

# Preterm Infant Oral Motor Intervention (PIOMI) on Feeding Progression, Length of Stay and Gain in Weight: A Systematic Review and Meta-Analysis

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**Abstract:** Preterm infants face difficulty in adjusting to extra uterine life due to weak and immature organ system. Newborn reflexes such as sucking and rooting are essential for a baby to begin oral feeding. Failure to develop essential reflexes in time leads to dehydration and failure to thrive especially in case of preterm birth. New oral motor exercise called Preterm Infant Oral Motor Intervention (PIOMI) has proven to be efficient in improving feeding abilities in preterm infants. This review is planned to measure the efficacy of intervention among inpatient preterm infants. The systematic review and meta-analysis has been carried out by following PRISMA guidelines. The review was carried out by utilizing literature search database like PubMed, Embase, Cochrane and Academia from 2010 till 2023. All Randomised control and clinical trials were included. Out of 223 studies reviewed, nine studies were included in Meta-analysis with 474 preterm infants as study samples. The PIOMI has been found to be effective in attaining oral feeding progression, reducing length of hospital stay and weight gain among preterm infants. This review highlights that the PIOMI is effective in accelerating oral feeding reducing hospital stay and improving the weight among preterm infants. This review also recommends adopting PIOMI as standard best practice for oral motor therapy for preterm infants as early as 29 weeks gestational age and continuing until full oral feedings are reached.

**Keywords:** Breast feeding, Length of hospital stay, Oral feeding, Oral stimulation, PIOMI, Preterm infants, Transition time, Weight gain.

## I. INTRODUCTION

Preterm babies are those babies born before gestational age of 37 weeks whereas babies taking birth with weight > 2500 gms are termed as low birth weight (LBW) babies. As per World health organization the preterm babies are classified as extremely preterm baby (G.A >28 weeks), very preterm

baby (28 to >32 weeks), moderate to late preterm (32 to 37 weeks). The factors associated with preterm birth are either due to spontaneous birth or medical indication of early delivery (caesarean or normal). Long term complications like diabetes, high BP are among the causes of preterm birth [1].

In a developing country like India, preterm birth is second most common factor for mortality in under-five children. In low-income countries, the factors include absence of accessible, cost-effective care such as provision of warmth, exclusive breast feeding and infections. On the contrary, babies survive through in high income countries [2].

The goals as set by Government of India are to decrease the mortality due to preventable diseases especially in children and newborn under-five years by 2030. Additionally, to lower the mortality rates among neonates and under-5 children to 12 deaths /1000 live births (at least) and 25 deaths per 1000 live births (at least) respectively [3].

Premature newborns have immature organ system which leads to difficulty in adjustment during extra uterine life. Certain reflexes such as sucking and swallowing reflex play a crucial role in preparing a newborn baby for oral feeding [4]. If the sucking reflex is not achieved during infancy the baby will have delayed direct feeding causing dehydration and low birth weight eventually failure to thrive. When feeding is delayed, the baby will have to suffer due to prolonged hospitalization, poor mother-baby bonding or serious feeding issues later in life [5].

For a preterm infant shifting from tube or gavage feeding to oral feeding can be a challenging task due to weak oral musculature. Oral feeding problems are commonly faced by 30-40% of preterm babies [6].

For term infants and adults with developmental delays and feeding issues 15- minute Beckman Oral Motor Intervention (BOMI) was designed. However, to better accommodate the small oral structure of preterm infant as well as the limited time

for tolerance of stimulation, Lessen developed a 5 minute novel intervention termed as Preterm Infant Oral Motor Intervention (PIOMI) was designed to elicit the structures in and around the mouth of preterm infant for successful oral feeding. The PIOMI is a much shorter and simpler version of BOMI and has been shown to decrease hospital stay and reduce time of feedings to progress from tube feeding to full paladai feedings [7-8].

