the lips, jaw, tongue, soft palate, pharynx, larynx and respiratory muscles,

which are thought to influence the physiological underpinnings of the oropharyngeal mechanism in order to improve its functions. Oral feeding skills and helps preterm infants transit to full oral feeding are a key focus for the medical and nursing staff of NICU. Overall, it appears that the provision of various oral stimulation interventions had a positive impact on the feeding performance of preterm infants who have not yet begun to feed orally, and the use of an individualized evidence-based approach is strongly recommended to assist them in transitioning from gavage to full oral feeding.<sup>8</sup>

Oral stimulation is used as an effective treatment strategy to enhance oral feeding performance of preterm infants with feeding problems to attain total oral feeding as soon as possible (Harding, et al, 2014). The applied perioral stimulation increases oral motor organization, improve muscle contractility and sucking rate as a result increases oral intake and minimize fluid loss, while applied intraoral stimulation and non-nutritive sucking (NNS) enhance the salivary secretions and facilitate swallowing (Greene, et al, 2012 and Corbin-Lewis, & Liss, 2014). Furthermore, the results provide strong support for using the ability to reach and maintain robust alertness as a meaningful readiness parameter for oral nipple feeding. Oral feeding requires coordination of nutritive sucking, swallowing, and breathing as well.<sup>2</sup>

This study emphasize that the suck-swallow-breathe coordination, the infant's interest in sucking, and the behavioral and organizational skills (e.g., quiet alert state) are decisive factors that facilitate a safe transition and a successful oral feeding. Sucking and swallowing reflexes are developed in the mother's womb and mature during the third trimester. Sucking involves a rhythmic movement of the tongue and jaw that causes milk to flow out of the bottle teat or nipple due to changes in intraoral pressure. The act of pulling and pushing is comprised of a negative pressure (suction) and a positive pressure (compression). Positive pressure creates a rhythmic compression of the nipple between the tongue and the palate, which pushes the milk out of the nipple/bottle teat and into the oral cavity. Non-nutritive sucking only begins at around 26 weeks, but the rhythmic pattern of sucking only becomes well established between 32 and 34 weeks. So, the establishment of non-nutritive sucking facilitates the development of the sucking reflex, which influences the feeding ability and, consequently, the daily weight gain. Swallowing is a complex motor activity and has the function of transporting food and liquid from the mouth to the stomach while preventing milk aspiration into the trachea and lungs.<sup>9</sup>

The swallowing reflex is fully functional at around 34 weeks, as well as the gag reflex. However, ineffective swallowing may be related to pharyngoesophageal dysfunctions, which are characterized by decreased muscle tone and relaxation of the esophageal sphincter. Breathing is an autonomic process, only acknowledged when there is a high respiratory effort. Preterm infants' immature respiratory system hampers respiratory mechanics, increasing the irregularity of respiratory cycles, and, consequently, the risk of aspiration and apnea. Respiratory diseases, particularly bronchopulmonary dysplasia pose an increased risk. Thus, after achieving respiratory stability, acquiring feeding skills is a priority, because, without it, the preterm infant cannot be discharged from the hospital.<sup>10</sup>

A study was conducted to assess the effect of an oral stimulation program on preterm infants. Preterm infants (n = 72) were randomly assigned to experimental and control groups. Controls (n = 36) received routine care while the experimental group (n = 36) received oral stimulation in addition to routine care. Postmenstrual age, total intake volume, body weight, the transition time from initiation of oral feeding to full oral feeding and feeding efficiency were calculated. Postmenstrual age and full oral feeding weight were significantly lower in the experimental group ( $p < 0.05$ ). The time from initiation of oral feeding to full oral feeding was significantly shorter in the experimental group ( $p < 0.05$ ) while feeding efficiency was higher in the experimental group ( $p < 0.05$ ) compared to controls.<sup>8</sup>

Effects of prefeeding oral stimulation on feeding performance of preterm infants, nineteen preterm infants who were in the transitional time to full oral feeding served as their own controls. A 5 min oral stimulation program was applied to infants prior to feeding in two of 4 feedings on two consecutive days. Oral stimulation had a modulating effect on the prefeeding behavioural states and short-lived beneficial effects on the feeding efficiency of preterm infants.

Due to their underdeveloped central nervous system and oral musculature, preterm infants frequently experience oral feeding difficulties, with coordination lacking for the suck swallow-breath mechanism. Preterm infants rely on administered feedings and parenteral nutrition to ensure proper nutritional requirements are met. Adverse effects, however, are increased due to the lack of stimuli from the gastrointestinal tract. Safe and successful suckle feeding, via breast or by bottle, is one requirement for hospital discharge and an ultimate goal for preterm infant feeding.<sup>8</sup>

One study found that the administration of oral stimulation and NNS resulted in the initiation of oral feeding 8 days earlier than controls, yet there was no significant difference in the number of days required to transition from initial to full oral feeds when compared to a control group. A second study found that infants who received either the full-body, oral, or combined treatment stimuli required 9-10 less days to transition from initial to full-oral feeds.<sup>5</sup>

Thus, facilitating oral feeding skills and helping preterm infants transit to full oral feeding are a key focus for the medical staff of neonatal intensive care units. So from the above literature review in the present situation of our NICUs, as in majority of NICUs, preterm infants never receive oral stimulation before the introduction of oral feeding. So based on above literature the investigator considered a thrust area of research and aimed to evaluate the effect of prefeeding oral stimulation programme.<sup>8</sup>

### Problem statement

A quasi experimental study to evaluate the effect of prefeeding oral stimulation program on oral feeding skills among preterm infants in selected hospitals, Jalandhar, Punjab.

### Aim of study

To evaluate the effect of prefeeding oral stimulation program on oral feeding skills among preterm infants.

### Objectives

- To pre assess the level of oral feeding skills among preterm infants in experimental and control group.
- To post assess the level of oral feeding skills among preterm infants in experimental and control group.
- To compare pre and post assessment level of oral feeding skills among preterm infants in experimental and control group.
- To find out association of pre and post assessment level of oral feeding skills among preterm infants with selected demographic variables.

### Operational definitions

**Preterm Infants:** In this study preterm infants refers to the infants born between 30 to 36 weeks of gestation and are inefficient oral feeders may only be slightly smaller than full-term infants and require special care.

**Oral feeding skills:** In this study oral feeding skills refers to the ability of the preterm infants to maintain engagement in feeding, to organize oral-motor functioning, to coordinate the swallowing during oral feeding and ability to maintain the physiological stability as measured by early feeding skills assessment scale.

**Prefeeding oral stimulation program:** It refers to the oral stimulation program will be given to preterm infants for 5 minutes which will include two forms of oral stimulation i.e 3 minutes of manual peri and intraoral stimulation and 2 minutes of sucking on a pacifier, twice a day for 4 consecutive days.

### Hypothesis

**H<sub>0</sub>:** There will be no statistical significant difference in oral feeding skills among preterm infants in both experimental and control group at  $p < 0.05$  level of significance.

**H<sub>1</sub>:** There will be statistical significant improvement in oral feeding skills among preterm infants in experimental group after application of pre feeding oral stimulation program as compared to control group at  $p < 0.05$  level of significance.

### Delimitation:

The study will be delimited to preterm infants who will be;

- born between 30 to 36 weeks of gestation.
- admitted in NICU of selected hospitals, Jalandhar, Punjab.

### Conceptual framework

American physical therapy association model of physical therapy practice (2006) is developed by D M **McKeough** to define scope of physical therapy practice and standardizes practice activities that are examination, evaluation, diagnosis, prognosis, intervention and outcome. In this model:

Examination refers to collection of history and assessment of patient for existing physical health status.

Evaluation refers to process of making clinical judgement based on data gathered during examination.

Diagnosis refers to the identification of the movement limitations. The ways of making diagnosis:-

1. Medical diagnosis i.e. to diagnose pathology.
2. Physical therapy i.e. to diagnose movement dysfunctions towards which physical therapy directs treatment.

Prognosis involves level of functional independence. Patient is expected to achieve following treatment and time required to reach that level. In this model plan of

care include anticipated goals and outcomes, interventions, expected duration and frequency.

Interventions are the treatment plan which includes purposeful and skilled intervention of physical therapy treatment.

Outcomes are treatment results in terms of achievement of goals, improvement in the functional level and risk reduction. Outcomes are confirmed by re-examination i.e. evaluation of progress and outcome.

After diagnosis, there is determination about the solution of the problem. If problem is within the scope of practice, the prognosis and plan of care is done and the problem which are outside the scope of physical practice needs referral and consultation or complementary service.

In this study, by applying the model, during the examination stage, the pretest was conducted by taking history (demographic data) and assessment of feeding skills assessment by using follow up sheet. In evaluation stage, the data was collected from selected preterm infants in experimental and control group were interpreted. In diagnosis stage, the preterm infants were classified as per criterion measures into different level of feeding skills i.e. inadequate feeding skills, moderately adequate feeding skills and adequate feeding skills. In prognosis and plan of care stage, for experimental group, early feeding skills scale was planned for 4 days with expected significant improvement in levels of feeding skills whereas for control group the routine care was planned for same 4 days. During intervention stage, the preterm infants in experimental group received peri and intra-oral stimulation for 3 minutes and pacifier sucking for 2 minutes, 2 times daily at 2 hours interval before feed for the duration of 4 days but control group received routine care. Every day after 2 cycle of oral skills stimulation, re-examination (post-test) was conducted by using early feeding skills scale in both the experimental and control group.

In the end, comparison was made between pretest and post-test score of levels of feeding skills in both the experimental and control group to determine the effectiveness of oral stimulation program on oral feeding skills of preterm.