Feeding per orally is a coordinated breathing in collaboration with sucking and swallowing movements as well as total motor stability with external sensory inputs. The oral motor exercise enhances the exclusive breastfeeding rate in neonates by improving oral motor musculature and neuro behavioural organization [9]. The effective feeding either by breast or paladai requires the swallowing coordination between lips, palate, tongue, jaw, upper trunk, pharynx, and respiratory systems. As per review, the therapy is effective when started between 29 to 33 weeks post-menstrual age (PMA) to provide complete transition from tube feeding to breast feeding from 8-13 days as compared to 13-26 days without therapy [10].

Literature revealed that the earliest age of initiating oral stimulation therapy safely is from gestation 29 weeks so that earlier therapy can yield a stronger benefit to subsequent feeding skill development [11]. The therapy should be continued for at least 7 days and ideally until the infant reaches complete transition from tube feeding to breast feeding [12]. The effective feeding either by breast or paladai requires the swallowing coordination between jaw, lips, tongue, palate, pharynx, upper trunk and respiratory systems [13].

PIOMI is a standardized protocol for oral stimulation for the premature infant. It is designed to help preterm newborns to improve their oral eating abilities. Due to preterm infants limited mouth stretching and tolerance of outside stress, it concentrates in and around the mouth especially over cheeks, lips, gums, tongue, chin, as well as palate. After training, healthcare providers such as doctors, nursing staff, therapists and parents can easily provide PIOMI [9]. No complication associated with the intervention has been reported [7-8, 14].

As per the studies published, the babies who received oral stimulation starting at 29-33 weeks post menstrual age have significantly improved coordination with sucking, feeding skills as well as oral motor function [15]. Simultaneously, these babies have reduced incidences of difficulty in feeding. There are numerous investigations that have been carried out to assess the efficiency of PIOMI with other stimulation therapies in terms of high oral intake, shorter transition times for full feeding per orally and shorter in patient stays [16].

## II. OBJECTIVE

To determine the effectiveness of the Preterm Infant Oral Motor Intervention on feeding progression, length of stay and weight gain among preterm infants.

## III. MATERIAL AND METHODS

The research approach used for the present study was systematic review and meta-analysis. Research design included Systematic Review and Meta-analysis as per PRISMA statement for conducting the literature review. PRISMA2009 checklist guided the systematic review by providing an evidence based set of items for collecting and reporting.

### A. Criteria for Eligibility

Following steps were adopted while searching literature review including only English language research articles from 2010 till 2023.

- Search databases like Pubmed, Embase, Cochrane and Academia were scrutinized for keywords such as “preterm infant oral motor intervention”, “Oral Stimulation”, “Multi-Sensory Stimulation”, “Oral Massage”, “Preterm Infants”, “Low Birth Weight Baby”. PICO guidelines utilized as follows:

P - Preterm infants.

I - Preterm Infant Oral Motor Intervention (PIOMI).

C - Routine Nursing care including Kangaroo mother care.

O - Benefits for the baby such as improved oral motor coordination, weight gain, successful breast feeding, reduced hospital stay and cost effective. All the abstracts and titles retrieved from literature are searched with appropriate keywords.

- Further search using additional keywords was done through major search engines like Cochrane library, Ovid, Scopus, Science Direct, CINAHL and Medline.

The criteria used to identify studies for this review are mentioned below:

- Only Peer review journals are scrutinized for research articles.
- Accessible research articles from e-databases are searched.
- *Study Design:* Only randomized control trails are used in this review.
- *Intervention:* Implementation of the Preterm Infant Oral Motor Intervention (PIOMI) on clinically stable hospitalized preterm infants.
- *Setting:* Newborn nurseries and Neonatal intensive care units
- *Outcomes:* Effectiveness of PIOMI in terms of physiological stability (gain in weight or improvement in oral feeding) as well as reduction of hospitalization among preterm infants.
- *Language:* Only research article published in English language are included.

- **Inclusion Criteria:** All the studies that have used terms like PIOMI or oral motor stimulation among preterm infants are included. Screening of relevant studies are done as per JBI guidelines [17].
- **Exclusion Criteria:** Any abstract from conference proceedings, grey literature or content from book are excluded.