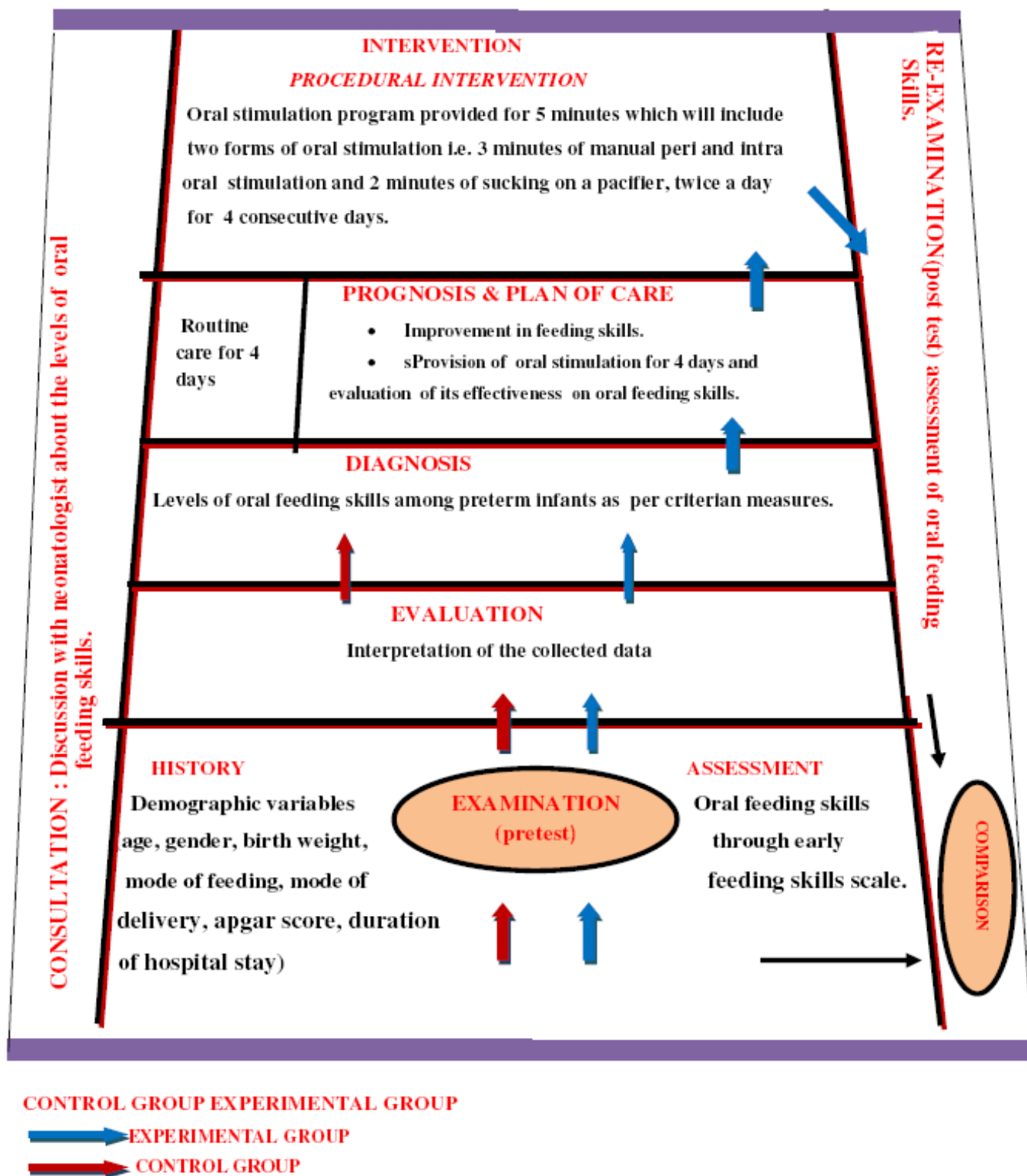


Figure 1 Conceptual framework based on APTA model of physical therapy practice (DM Mc Keough, 2006)

## REVIEW OF LITERATURE

Review of literature is the systematic and critical review of the most important published scholarly literature on a particular topic. It is essential step in the research project. It provides basis for future investigation, justifies the need for the study, throws light on the feasibility of the study, reveals constraints of data collection and relates the findings from one study to another with a hope to establish a comprehensive study of scientific knowledge in a professional discipline.

The review of literature is defined as a broad, comprehensive in depth, systematic and critical review of scholarly publication, unpublished scholarly print materials, audio-visual materials and personal communication.

Review of literature for present study has been taken from different sources like books, journals, internet and etc.



The review of literature is categorized into following sections:

- Literature related to evaluate the effect of oral feeding skills among preterm infants.
- Literature related to evaluate the effect of prefeeding oral stimulation program among preterm infants.

### **Literature review related to evaluate the oral feeding skills among preterm infants.**

A study was conducted on oral stimulation for promoting oral feeding in preterm infants and in this many preterm infants have delayed establishment of oral (suck) feeding and are fed at first with feeding tubes or with intravenous (parenteral) nutrition. Development of oral feeding skills needs careful co-ordination of sucking, swallowing and breathing. In preterm infants, the development of oral feeding can be challenging because of long hospitalizations, breathing difficulties and other medical conditions associated with preterm birth. Unpleasant procedures such as ventilation or frequent suctioning of secretions from the mouth or nose can negatively impact feeding skills. International guidelines for the transition from tube feeding to oral feeding vary widely. Healthcare providers use a range of interventions to improve sucking and feeding skills in preterm infants, and studies report faster transition time from tube feeds to oral feeds, reduced length of stay in hospital and improvement in infants' sucking skills. No Cochrane review has assessed the intervention involving finger stimulation of the mouth before and during feeds.<sup>18</sup>

A study was conducted in which multicenter retrospective analysis of a prospective cohort of moderately preterm infants was used and take 6146 infants born at 29-33 weeks gestation from January 2012 to November 2013. The median postmenstrual age at first oral feeding was 33.9 weeks (interquartile range 33.1-33.3). for each week earlier at first oral feeding, full oral feeding occurred 4.5 days earlier ( $p < 0.0001$ ) and hospital stay was shortened by 3.4 days ( $p < 0.0001$ ). Higher birth weight ( $p < 0.0001$ ) and the black maternal race ( $p = 0.0001$ ) were associated with younger postmenstrual age at full oral feeding and at discharge. In the study preterm infants with earlier introduction of oral feeding achieved earlier full oral feeding and hospital discharge.<sup>1</sup>

A study was conducted for the early feeding skills assessment for preterm infants they develop the skills necessary to begin oral feeding as their health stabilizes and as they reach a post conceptional age that supports coordination of breathing and swallowing with oral motor functioning. The time from initiation of oral feeding to full oral feedings

(with adequate intake for growth and maintenance of physiologic stability) can vary from days to months for the preterm infant. The approach to feeding the infant during this transition period must be developmentally supportive and tailored to meet the needs of the individual. To accomplish this, caregivers—notably nurses and parents—need to communicate about the specific skills that the infant has gained, about skills that are emerging, and about skills that the infant has not yet developed. The Early Feeding Skills (EFS) Assessment is a checklist for assessing infant readiness for and tolerance of feeding and for profiling the infant's developmental stage regarding specific feeding skills: the abilities to remain engaged in feeding, organize oral-motor functioning, coordinate swallowing with breathing, and maintain physiologic stability. (Suzanne M. Thoyre; 2005)<sup>36</sup>

Oral feeding skills have commonly been conceptualized by health care providers as an infant's ability to organize and coordinate oral-motor functions to efficiently consume enough calories for growth. Early feeding skills are much more complex than this, however. They also involve the infant's ability to (1) engage and remain engaged in a physiologically and behaviorally challenging task, (2) organize oral-motor movements so as to have long-term functional benefits, (3) coordinate breathing with swallowing to avoid prolonged apnea or aspiration of fluids, and (4) regulate the depth and frequency of breathing to maintain physiologic stability. The EFS is a 36 item observational measure of oral feeding skill that can be used from the time of initiation of oral feeding through maturation of oral feeding skill. The initial section, "Oral Feeding Readiness," is designed to assess whether the infant has sufficient energy for feeding, is in an optimal state, and has adequate baseline oxygen saturation. The middle section, "Oral Feeding Skill," has items to assess four skill domains critical to successful feeding. The final section, "Oral Feeding Recovery," is used to evaluate the impact of the feeding on the infant's state of alertness, energy level, and physiologic system.<sup>20</sup>

Oral feeding performance was assessed as a function of both clinical outcomes and sucking skills. Infants oral feeding performance was followed longitudinally, i.e. when infants were taking 1 to 2 and 6 to 8 oral feedings per day. Clinical outcomes included number of days to transition from tube to full oral feedings, overall intake (volume taken/volume prescribed,%) and rate of milk transfer (ml/min; Fucile et al. 2002)<sup>34</sup>

A study was evaluated whether infants who received oral stimulation would attain independent oral feeding sooner, and demonstrate increased formula intake compared to no-treatment controls. Thirty-two infants born between 26 and 29 weeks GA who were fully tube fed, and had no chronic medical complications were randomized into intervention or control groups with no intervention for gestational age. The treatment group received a 15-minute oral stimulation intervention consisting of stroking and pacifier use once daily. Results revealed that the intervention group demonstrated a significant increase in total oral intake rate, less net leakage and shorter oral feeding duration than the control group.<sup>14</sup>

A randomized, blinded, clinical trial was conducted to examine the effect of the preterm infant oral motor intervention on feeding progression and length of stay in preterm infants. In this study, total 19 infants from 1 level III NICU born between 26 and 29 weeks PMA. 10 in the experimental group and 9 in the control group. The experimental group received the PIOMI for 5 minutes per day for 7 consecutive days. The control group received a sham intervention to keep staff and parents blinded to the infants group assignment. Physiological and behavioural stabilities were continually assessed throughout the intervention. The PIOMI is a 5-minute oral motor intervention that provides assisted movement to activate muscle contraction and provides movement against resistance to build strength. The focus of the intervention is to increase functional response to pressure and movement and control of movements for the lips, cheeks, jaw, and tongue. The cheeks, lips, gums, tongue, and palate were stimulated per specific protocol with finger stroking. The use of PIOMI with preterm infants to enhance oral-feeding skills and decrease LOS.<sup>15</sup>

A study was evaluated the effects of stroking and oral stimulation on the feeding behaviours of preterm infants who were NPO. Eighteen medically stable neonates born between 30 and 34 weeks gestation were selected. These infants were randomly assigned to the treatment or control group. Parents of infants in both groups were trained to provide an oral stroking protocol. Parents in the treatment group received additional training on delivering a 2-minute oral motor protocol. Both parent groups were asked to deliver the single or combined interventions thrice daily, 5 days a week. Type of feeding, and Revised Neonatal Oral Motor Assessment Scale (R-NOMAS) scores at select oral feeds were recorded. Infants were discharged from the study after 24 hours of oral feeding. Data were analyzed using t-tests (for number of nipple feeds in each group and number of days until total oral feeding), and a Mann Whitney U test

(for R-NOMAS scores). Due to the small number of infants in the study, *p* levels of 0.10 were utilized in order to minimize the likelihood of type II error. At the initiation of the study, there were no significant between-group differences. Results revealed that subjects in the experimental group had a higher percentage of bottle feeds and higher R-NOMAS scores than the control group. There were no significant differences in the number of treatments received by either group. Overall, it concluded that prefeeding oral stroking in conjunction with oral motor stimulation can significantly increase oral feeding skills when compared to stroking alone.<sup>24</sup>

Bolzan GP et al. was conducted the study and included 82 preterm infants, 43 male and 39 female, with average weight at birth of 1,821 ( $\pm 527$ ) grams and gestational age of 33 ( $\pm 6.22$ ) weeks. Regarding the intrauterine growth, 71.97% of the sample was classified as appropriate for gestational age, 24.39% as small for gestational age and 3.66% as large for gestational age.

The speech therapist assessments were performed as soon as the infants had medical prescription for oral feeding. At the time of evaluation, the preterm infants had an average gestational age corrected of 35 ( $\pm 1.33$ ) weeks and weight of 1921 ( $\pm 372$ ) grams.