**B. Search Strategy**

**Pubmed:** (PIOMI) OR (physiological stability) AND (length of hospital stay), Randomized control trials results only: Research articles from Year; 2010-2023.

**Science Direct Databases:** PIOMI OR oral stimulation AND premature infants AND weight gain AND hospital length AND {randomized control trials} Filters: Original research articles from Year; 2010-2023.

**Selection Process:** As per the applicability of review during the screening process all the titles as well as abstracts were

searched with the help of two reviewers (AA and PK). The completeness of available content was reviewed following eligibility guidelines. After independent assessment of abstract as well as full texts any disagreements were resolved after third (DRP) reviewer’s consultation.

SR and MA was carried out following PRISMA guidelines, [18] (Fig. 1) covering studies from 2010 to 2023. Various published and unpublished researches were searched (English only) until October 2023. The review question was structured using the PICO framework. The PICO strategy guided the comprehensive search, employing keywords like “PIOMI”, “oral motor stimulation”, “gum massage”, “preterm babies”, “physiological stability”, “feeding progression”, and “length of hospital stay”. Headings and abstracts were screened for relevancy as well as duplicate trials were removed using Zotero software. Two independent searches ensured thorough examination of abstracts meeting inclusion criteria, followed screening of full-text article.

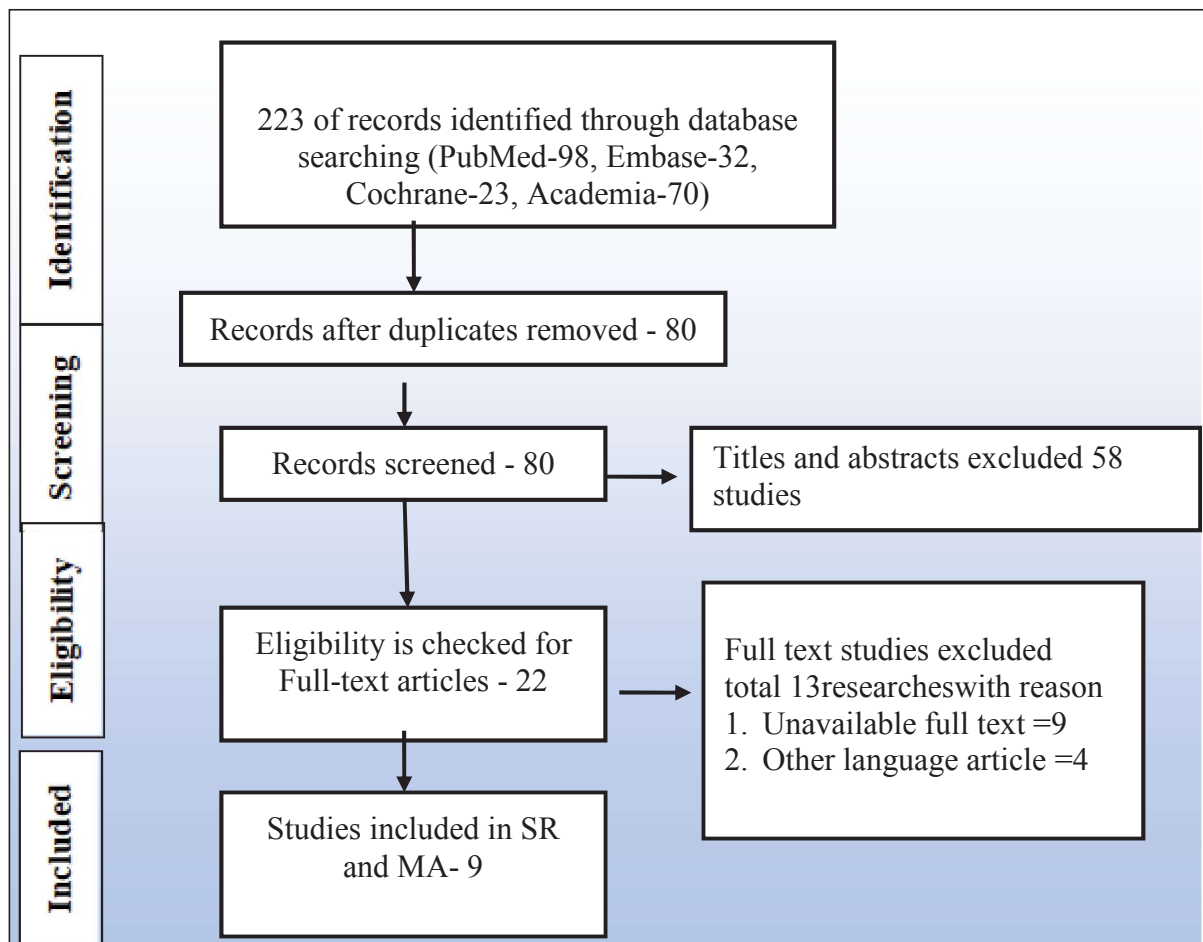


Fig. 1: PRISMA Flow Diagram Showing Study Selection Process

All authors collected predefined outcome data from the studies, focusing on study characteristics. Successful progression to oral feed was taken as primary outcome as well as gain in weight where as reduction in hospital stays served as a secondary outcome. Data extraction involved removing duplicates and independent work by all authors, with any discrepancies resolved systematically with the inputs of authors. The characteristics of study are tabulated to help in extraction of data effectively. Two reviewers (AA and PK) initially analysed the data, with a third author (DRPT) assisting in resolving any discrepancies. Information related to first author, publication year, country, sample size, population characteristics (post menstrual birth age, weight, gender), intervention details (time of stimulation, frequency and total duration of stimulation), outcomes (length of hospital stay, feeding through breast or oral, improvement in weight, amount of feed taken orally). If any missing data was found, that was reverted to original author for clarification. Checklist as uploaded by Cochrane was utilised for quality assessment for studies included in this review [19].