The assessment of the infant's oral feeding readiness, through POFRAS, was performed 15 minutes before the estimated time of first oral feeding. This evaluation was conducted with the infants in lateral decubitus position, with upper and lower limbs flexed and head aligned with the spine. The aspects assessed contemplated the state of behavioral organization (state of consciousness, posture and global tonus); oral posture (lips and tongue); oral reflexes (rooting, sucking, biting and vomiting); and nonnutritive sucking (tongue movement and cupping, jaw movement, sucking strain, sucking/pause, maintenance of sucking/pause and of alert state, and signs of stress); besides the corrected gestational age of preterm infants. A score ranging from 0 to 2 was attributed to each item of the protocol. The performance of the infant was determined by the sum of the scores obtained, which could vary from zero to 36.<sup>1</sup>

### **Literature related to evaluate the effect of prefeeding oral stimulation program among preterm infants.**

A comparative study to assess the effect of feeding performance on cheek stimulation versus lip stimulation among preterm babies selected hospitals in PCMC, Pune. In this study quasi experimental two group pretest-posttest experimental research design was used. The Non-Probability Convenience

Sampling Technique was used on 60 sample with modified Brazeltone scale which includes 12 observations. The effect of feeding performance of preterm babies before lip stimulations pretest mean score is 9.7 and after given lip stimulations mean score is 11.6 and the effect of feeding performance of preterm babies before cheek stimulations pretest mean score is 10.8 and after given cheek stimulations mean score was 9.7. It indicates that after cheek stimulations mean score was decreased. After comparison cheek and lip stimulation p-value not significant (less than 0.05). It has been observed that pretest knowledge average mean score is 11.6 and practice score is 7.8 after stimulation average score rises to 11.6. Knowledge and practice grades improved after stimulation.<sup>1</sup>

A study was conducted to evaluate the effect of a 5 min prefeeding oral stimulation program on oral feeding duration, total intake rate and net-leakage of preterm infants who were defined as inefficient feeders. A quasi experimental design was used on a purposive sample composed of fifty five preterm infants selected from two NICUs of Cairo University Hospitals. Twenty eight as a control group who were left to hospital routine care, and twenty seven as intervention group. Three minutes of manual perioral and intraoral stimulation followed by two minutes of sucking on a pacifier was applied to the intervention group for two consecutive days twice per day. Results revealed that the intervention group demonstrated a significant increase in total oral intake rate, less net leakage and shorter oral feeding duration than the control group. Prefeeding oral stimulation programme improved the preterm infant's feeding performance and for inefficient feeders.<sup>35</sup>

A study was conducted on Oral stimulation is used as an effective treatment strategy to enhance oral feeding performance of preterm infant's with feeding problems to attain total oral feeding as soon as possible (Harding, et al, 2014). The applied perioral stimulation increases oral motor organization, improve muscle contractility and sucking rate as a result increases oral intake and minimize fluid loss, while applied intraoral stimulation and non-nutritive sucking (NNS) enhance the salivary secretions and facilitate swallowing.<sup>13</sup>

A quasi experimental study to evaluate the effect of an early oral stimulation program on oral feeding of preterm infants was conducted to evaluate the effect of an oral stimulation program on preterm infants. Preterm infants are randomly assigned to experimental and control groups. Control group received routine care while the experimental group received oral stimulation in addition to routine care.

Postmenstrual age, total intake volume, body weight, the transition time from initiation of oral feeding to full oral feeding and feeding efficiency were calculated. Postmenstrual age and full oral feeding weight were significantly lower in the experimental group ( $p < 0.05$ ). the time from initiation of oral feeding to full oral feeding was significantly shorter in the experimental group ( $p < 0.05$ ) while feeding efficiency was higher in the experimental group ( $p < 0.05$ ) compared to controls. No significant differences existed in hospital stay length or weight gain rate and early oral stimulation programme is beneficial for preterm infants.<sup>8</sup>

A quasi experimental study was conducted to assess the accuracy of oral feeding in preterm infants 82 preterm infants were assessed by POFRAS regarding their readiness to initiate oral feeding and by the oral feeding skill level evaluation during the first oral feeding POFRAS's accuracy was estimated regarding proficiency by a Receiver Operating Characteristics (ROC) curve. The concordance between the tools was obtained by analysis of the Kappa coefficient. The Kappa coefficient has shown a weak concordance between the instruments to identify infants able and unable to oral feeding ( $k = 0.281$ ). POFRAS's accuracy to indicate oral feeding considering the proficiency was similar to that obtained with the technique of translactation. Observed a weak concordance between the instruments. In clinical practice, both instruments should be used in a complementary manner, since both present important aspects of the preterm feeding behaviour that together will better guide the necessary conduct to provide an effective and quick transition to full oral feeding in this population.<sup>11</sup>

A study was conducted on effectiveness of a nurse educational oral feeding programme on feeding outcomes in neonates at the NICU of the Femme Mere Enfant Hospital, Bron, Lyon, France between 16 February and 21 March 2016. The aim of the study was to evaluate the impact of an educational oral feeding nurse training programme on the achievement of full oral feeding and transition time among all admitted neonates of <34 weeks postmenstrual age (PMA). The sample size was 130 neonates and the study design was interrupted time series design with three phases: a 6-month baseline period, a 22-month intervention period and a 6-month post intervention period. the training modules will be composed of a 2-day conference, 2 interactive multidisciplinary workshops and routine practice nurse coaching. The study concluded, that nurses should apply prefeeding oral stimulation program twice a day as an intervention helping to prevent oral feeding skills.<sup>37</sup>

A study was conducted and finds that there is considerable evidence that oral stimulation through NNS or sensorimotor input to the oral structures has beneficial effects on oral feeding performance when applied before or during oral feedings in medically stable preterm infants (Lau, 2014). Leonard, et al, Garber, 2013 and Zhang, et al, 2014, reported an enhanced sucking rate after stroking the cheeks during oral feeding session and Einarsson- Backes, et al, Greene, et al, 2012 and Zhang, et al, 2014, demonstrated an increase in intake volume when cheek and chin support was provided during oral feeding. Accelerated maturation of the sucking reflex and earlier readiness for bottle-feeding is reported when preterm infants are presented with NNS opportunities during gavage feeding.<sup>12</sup>

A study was conducted and suggest that an oral stimulation program (peri- and intraoral stimulation, with or without nonnutritive sucking) applied to preterm infants for at least 10 days in the period of full gavage feeding can facilitate their oral feeding progress (Fucile, et al, 2005, Boiron, et al, 2007 and Rocha, et al, 2007). In these studies, the stimulated infants initiated oral feedings and reached total oral feeding sooner than those in the control group. Moreover, the intervention group demonstrated better sucking and feeding performance during the transition period from tube feeding to full oral feeding. Similar stimulation program conducted just before oral feeding is a common type of intervention used in the NICUs to facilitate feeding success of preterm infants after the introduction of oral feeding (Hwang, et al, 2010). A major aspect of nursing intervention in the NICUs is assisting preterm infants with feeding problems in becoming successful bottle feeders as early as possible.<sup>6</sup>

This study was conducted and assessed the effect of an oral stimulation program on the maturation of sucking skills of preterm infants. Thirty two preterm infants (13 males, 19 females), appropriate size for gestational age (gestational age at birth 28 weeks, SD 1.2 weeks, birth weight 1002g, SD 251g), were randomly placed into experimental and control groups. The experimental group received a daily 15 minute oral stimulation program, consisting of stroking the peri-and intra-oral structures, for 10 days before the start of oral feedings. Sucking measures were monitored with a specially-designed nipple-bottle apparatus. Results indicate that the experimental group achieved full oral feedings 7 days sooner than the control group, and demonstrated greater overall intake (%), rate of milk transfer (ml/min), and amplitude of the expression component of sucking (mmHg)<sup>5</sup>.

This study was conducted in which the oral stimulation program was administered for 27 preterm infant twice a day 5– min. before the beginning of a scheduled feeding. Each preterm infant in the intervention group received two stimulation sessions per day for two consecutive days. The feeding procedures were identical for both groups. At feeding scheduled time, each preterm infant was held in a semi-upright position, with neck and head support provided. Prefeeding oral stimulation program was administered following the steps. The feeding ended when one of the following conditions occurred: feeding time reached a 30-minute limit, the infant finished the prescribed volume in less than 30 min, or the infant did not resume sucking after using necessary strategies (e.g., burping, slowly pulling out and reinserting the nipple) to facilitate sucking. The weight of the feeding bottle with milk and the tissue placed underneath the preterm infant's chin to collect any amount of leakage were measured at the three time points (before feeding, after the first 5-min. feeding, and after the entire feeding). Total oral intake rate was determined by subtracting the amount of milk lost from drooling from the change in the weight of bottle with milk for the same time period. The amount of total oral intake rate was converted to milliliters (i.e., 1ml of formula or milk weighs approximately 1gm).<sup>12</sup>

A study was conducted to study the effect of an oral stimulation program on sucking skill maturation of preterm infants. The sample size were 32 preterm infants (13 males, 19 females), were randomly placed into experimental and control groups. The experimental group received a daily 15 minutes oral stimulation program, consisting of stroking the peri- and intra-oral structures.

This study assessed the effect of an oral stimulation program on the maturity of sucking skills of preterm infants. Thirty –two preterm infants (13 males, 19 females), appropriate size for gestational age (gestational age at birth 28 weeks, birth weight 1002g), were randomly placed into experimental and control groups. The experimental group received a daily 15-minute oral stimulation program, consisting of stroking the peri-and intra-oral structures, for 10 days before the start of oral feedings. Sucking measures were monitored with a specially-designed nipple-bottle apparatus. Results indicate that the experimental group achieved full oral feedings 7 days sooner than the control group, and demonstrated greater overall intake (%), rate of milk transfer (ml/min), and amplitude of the expression component of sucking (mmHg). There was no difference in sucking stage maturation, sucking frequency, and

amplitude of the suction component of sucking. The stimulation program enhanced the expression component of sucking, resulting in better oral feeding performance.<sup>26</sup>

## RESEARCH METHODOLOGY

This chapter describes the methodology that was adopted for this study. The methodology of research indicates the general pattern of organizing procedure to gather valid and reliable data for investigation.

**Research approach:** A quantitative quasi-experimental research approach was adopted for this study.

**Research design:** Non randomised pre-test- post-test research design was used to evaluate the effect of prefeeding oral stimulation program on oral feeding skills among preterm infants.

GROUP	Pretest	Intervention	Posttest			
			Day 1	Day2	Day3	Day 4
Experimental group	O <sub>1</sub>	X	O <sub>2</sub> X <sub>1</sub> X <sub>2</sub>	O <sub>3</sub> X <sub>3</sub> X <sub>4</sub>	O <sub>4</sub> X <sub>5</sub> X <sub>6</sub>	O <sub>5</sub> X <sub>7</sub> X <sub>8</sub>
Control group	O <sub>1</sub>	-	O <sub>2</sub>	O <sub>3</sub>	O <sub>4</sub>	O <sub>5</sub>

### Key:

O<sub>1</sub>: First observation on Day-1

X: Intervention

X<sub>1</sub>–X<sub>8</sub>: No. of times intervention administered

### Variables of the study:

**Independent variable:** Prefeeding oral stimulation program.

**Dependent variable:** Oral feeding skills.

**Extraneous variable:** Gender, mode of delivery, type of feed, gestational age in weeks, birth weight, Apgar Score, duration of hospital stay.

### Research setting

The study was conducted in NICU of Ankur kids hospital and Life line hospital at Jalandhar, Punjab. The primary reason for selecting these hospitals were researcher's convenience and expected cooperation from the authorities in getting permission for conducting the study.

### Target Population

The target population was preterm infants who are born between 30 to 36 weeks of gestation admitted in NICU of Ankur kids hospital and Life line hospitals, Jalandhar.

### Sample and sampling technique

The study sample comprised of 40 preterm infants i.e. 20 each in experimental and control group. Non-probability purposive sampling technique was used to select the sample.

### Criteria for sample selection:

#### Inclusion criteria:

- Preterm infants who were born between 30 to 36 weeks of gestation.
- Preterm infants who were on tube feeding having inefficient oral feeding skills.
- Mothers of preterm infants who were willing to participate in the study.
- Preterm infants who were admitted in hospitals from the first day of life.

#### Exclusion criteria:

- Preterm infants; with congenital anomalies that are affecting feeding and digestive function.
- Preterm infants who have undergone any surgical interventions.
- Preterm infants who were receiving mechanical ventilation for life support.

### Development and description tool:

**Section I:** The tool for data collection was developed in accordance with the objectives of the study demographic variables such as gender, mode of delivery, type of feed, gestational age in weeks, birth weight, apgar score, and duration of hospital stay etc.

**Section II:** It includes modified Early Feeding Skills Assessment tool which consist of 21 items under four sections. These sections contain 2 items to assess ability to maintain engagement during feeding, 6 items to

assess ability to organize oral motor functioning, 6 items to assess ability to coordinate swallowing, 7 items to assess physiological stability.

#### Criterion Measure:

Inadequate feeding skills	0-21
Moderately adequate feeding skills	22-42
Adequate feeding skills	43-63

**Maximum score:** 63

**Minimum score:** 0

#### Validity of tool

The content validity of the tool was determined by expert's opinion. The tool for content validity was circulated among experts in the field of nursing.

#### Pilot study

The pilot study was conducted on 1/10<sup>th</sup> of the total sample i.e. 4 preterm infants 2 in experimental group and 2 in control group at Civil hospital Jalandhar, Punjab to check the reliability of tool and feasibility of the study. After pilot study, tool was found to be reliable and feasible as per sample and hospital setting.

#### Reliability

The reliability of tool was computed by inter rater method and it was found to be 0.86 hence the tool was considered highly reliable for data collection.

#### Description of Intervention

- Establish friendly relationship with mother of the preterm infants and informed consent was be taken
- Pre assess the level of oral feeding skills of preterm infants by using early feeding skills assessment tool in experimental and control group.
- Prefeeding oral stimulation was given to the experimental group which includes 3 minutes of manual perioral stimulation on cheeks and lips and intraoral on gums, tongue and 2 minutes of pacifier sucking (total of 5 min) twice a day for four consecutive days.
- After prefeeding oral stimulation, oral feeding was given.
- Post-test on level of oral feeding skills was done twice a day for 4 consecutive days.

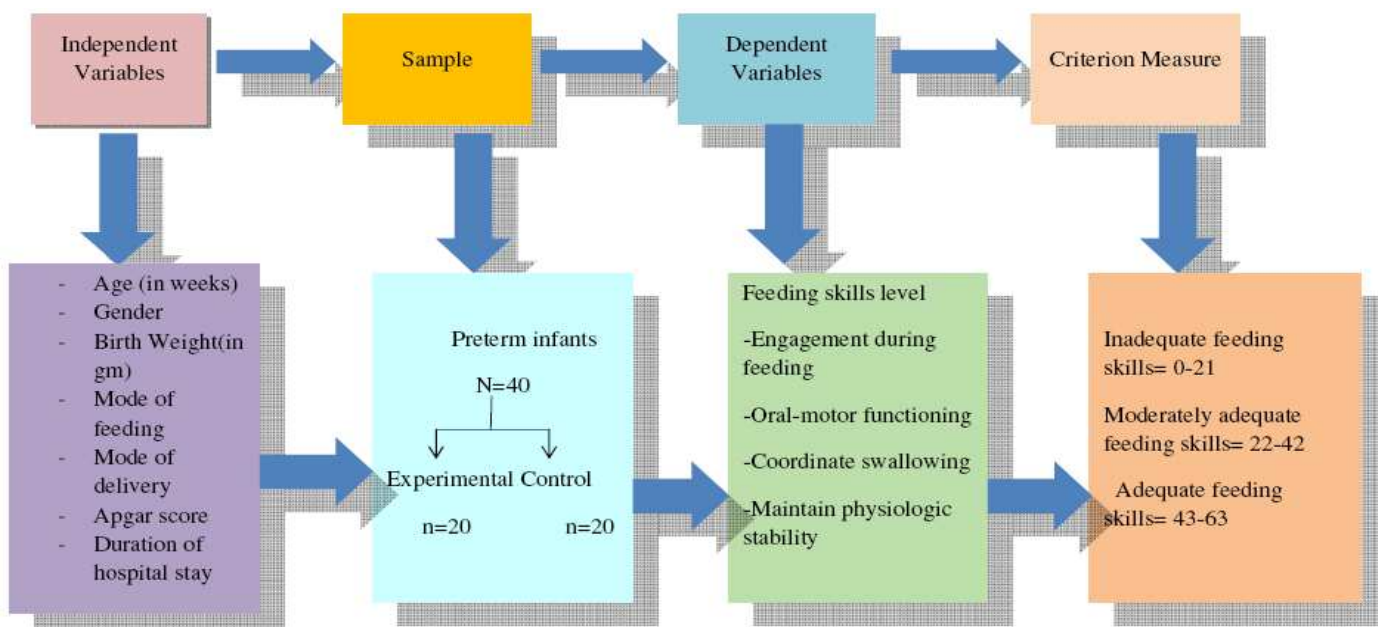
#### Data collection procedure:

- Data collection was done after taking permission from concerned authorities of selected hospitals and after explaining the aim and objectives of the study.
- Pre term infants was identified as per exclusion and inclusion criteria.
- Informed consent was taken from mothers of preterm infants.
- Pretest among both the experimental and control group was assessed through early feeding skills assessment tool.
- Prefeeding oral stimulation was given which includes 3 minutes of manual perioral stimulation on cheeks and lips and intraoral on gums, tongue and 2 minutes of pacifier sucking (total of 5 min) twice a day for four consecutive days.
- In posttest the level of oral feeding skills among preterm infants were assessed twice a day for 4 consecutive days.

#### Ethical consideration:

- Permission was obtained to conduct the study from senior medical officer/director of selected hospitals.
- The purpose of the study was explained to the subject's guardians and written consent was obtained from them for the study.
- The responses was kept confidential and the professional interpersonal relationship with subject was maintained.

**Plan of data analysis:** The data analysis was done by calculated frequency, percentage, mean, standard deviations, chi square, t test.



**Figure: 2 RESEARCH DESIGN**

### ANALYSIS AND INTERPRETATION OF DATA

This chapter deals with the analysis and interpretation of data collected from sample of 40 preterm infants with levels of feeding skills i.e. 20 in experimental group and 20 in control group. Analysis and interpretation of data was done in accordance with the objectives of study by using descriptive and inferential statistics in order to bring light on real meaning of the findings of the study.

#### Objectives

1. To pre assess the level of oral feeding skills among preterm infants in experimental and control group.
2. To post assess the level of oral feeding skills among preterm infants in experimental and control group.
3. To compare pre and post assessment level of oral feeding skills among preterm infants in experimental and control group.
4. To find out association of pre and post assessment level of oral feeding skills among preterm infants with selected demographic variables.

#### Hypothesis

**H<sub>0</sub>:** There will be no statistically significant difference in oral feeding skills among preterm infants in both experimental and control group at  $p < 0.05$  level of significance.

**H<sub>1</sub>:** There will be statistical significant improvement in oral feeding skills among preterm infants in experimental group after application of pre feeding oral stimulation program as compared to control group at  $p < 0.05$  level of significance.

#### Presentation of data

The data are organized and presented in four sections.

Section I: Frequency and percentage distribution of preterm infants in experimental and control group according to their demographic variables.

Section II: Frequency and percentage distribution of preterm infants in experimental and control group according to pretest levels of oral feeding skills assessment.

Frequency and percentage distribution of preterm infants in experimental and control group according to posttest levels of oral feeding skills assessment.

Section III: Comparison of the pretest mean score of oral feeding skills among preterm infants in experimental and control group.

Comparison of the post-test mean score of oral feeding skills among preterm infants in experimental and control group.

Section IV: Relationship of post-test oral feeding skills score among preterm infants in experimental group with their selected variables.

Relationship of post-test oral feeding skills score among preterm infants in control group with their selected variables.

## SECTION-I

**Table -1 Frequency and Percentage distribution of preterm infants in experimental and control group according to their demographic variables**

N=40

SAMPLE CHARACTERSTICS	Experimental group (n=20)		Control group (n=20)		Df	$\chi^2$
	n	%	n	%		
1. Age (in weeks)						
a) 30-32	10	50	9	45	2	0.1637 <sup>NS</sup>
b) 32-34	6	30	6	30		
c) 34-36	4	20	5	25		
2. Gender						
a) Male	11	55	10	50	1	0.1003 <sup>NS</sup>
b) Female	9	45	10	50		
3. Birth weight (in gm)						
a) 1400-1700	8	40	6	30	2	0.9262 <sup>NS</sup>
b) 1700-2000	7	35	10	50		
c) 2000-2300	5	25	4	20		
4. Mode of feeding						
a) Spoon feeding	9	45	10	50	2	0.1955 <sup>NS</sup>
b) Cup feeding	7	35	7	35		
c) Breast feeding	4	20	3	15		
5. Mode of delivery						
a) Normalvaginal delivery	17	85	18	90	1	0.2286 <sup>NS</sup>
b) Cesarean section	3	15	2	10		
6. Apgar score						
a) 0-2	0	0	2	10	3	0.4117 <sup>NS</sup>
b) 3-4	0	0	3	15		
c) 5-7	15	75	14	70		
d) 7-10	4	20	2	10		
7. Duration of hospital stay (in days)						
a) 0-5 days	13	65	14	70	3	0.9037 <sup>NS</sup>
b) 5-10 days	4	20	2	10		
c) 10-15 days	2	10	3	15		
d) 15-20 days	1	5	1	5		

NS= Non-significant at  $p < 0.05$  level

Table-1 shows frequency and percentage distribution of sample under study. According to gestational age in both experimental and control group half of preterm infants i.e. 50% were of 30-32 weeks, 30% were of 32-34 weeks and 20% were of 34-36 weeks of age where as in control group, 45% were of 30-32 weeks, 30% were of 32-34 weeks and 25% were 34-36 weeks of age.

According to gender, in experimental group, 55% preterm infants were male and 45% preterm infants were female whereas in control group, 50% preterm infants were male and 50% preterm infants were female.

According to birth weight in experimental group, 40% of preterms were having birth weight between 1400-1700gms, 35% were having birth weight between 1700-2000gms, 25% were having birth weight between 2000-2300gms whereas in control group, 50% of the preterm infants were having birth weight between 1700-2000gms, 30% were having birth weight between 1400-1700gms and 20% birth weight between 2000-2300gms.

According to type of feed, in experimental group, 45% of preterm infants were on spoon feeding and 35% of preterm infants were on cup feeding and 20% of preterm infants were on breast feeding and in control group, 10% of preterm infants were on spoon feeding, 7% of preterm infants were on cup feeding and 4% of the preterm infants was taking breast feeding.



According to apgar score, in experimental group 70% i.e. majority of preterm infants were having score between 5-7, 15% of preterm infants apgar score was between 0-2, 10% of preterm infants apgar score was between 3-4 and 5% of preterm infants apgar score was between 7-10 whereas in control group, 70 % of preterm infants apgar score was between 5-7, 15% of preterm infants score was between 3-4, 10% of preterm infants apgar score was between 0-2 and 5% of preterm infants apgar score was between 7-10.

According to type of delivery, in experimental group 85% preterm infants were delivered with NVD, 15% preterm infants were delivered with LSCS and in control group, 90% preterm infants delivered with NVD, 10% preterm infants were delivered with LSCS.

According to duration of hospital stay, in experimental group 65% of preterm infants were hospitalized for 0-5 days, 20% of preterm infants were hospitalized for 5-10 days, 10% of preterm infants were hospitalized for 10-15 days and 5% of preterm infants were hospitalized for 15-20 days whereas in control group, 70% of preterm infants were hospitalized for 0-5 days, 15% of preterm infants were hospitalized for 10-15 days, 10% of preterm infants were hospitalized for 5-10 days and 5% of preterm infants were hospitalized for 15-20 days.

The chi square value was calculated to compare the demographic characteristics of sample in experimental and control group and difference was found to be statistically non-significant at  $p < 0.05$  level in all variables. Thus it was concluded that experimental and control group are homogenous in all aspects.

## SECTION-II

### Objective 1

To pre assess the level of oral feeding skills among preterm infants in experimental and control group.

**Table-2 (a) Frequency and percentage distribution of preterm infants in experimental and control group according to pretest levels of oral feeding assessment.**

**N=40**

Feeding skills assessment	Experimental group (n=20)		Control group (n=20)	
	n	%	n	%
Inadequate feeding skills	14	70	18	90
Moderately adequate feeding skills	6	30	2	10
Adequate feeding skills	-	-	-	-

Table -2 shows that in pretest in the experimental group, majority of preterm infants i.e. 14 (70%) had inadequate feeding skills 6 (30%) had moderately adequate feeding skills whereas in control group, majority of preterm infants i.e. 18 (90%) had inadequate feeding skills and 2 (10%) had moderately adequate feeding skills.

Thus, based on above findings it was concluded that majority of preterm infants in both experimental and control group had inadequate feeding skills.

**Objective 2:-** To post assess the level of oral feeding skills among preterm infants in experimental and control group.

**Table-2 (b) Frequency and percentage distribution of preterm infants in experimental and control group according to posttest levels of oral feeding skills assessment.**

Feeding skills assessment	Experimental group (n=20)								Control group (n=20)							
	Post test 1		Post test 2		Post test3		Post test4		Post test1		Post test2		Post-test3		Post -test 4	
	n	%	N	%	n	%	n	%	n	%	N	%	n	%	n	%
Inadequate Feeding skills	4	20	3	15	3	15	-	-	9	45	9	45	6	30	1	5
Moderately adequate feeding skills	16	80	15	75	12	60	9	45	11	55	10	50	12	60	15	75
Adequate feeding Skills	-	-	2	10	5	25	11	55	-	-	0	0	2	10	4	20

Table 2 (b) depicts that in post-test 1 in experimental group most of preterm i.e. 16 (80%) had moderately adequate feeding skills, 4 (20%) had inadequate feeding skills and none of the preterm infants had adequate feeding skills whereas in control group majority of preterm infants i.e. 11 (55%) had moderately adequate feeding skills, 9 (45%) had inadequate feeding skills and none of the preterm infants had adequate feeding skills.

In post-test day 2 in experimental group, majority of preterm infants i.e. 15 (75%) had moderately adequate feeding skills, 3 (15%) had inadequate feeding skills and 2 (10%) of the preterm infants had adequate feeding skills whereas in control group 10 (50%) had moderately adequate feeding skills, 9 (45%) had adequate feeding skills and none of the preterm infants had adequate feeding skills.

In post-test day 3 in experimental group, majority of preterm infants i.e. 12 (60%) had moderately adequate feeding skills, 5 (25%) had adequate feeding skills and 3 (15%) had inadequate feeding skills whereas in control group majority 12 (60%) had moderately adequate feeding skills, 6 (30%) had inadequate feeding skills, 2 (10%) had adequate feeding skills.

In post-test day 4 in experimental group, majority of preterm infants i.e. 11 (55%) had adequate feeding skills, 9 (45%) had moderately feeding skills and none of the preterm infants had inadequate feeding skills whereas in control group majority of preterm infants i.e. 15 (75%) had moderately feeding skills, 4 (20%) had adequate feeding skills and 1 (5%) had inadequate feeding skills.

Thus based on above findings it was concluded that in experimental group compared to control group there was more transition from moderately adequate feeding skills to adequate feeding skills.

**Objective 3:-** To compare pre and post assessment level of oral feeding skills among preterm infants in experimental and control group.

**Table 3 (a) Comparison of the pretest mean scores of oral feeding skills among preterm infants in experimental and control group**

N=40

Feeding skills assessment	Experimental group (n=20)		Control group (n=20)		df	t-test
	Mean	S.D.	Mean	S.D.		
Engagement during feeding	2.25	0.43	2.15	0.35	38	0.77 <sup>NS</sup>
Oral-motor functioning	6	1.77	6.05	0.99	38	0.10 <sup>NS</sup>
Coordinate swallowing	7.15	1.03	6.55	0.94	38	1.90 <sup>NS</sup>
Maintain physiologic stability	3.9	0.87	3.65	1.11	38	0.78 <sup>NS</sup>

NS= Non significant at  $p < 0.05$  level

Table 3 (a) shows comparison of the pre-test mean scores of feeding skills assessment among preterm infants between experimental and control group. The mean score of engagement during feeding in experimental group was 2.25 and in control group was 2.15. The difference of mean score of engagement during feeding among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

The mean score of oral-motor functioning in experimental group was 6 and in control group was 6.05. The difference of mean score of oral-motor functioning among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

The mean score of coordinate swallowing in experimental group was 7.15 and in control group was 6.55. The difference of mean score of coordinate swallowing among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

The mean score of maintain physiologic stability in experimental group was 3.9 and in control group was 3.65. The difference of mean score of maintain physiologic stability among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

Hence, it was concluded that in pre-test, there was no statistically significant ( $p < 0.05$ ) difference in all parameters of feeding skills assessment among preterm infants in experimental and control group.

**Table 3 (b) Comparison of the post-test (Day-1) mean scores of oral feeding skills among preterm infants in experimental and control group.**

N=40

Feeding skills assessment	Experimental group (n=20)		Control group (n=20)		df	Unpaired t-test
	Mean	S.D.	Mean	S.D.		
Engagement during feeding	3	0.56	3.2	0.61	38	1.07 <sup>NS</sup>
Oral-motor functioning	8.65	0.81	7.4	0.94	38	0.71 <sup>NS</sup>
Coordinate swallowing	7.1	0.83	6.9	0.96	38	0.80 <sup>NS</sup>
Maintain physiologic stability	3.7	0.57	3.8	0.95	38	0.71 <sup>NS</sup>

NS=Non significant at  $p < 0.05$  level

Table 3 (b) depicts the comparison of the post-test (Day 1) mean scores of feeding skills assessment among preterm infants between experimental and control group. The mean score of engagement during feeding in experimental group was 3 and in control group was 3.2. The difference of mean score of engagement during feeding among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

The mean score of oral-motor functioning was 8.65 and in control group was 0.94. The difference of mean score of oral-motor functioning among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

The mean score of coordinate swallowing was 7.1 and in control group was 6.9. The difference of mean score of coordinate swallowing among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

The mean score of maintain physiologic stability was 3.7 and in control group was 3.8. The difference of mean score of maintain physiologic stability among preterm infants between experimental and control group was statistically non-significant at  $p < 0.05$  level.

Hence, it was concluded that in post-test (Day-1), there was no statistically significant ( $p < 0.05$ ) difference in all parameters of feeding skills assessment among preterm infants between experimental and control group after provision of 1 day oral stimulation programme an oral feeding skills on preterm infants.

**Table 3 (c) Comparison of the post-test (Day-2) mean scores of oral feeding skills among preterm infants in experimental and control group**

**N=40**

Feeding skills assessment	Experimental group (n=20)		Control group (n=20)		df	Unpaired t-test
	Mean	S.D.	Mean	S.D.		
Engagement during feeding	4.2	1.39	3.25	0.71	38	2.70*
Oral-motor functioning	8.85	0.87	7.85	2.13	38	1.93 <sup>NS</sup>
Coordinate swallowing	8.35	0.87	7.75	1.91	38	1.27 <sup>NS</sup>
Maintain physiologic stability	3.95	0.51	3.9	1.16	38	0.17 <sup>NS</sup>

\*=significant at  $p < 0.05$  level

NS= Non significant at  $p < 0.05$  level

Table 3 (c) illustrate the comparison of the post-test (Day-2) mean score of feeding skills assessment among preterm infants between experimental and control group. The mean score of engagement during feeding in experimental group was 4.2 and in control group was 3.25. The difference of mean score of engagement during feeding among preterm infants between experimental and control group was statistically significant at  $p < 0.05$  level.

The mean score of oral-motor functioning in experimental was 8.85 and in control group was 7.85. The difference of mean score of oral-motor functioning among preterm infants between experimental and control group was statistically non- significant at  $p < 0.05$  level.

The mean score of coordinate swallowing in experimental group was 8.35 and in control group was 7.75. The difference of mean score of coordinate swallowing among preterm infants between experimental and control group was statistically non- significant at  $p < 0.05$  level.

The mean score of maintain physiologic stability in experimental group was 3.95 and in control group was 3.9. The difference mean score of maintain physiologic stability among preterm infants was statistically non-significant at  $p < 0.05$  level.

Hence, it was concluded that in post-test (Day-2), there was statistically significant ( $p < 0.05$ ) difference found in mean scores of engagement during feeding parameters of feeding skills assessment among preterm infants between experimental and control group after provision of 2 days of prefeeding oral stimulation programme on oral feeding skills among preterm infants.

**Table 3 (d) Comparison of the post-test (Day-3) mean scores of oral feeding skills among preterm infants in experimental and control group****N=40**

Feeding skills assessment	Experimental group (n=20)		Control group (n=20)		df	Unpaired t-test
	Mean	S.D.	Mean	S.D.		
Engagement during feeding	4.2	1.39	3.25	0.71	38	2.70*
Oral-motor functioning	12.4	3.34	8.3	2.90	38	4.08*
Coordinate swallowing	9.75	3.17	6.8	2.21	38	3.40*
Maintain physiologic stability	4.25	1.77	4.19	1.22	38	0.20 <sup>NS</sup>

\* = significant at  $p < 0.05$  levelNS = Non significant at  $p < 0.05$  level**Maximum score: 63****Minimum score: 0**

Table 3 (d) illustrate the comparison of the post-test (Day-3) mean score of feeding skills assessment among preterm infants between experimental and control group. The mean score of engagement during feeding in experimental group was 4.2 and in control group was 3.25. The difference of mean score of engagement during feeding among preterm infants between experimental and control group was statistically significant at  $p < 0.05$ .

The mean score of oral-motor functioning in experimental group was 12.4 and in control group was 8.3. The difference of mean score of oral-motor functioning among preterm infants between experimental and control group was statistically significant at  $p < 0.05$ .

The mean score of coordinate swallowing in experimental group was 9.75 and in control group was 6.8. The difference of mean score of coordinate swallowing among preterm infants between experimental and control group was statistically significant at  $p < 0.05$ .

The mean score of maintain physiologic stability in experimental group was 4.25 and in control group was 4.19. The difference of mean score of maintain physiologic stability among preterm infants between experimental and control group was non statistically significant at  $p < 0.05$ .

Hence, it was concluded that there was statistically significant ( $p < 0.05$ ) difference found in mean scores of engagement during feeding, oral-motor functioning and coordinate swallowing parameters of feeding skills assessment among preterm infants between experimental and control group after provision of 3 days of prefeeding oral stimulation program on oral feeding skills among preterm infants.

**Table 3 (e) Comparison of the post-test (Day-4) mean scores of oral feeding skills among preterm infants in experimental and control group****N=40**

Feeding skills assessment	Experimental group (n=20)		Control group (n=20)		Df	Unpaired t-test
	Mean	S.D.	Mean	S.D.		
Engagement during feeding	4.75	1.44	3.7	0.97	38	2.68*
Oral-motor functioning	14.55	2.94	8.65	3.66	38	4.85*
Coordinate swallowing	16	0.91	8.65	3.13	38	10.06*
Maintain physiologic stability	7	0	6.3	1.11	38	2.77*

\* = significant at  $p < 0.05$  level**Maximum score: 63****Minimum score: 0**

Table 3 (e) illustrate the comparison of the post-test (Day-4) mean score of feeding skills assessment among preterm infants between experimental and control group. The mean score of engagement during feeding in experimental group was 4.75 and in control group was 3.7. The difference of mean score of engagement during feeding among preterm infants between experimental and control group was statistically significant at  $p < 0.05$ .

The mean score of oral-motor functioning in experimental group was 14.55 and in control group was 8.65. The difference of mean score of oral-motor functioning among preterm infants between experimental and control group was statistically significant at  $p < 0.05$ .

The mean score of coordinate swallowing in experimental group was 16 and in control group was 8.65. The difference of mean score of coordinate swallowing among preterm infants between experimental and control group was statistically significant at  $p < 0.05$ .

The mean score of maintain physiologic stability in experimental group was 7 and in control group was 6.3. The difference of mean score of maintain physiologic stability among preterm infants between experimental and control group was statistically significant at  $p < 0.05$ .

Hence, it was concluded that there was statistically significant ( $p < 0.05$ ) difference found in mean score of all parameters of feeding skills assessment among preterm infants between experimental and control group after provision of 4 days of prefeeding oral stimulation program on oral feeding skills among preterm infants.

Hence, research hypothesis ( $H_1$ ) was accepted and null hypothesis ( $H_0$ ) was rejected.

**Table 3 (f) Comparison of the pretest and post-test mean scores of oral feeding skills assessment of preterm infants in experimental and control group**

Feeding skills assessment	Experimental group (n=20)					Control group (n=20)				
	Pre test		Posttest		df=19	Pre test		Posttest		df=19
	Mean	S.D.	Mean	S.D.	Paired t-test	Mean	S.D.	Mean	S.D.	Paired t-test
Engagement during feeding	0	0	4.75	1.44	9.86***	0	0	3.7	0.97	2.71*
Oral-motor functioning	6	1.36	14.55	2.94	11.7***	6.05	0.99	9.45	3.66	4.61**
Coordinate swallowing	7.15	1.05	16	0.91	13.58***	6.55	0.94	8.65	3.13	9.47***
Maintain physiologic stability	3.9	1.11	7	0	4.08*	3.65	0.87	6.3	1.12	2.35*

\*=significant at  $p < 0.05$  level

\*\*=significant at  $p < 0.01$  level

\*\*\*=significant at  $p < 0.001$  level

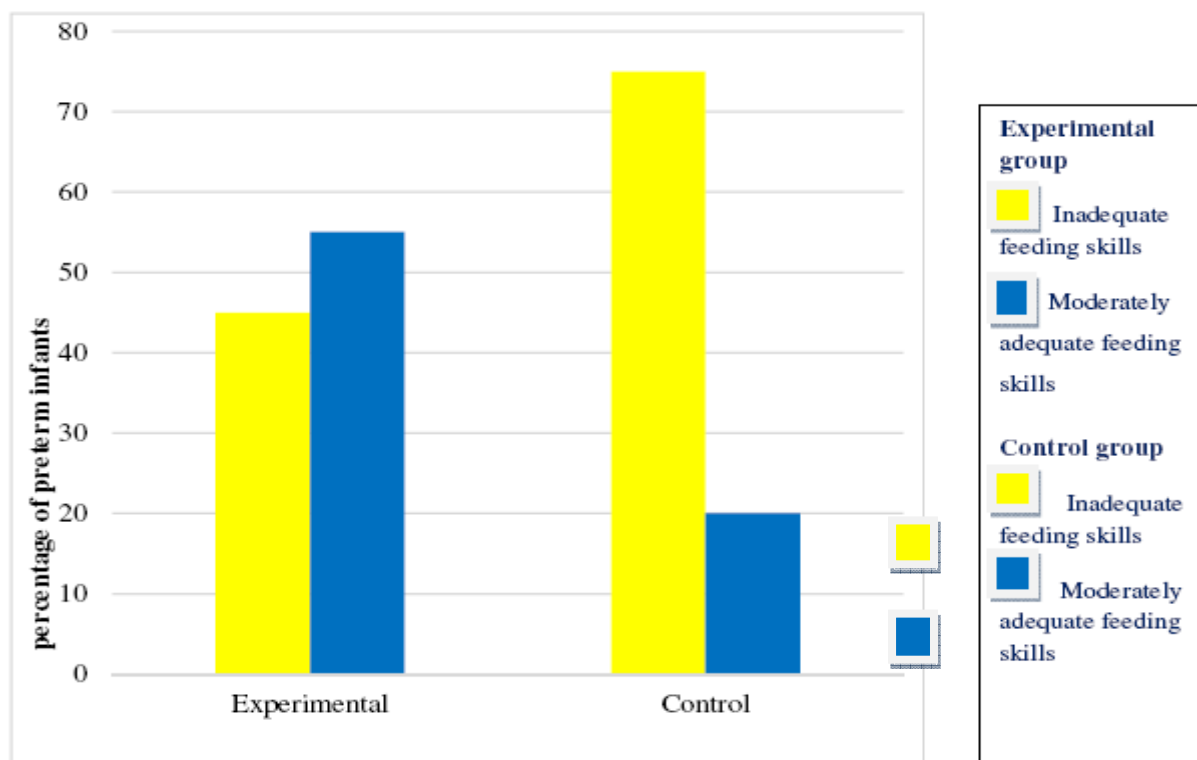
Table 3 (f) demonstrates the comparison of the pre-test and post-test mean scores of feeding skills assessment among preterm infants between experimental and control group. In experimental group, the mean pre-test score of engagement during feeding was 0 and in post-test was 4.75 and whereas in control group, the mean pretest score of engagement during feeding was 0 and in post-test was 3.7. The difference between the pre-test and post-test mean scores of engagement during feeding was statistical very highly significant at  $p < 0.05$  level.

The mean pretest score of oral-motor functioning in experimental group was 6 and post-test was 14.55 whereas in control group, the mean pre-test score of oral-motor functioning was 6.05 and in post-test was 9.45. the difference between the pre-test and post-test mean scores of oral-motor functioning was statistical very highly significant at  $p < 0.01$  level.

The mean pretest score of coordinate swallowing in experimental group was 7.15 and post-test was 16 whereas in control group, the mean pre-test score of coordinate swallowing was 6.55 and in post-test was 8.65. The difference between the pre-test and post-test mean scores of coordinate swallowing was statistical very highly significant at  $p < 0.001$  level.

The mean pretest score of maintain physiologic stability in experimental group was 3.9 and post-test was 7 whereas in control group, the mean pre-test score of maintain physiologic stability was 3.65 and in post-test was 6.3. The difference between the pre-test and post-test mean scores of maintain physiologic stability was statistical very highly significant at  $p < 0.05$  level.

Hence, based on above findings it was concluded that the difference between the pre-test and post-test mean scores of all feeding skills assessment parameters among preterm infants in experimental group was statistically more significant in comparison with control group. Thus prefeeding oral stimulation program on oral feeding stimulation was found to be effective in improving oral feeding skills among preterm infants.



**Figure3: Frequency and percentage distribution of preterm infants in experimental and control group.**

**Objective:-**To find out association of pre and post assessment level of oral feeding skills among preterm infants with selected demographic variables.

**Table 4 (a) Relationship of post-test (Day-4) oral feeding skills score among preterm infants in experimental group with their selected variables**  
N=40

Levels of feeding skills									
Demographic Variables	Total	Inadequate feeding skills		Moderately adequate feeding skills		Adequate feeding skills		Df	$\chi^2$
		n	%	n	%	n	%		
1. Age (in weeks)									
a) 30-32	13	0	0	4	20	9	45	2	3.08 <sup>NS</sup>
a) 32-34	03	0	0	2	10	1	5		
b) 34-36	04	0	0	3	15	1	5		
2. Gender									
a) Male	11	0	0	3	15	8	40	1	3.10 <sup>NS</sup>
b) Female	09	0	0	6	30	3	15		
3. Birth weight (in gms)									
a) 1400-1700	11	0	0	3	15	8	40	2	4.85*
b) 1700-2000	09	0	0	2	10	7	35		
c) 2000-2300	0	0	0	0	0	0	0		
4. Mode of feeding									
a) Spoon feeding	07	0	0	2	10	5	25	2	1.24 <sup>NS</sup>
b) Cup feeding	07	0	0	4	20	3	15		
c) Breast feeding	06	0	0	3	15	3	15		
5. Mode of delivery									
a) Normal vaginal delivery	17	0	0	6	30	11	55	1	1.04 <sup>NS</sup>
b) Cesarean section	03	0	0	2	10	1	5		
6. Apgar score									
a) 0-2	00	0	0	0	0	0	0	3	0.02 <sup>NS</sup>
b) 3-4	00	0	0	0	0	0	0		
c) 5-7	18	0	0	8	40	10	50		
d) 7-10	01	0	0	1	5	1	5		

7. Duration of hospital stay (in days)									
a) 0-5	15	0	0	7	35	8	40	3	0.06 <sup>NS</sup>
b) 5-10	05	0	0	2	10	3	15		
c) 10-15	00	0	0	0	0	0	0		
d) 15-20	00	0	0	0	0	0	0		

**Non –significant p<0.05 level**

**Significant p<0.05 level**

Table 4 (a) depicts relationship of post-test (Day 4) feeding skills assessment with selected demographic variables of preterm infants in experimental group. According to gestational age, among 13 preterm infants were between 30-32 weeks 9 (45%) had adequate feeding skills and 4 (20%) had moderately adequate feeding skills. Among 3 preterm infants between 32-34 weeks 2 (10%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test feeding skills assessment with their gestational age was statistically non-significant at p<0.05 level.

According to gender, among 11 preterm infants 8 (40%) had adequate feeding skills and 3 (15%) had moderately adequate feeding skills. 9 preterm infants 6 (30%) had moderately adequate feeding skills and 3 (15%) had adequate feeding skills. The relationship of post-test feeding skills assessment of with their gender was statistically non-significant at p<0.05 level.

According to birth weight, among 11 preterm infants birth weight between 1400-1700gms, 8 (40%) had adequate feeding skills and 3 (15%) were having moderately adequate feeding skills. Among 9 preterm infants birth weight between 1700-2000gms, 7 (35%) had adequate feeding skills and 2 (10%) had moderate adequate feeding skills. The relationship post-test feeding skills assessment of preterm infants with their birth weight was statistically significant at p<0.05 level.

According to the mode of feeding, among 7 preterm infants were taking spoon feed, 5 (25%) had adequate feeding skills and 2 (10%) had moderately adequate feeding skills. Among 7 preterm infants were taking cup feed, 4 (20%) had moderately adequate feeding skills and 3 (15%) had adequate feeding skills. Among 6 preterm infants were taking mother milk 3 (15%) had moderately adequate feeding skills and 3 (15%) had adequate feeding skills. The relationship of post-test feeding skills assessment with their mode of feeding was statistically non-significant at p<0.05 level.

According to mode of delivery, among 17 preterm infants who were delivered through NVD, 11 (55%) had adequate feeding skills and 6 (30%) had moderately adequate feeding skills. Among 3 preterm infants who were delivered through LSCS, 2 (10%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test feeding skills assessment with their mode of delivery was statistically non-significant at p<0.05 level.

According to apgar score, 19 preterm infants between 5-7, 10 (50%) had adequate feeding skills and 8 (40%) had moderately adequate feeding skills. Among 2 preterm infants between 7-10, 1 (5%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test feeding skills assessment with apgar score was statistically non-significant at p<0.05 level.

According to duration of hospital stay, 15 preterm infants between 0-5 days, 8 (40%) had adequate feeding skills and 7 (35%) had moderately adequate feeding skills. Among 5 preterm infants between 5-10 days, 3 (15%) had adequate feeding skills and 2 (10%) had moderately adequate feeding skills. The relationship of post-test feeding skills assessment with hospital stay duration was statistically non-significant at p<0.05 level.

**Table 4 (b) Relationship of post-test (Day-4) oral feeding skills score among preterm infants in control group with their selected variables**

**N=40**

Levels of feeding skills									
Demographic variables	Total	Inadequate feeding skills		Moderately adequate feeding skills		Adequate feeding skills		Df	$\chi^2$
		N	%	n	%	n	%		
1. Age (in weeks)									
a) 30-32	13	0	0	10	50	3	15	2	0.07 <sup>NS</sup>
b) 32-34	07	0	0	5	25	2	10		
c) 34-36	00	0	0	0	0	0	0		

2. Gender									
a) Male	10	0	0	6	30	4	20	1	2.4 <sup>NS</sup>
b) Female	10	0	0	9	45	1	5		
3. Birth weight (in gm)									
a) 1400-1700	12	0	0	7	35	5	25	2	2.65*
b) 1700-2000	08	0	0	7	35	1	5		
c) 2000-2300	00	0	0	0	0	0	0		
4. Mode of feeding									
a) Spoon feeding	05	0	0	4	20	1	5	2	0.31 <sup>NS</sup>
b) Cup feeding	12	0	0	8	40	4	20		
c) Breast feeding	03	0	0	2	10	1	5		
5. Mode of delivery									
a) Normal vaginal delivery	18	0	0	14	70	4	20	1	0.74 <sup>NS</sup>
b) Cesarean section	02	0	0	1	5	1	5		
6. Apgar score									
a) 0-2	00	0	0	0	0	0	0	3	0.98 <sup>NS</sup>
b) 3-4	00	0	0	0	0	0	0		
c) 5-7	15	1	5	9	45	5	25		
d) 7-10	5	1	5	2	10	2	10		
7. Duration of hospital stay									
a) 0-5 days	17	1	5	12	60	4	20	3	2.56 <sup>NS</sup>
b) 5-10days	03	1	5	1	5	1	5		
c) 10-15days	00	0	0	0	0	0	0		
d) 15-20days	00	0	0	0	0	0	0		

**Non –significant p<0.05level**

**Significant p<0.05 level**

Table 4 (b) depicts relationship of post-test (Day 4) feeding skills assessment with selected demographic variables of preterm infants in control group. According to gestational age, among 13 preterm infants between 30-32 weeks, 10 (50%) had moderately adequate feeding skills and 3 (15%) had adequate feeding skills. Among 7 preterm infants between 32-34 weeks, 5 (25%) had moderately adequate feeding skills and 2 (10%) had adequate feeding skills. The relationship of post-test feeding skills assessment with their gestational age was statistically non-significant at p<0.05 level.

According to gender, among 10 male preterm infants, 6 (30%) had moderately adequate feeding skills and 4 (20%) had adequate feeding skills. Among 10 female preterm infants, 9 (45%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test feeding skills assessment with their gender was statistically non-significant at p<0.05 level.

According to birth weight, among 12 preterm infants of birth weight between 1400-1700gms, 7 (35%) had moderately adequate feeding skills and 5 (25%) had adequate feeding skills. Among 8 preterm infants of birth weight between 1700-2000gms, 7 (35%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test

of preterm infants with their birth weight was statistically significant at p<0.05 level.

According to mode of feed, among 5 preterm infants who were taking spoon feed, 4 (20%) had moderately adequate feeding and 1 (5%) had adequate feeding skills. Among 12 preterm infants who were taking on cup feed, 8 (40%) had moderately adequate feeding and 4 (20%) had adequate feeding skills. Among 3 preterm infants who were taking mother milk, 2 (10%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test feeding skills assessment with their mode of feed was statistically non-significant at p<0.05 level.

According to mode of delivery, among 18 preterm infants who were delivered through NVD, 14 (70%) had moderately adequate feeding skills and 4 (20%) had adequate feeding skills. Among 2 preterm infants who were delivered through LSCS, 1 (5%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test feeding skills assessment with their mode of delivery was statistically non-significant at p<0.05 level.

According to apgar score, among 15 preterm infants between 5-7 range, 9 (45%) had moderately adequate feeding skills, 5 (25%) had adequate feeding skills and 1 (5%) had inadequate feeding skills. Among 5 preterm infants between 7-10 range, 2 (10%) had



moderately adequate feeding skills, 2 (10%) had adequate feeding skills and 1 (5%) had inadequate feeding skills. The relationship of post-test feeding skills assessment with apgar score range was statistically non-significant at  $p < 0.05$  level.

According to duration of hospital stay, among 17 preterm infants between 0-5 days, 12 (60%) had moderately adequate feeding skills, 4 (20%) had adequate feeding skills and 1 (5%) had inadequate feeding skills. Among 3 preterm infants between 5-10 days, 1 (5%) had inadequate feeding skills, 1 (5%) had moderately adequate feeding skills and 1 (5%) had adequate feeding skills. The relationship of post-test feeding skills assessment with hospital stay duration was statistically non-significant at  $p < 0.05$  level.

## Major findings

### Findings related to sample characteristics

- In both experimental group, majority of preterm infants i.e. 50% were of 30-32 weeks and least i.e. 20% were of 34-36 weeks whereas in control group, majority of preterm infants i.e. 45% were of 30-32 weeks and least i.e. 25% were of 34-36 weeks of age.
- In experimental group, majority of preterm infants i.e. 55% were male and rest i.e. 45% were female whereas in control group, 50% were male and 50% were female.
- In experimental group, majority of preterm infants i.e. 40% were of birth weight between 1400-1700gms and least i.e. 25% were of birth weight between 2000-2300gms whereas in control group, majority of preterm infants i.e. 50% were of birth weight between 1700-2000gms and least i.e. 20% were of birth weight between 2000-2300gms.
- In experimental group, majority of preterm infants i.e. 45% were on spoon feed and rest 20% were on breast feeding whereas in control group, majority of preterm infants i.e. 50% were on spoon feed and rest i.e. 15% were on breast feeding.
- In experimental group, majority of preterm infants i.e. 85% were delivered with NVD and rest 15% were delivered with LSCS whereas in control group, majority of preterm infants i.e. 90% were delivered with NVD and rest 10% were delivered with LSCS.
- In experimental group, majority of preterm infants i.e. 70% had apgar score between 5-7 and least 5% had apgar score between 7-10 whereas in control group, majority of preterm infants i.e. 70% had apgar score between 5-7 range and least 10% both of apgar score between 0-2 and 7-10 range.

- In experimental group, majority of preterm infants i.e. 65% had hospital stay duration between 0-5 days and least 5% of hospital stay duration between 15-20 days whereas in control group, majority of preterm infants i.e. 70% of hospital stay duration between 0-5 days and least 5% of hospital stay duration was between 15-20 days.

### Findings related to levels of feeding skills assessment among preterm infants in experimental and control group.

- In pre-test, in the experimental group, majority of preterm infants i.e. 70% had inadequate feeding skills and 30% had moderately adequate feeding skills whereas in control group, majority of preterm infants i.e. 90% had inadequate feeding skills and 10% had moderately adequate feeding skills
- In post-test (Day-4), in experimental group, majority of preterm infants i.e. 55% had adequate feeding skills and 45% had moderately adequate feeding skills whereas in control group, majority of preterm infants i.e. 75% had moderately adequate feeding skills and 20% had adequate feeding skills.

### Findings related to comparison of feeding skills assessment among preterm infants in experimental and control group.

- In pre-test mean scores, there was no statistically significant difference in all parameters of feeding skills assessment among preterm infants between experimental and control group.
- In post-test (Day-4) mean scores, there was statistically significant difference in all parameters of feeding skills assessment among preterm infants between experimental and control group at  $p < 0.05$  level. Hence research hypothesis ( $H_1$ ) was accepted and null hypothesis ( $H_0$ ) was rejected.
- The difference between the pre-test and post-test mean scores of all feeding skills assessment parameters among preterm infants in experimental group was statistically more significant as compared to control group.
- Hence it was concluded that oral stimulation program was effective in improving the feeding skills among preterm infants.

### Findings related to relationship of feeding skills assessment with selected demographic variables of preterm infants in experimental and control group.

- In both experimental and control group, birth weight had significant relationship with post-test oral feeding skills assessment at  $p < 0.05$  level.

## DISCUSSION

Findings of the present quasi experimental study have been discussed according to the objectives of the study

### **Objective 1: To pre assess the level of oral feeding skills among preterm infants in experimental and control group.**

In pre-test, in the experimental group, majority of preterm infants i.e. 70% had inadequate feeding skills and 30% had moderately adequate feeding skills whereas in control group, majority of preterm infants i.e. 90% had inadequate feeding skills and 10% had moderately adequate feeding skills

The findings of the present study almost resemble to the findings of study conducted Effects of Prefeeding Oral Stimulation on Feeding Performance of Preterm Infants which revealed that in experimental group 37.5% preterm infants had inadequate feeding skills, 42.5% had moderately adequate feeding skills and 8% had adequate feeding skills whereas in control group 30% preterm infants had inadequate feeding skills, 46% preterm infants had moderately adequate feeding skills and 24% had adequate feeding skills.

Another study conducted by Tenhaaf, J. J. to evaluate the Effects of Oral Stimulation on Feeding Behaviours in Preterm Infants contradicts the findings of the present study which revealed that 18% preterm infants had inadequate feeding skills, 42% had moderate feeding skills and 40% had adequate feeding skills whereas in control group 25% had inadequate feeding skills, 70% had moderately adequate feeding skills and 5% had adequate feeding skills.

### **Objective 2: To post assess the level of oral feeding skills among preterm infants in experimental and control group.**

In post-test (Day-4), in experimental group, majority of preterm infants i.e. 55% had adequate feeding skills and 45% had moderately adequate feeding skills whereas in control group, majority of preterm infants i.e. 75% had moderately adequate feeding skills and 20% had adequate feeding skills.

The results of the present study were supported by a study conducted by Yea-Shwu Hwang, Elsie Vergara to Effects of Prefeeding Oral Stimulation on Feeding Performance of Preterm Infants. Finding revealed that in experimental group posttest, 8% had inadequate feeding skills, 72% had moderately feeding skills and 20% had adequate feeding skills whereas in control group, 25% had inadequate feeding skills, 58% had moderately adequate feeding skills and 17% had adequate feeding skills.

Another study conducted by Hyejeong Choi et al to evaluate the Early Feeding Skills among Preterm Neonates Received Verses Not Received Prefeeding Oral Stimulation Technique In Neonatal Intensive Care Units, revealed that after intervention in experimental group 15% had inadequate feeding skills, 62% had moderately adequate feeding skills and 23% had adequate feeding skills whereas in control group, 27% had inadequate feeding skills, 54% had moderately adequate feeding skills and 19% had adequate feeding skills.

### **Objective 3: To compare pre and post assessment level of oral feeding skills among preterm infants in experimental and control group.**

The present study result showed that in pre-test, there was no statistically significant ( $p < 0.05$ ) difference in all levels of feeding skills among preterm infants between experimental and control group. [Table 3 (a) ] but in post-test (day-4) there was statistically significant ( $p < 0.05$ ) difference found in mean score of all levels of feeding skills among preterm infants between experimental and control group after provision of 4 days of manual peri-oral stimulation or suck on pacifier [Table 3 (e) ]. The difference between the pre-test and post-test mean scores of all levels of feeding skills among preterm infants in experimental group was statistically more significant in comparison with control group. Thus manual peri-intra oral stimulation was found to be effective in oral feeding skills among preterm infants [Table 3 (f) ]. The present study findings are consistent with findings of the study done by Greene Z, O'Donnell CPF et al on the effect of The Early Feeding Skills Assessment for Preterm Infants and result showed that there was statistically significant difference in all levels of feeding and control group. A study conducted by Yea-Shwu Hwang et al in Sept. 2009 and March 2010 found that oral feeding stimulation increases the engagement during feeding, oral-motor functioning, coordinate swallowing and maintain physiologic stability in increased weight gain.

Based on result of objective 1 and objective 2 of present study and previous studies result it was concluded that prefeeding oral stimulation program on oral feeding skills is efficient in preventing engagement during feeding, oral-motor functioning, coordinate swallowing and maintain physiologic stability and weight among oral feeding skills infants.

### **Objective 4: To find out association of pre and post assessment level of oral feeding skills among preterm infants with selected demographic variables.**

The present study reveals that in both the experimental and control group there was significant

relationship of birth weight with levels of feeding skills at  $p < 0.05$  level whereas other variables like age, gender, mode of feeding, mode of delivery, apgar score and duration of hospital stay were not significantly associated at  $p < 0.05$  level [Table 4 (a) & 4 (b)]. A study done by Tekgunduz et al revealed that low gestational age, low birth weight delayed feeding and complications may be associated with the development of levels of feeding skills in preterm infants. In the present study also investigator found that birth weight had significant relationship that is consistent but gestational age had no significant relationship with levels of feeding skills that is contradictory.

## SUMMARY, CONCLUSION AND RECOMMENDATIONS

### Summary

The present study was conducted as an attempt to evaluate the effect of prefeeding oral stimulation program on oral feeding skills among preterm infants in selected hospitals, Jalandhar, Punjab.

The main aim of the study was to evaluate the effect of prefeeding oral stimulation program on oral feeding skills among preterm infants.

To accomplish the objectives and determine methodology for the study, a thorough review of literature was done. The Quantitative quasi-experimental research approach was adopted for the study. The modified EFS Scale was developed and circulated among experts in the field of pediatrics and pediatric nursing for establishing the content validity and necessary modifications were made according to experts view.

The tool was consist of two sections:

- Section I: Demographic variables of preterm infants.
- Section II: Modified Early Feeding Skills Scale to assess the levels of feeding skills.

Before commencing data collection, the written permission was obtained from Ankur kids hospital and Life line hospital surgeon and SMO of concerned hospitals and informed consent was obtained from parents of preterm infants. Purposive sampling technique was used to select 40 preterm infants, 20 in each experimental and control group from Ankur kids hospital, Jalandhar and Life line hospital, Jalandhar. In experimental group, manual peri and intra-oral stimulation for 3 mins and 2 mins sucking on pacifier was given twice a day among preterm infants. During this care, oral feeding skills were assessed for engagement of feeding, oral-motor functioning, ability to coordinate swallowing and maintain physiologic stability with the help of modified EFS

scale. Analysis and interpretation of data was done in accordance with the objectives of study by calculating frequency, percentage, mean, standard deviation, t-test and chi-square to describe the findings of the study.

The results revealed that the difference between mean score of oral feeding skills in experimental group as compared to control group is significant at  $p < 0.001$  level. Thus provision of prefeeding oral stimulation program for four days was an effective measure for improving the oral feeding skills of preterm infants.

### Limitations

1. The study was conducted on a small sample i.e. 40; hence it is difficult to generalize the findings.
2. Purposive sampling technique was used to select sample from selected hospitals, which restricts the generalization of the study to the different settings.
3. The researcher was not able to check the prolonged effect of oral feeding skills because of time constraint.

### Conclusion

Based on the findings of present study, the investigator found that the prefeeding oral stimulation program helps in improving oral feeding skills among preterm infants. As it is simple, non-invasive and easily performed method, thus can be used by health care professionals and care takers of baby. So we need to motivate them regarding prefeeding oral stimulation program on oral feeding skills, so we need to motivate and create awareness among them regarding the effective use of this therapy.

### Implications

The findings of the study have several implications in nursing education, nursing practice, nursing administration and nursing research.

### Nursing Education

- The findings of the present research can be presented in seminars, workshops and conferences organized in nursing institutions to improve knowledge of nursing students regarding peri or intra-oral stimulation on levels of feeding skills.
- The study can be helpful in nursing curriculum to provide opportunities for students to improve their knowledge regarding technique and benefits of oral feeding stimulation with manual peri or intra-oral stimulation or pacifier sucking among preterm infants with levels of feeding skills.
- This study will help to bring focus towards role of oral feeding stimulation in enhancing growth and development among preterm infants.

- The nursing students should create awareness among parents of preterm infants regarding benefits of prefeeding oral stimulation program on oral feeding skills among preterm infants through formal and informal health teaching.

### **Nursing practice**

- Pediatricians, pediatric health nurses and other health professionals can be made aware about the technique and benefits of prefeeding oral stimulation program on oral feeding skills among preterm infants.
- Pediatric nurse can conduct further research on same topic to explore various other benefits which the present researcher could not identify because of certain limitations.
- Nursing personnel should utilize the findings of the study to impart health education to mothers regarding benefits and technique of prefeeding oral stimulation program on oral feeding skills among preterm infants.

### **Nursing administration**

- Nursing administrator should plan and provide in service education to the nurses regarding effects of prefeeding oral stimulation program on oral feeding skills among preterm infants.
- Nursing administrator should make the hospital policy to provide manual intra and peri-oral stimulation and sucking on pacifier to preterm infants.
- Nursing administrator at institution level should evaluate knowledge of nurses regarding technique and benefits of manual intra-oral stimulation and sucking on pacifier to preterm infants.

### **Nursing research**

- The same study can be replicated and the data can be used to disseminate this knowledge to large population.
- The research methodology, tool and findings of the study should be added to nursing literature which may serve as referral material for the students.
- Evidence based nursing practice must be taken in order to increase the knowledge about non pharmacological interventions in oral feeding skills.

### **Recommendations**

1. A similar study can be replicated on a large sample to validate and generalize findings.
2. A similar study can be conducted in different target population in different settings.
3. A randomized controlled trial study can be conducted on large sample for longer duration to check the prolonged effect of manual intra or peri oral stimulation.

4. An experimental study can be conducted to evaluate the effect of prefeeding oral stimulation program on oral feeding skills among preterm infants.

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