The seven domains included random sequence, blinding of participants, allocation concealment. Two reviewers (AA and PK) assessed all included studies for risk of bias under domains of random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessors, incomplete outcome data, selective reporting, and other biases. Using the Cochrane Collaboration approach, each study was categorised as low, high, or unclear risk in each domain. Studies with low risk across all domains were considered good quality, and vice versa. In cases of disagreement, 3<sup>rd</sup> and 4<sup>th</sup> reviewers (RSK and DRPT) scrutinized with conclusions to reach to a mutual consensus.

### C. Outcome of the Search

The study measure included the trials with efficacy of PIOMI

on stay at hospital, feeding progression and gain in weight in preterm infants was segregated with control group who only received routine hospital care. Meta analysis was done using randomized control trials in RevMan v5.4 software [20].

## IV. ETHICAL CONSIDERATION

The systematic review and meta-analysis was registered with PROSPERO with ID- CRD42023443584. Any nonsignificant results were also mentioned without bias.

## V. RESULTS

### A. Study Risk of Bias Assessment and Effect Measures

Cochrane bias assessment tool was utilized for selection of quality studies to be included. It was evaluated by two independent authors (AS and PK) (Table I) [19]. In this present study, Random sequence generation was adequately analysed in six studies [6, 9, 23, 25, 16, 10] while three studies [22, 12, 24] had a high risk due to unclear random selection. Allocation concealment was low risk in four studies [6-7, 16, 25] unclear in two [9, 24] and high risk in three [22, 19, 23]. Participant and personnel blinding were implemented in three studies [9, 7, 25] and unclear in three [6, 23-24] and high risk in one [22]. Blinding of outcome assessment is done six studies [6-7, 9, 24-25, 16] with unclear status in two [12, 22-23] reported as high risk. Low risk was found in all 9 researches for biasness of incomplete outcome data. Eight studies had low risk for selective reporting bias, with one study having unclear reporting [6]. In other biases, eight studies were low risk, while one study had unclear risk [23]. Other details regarding percentages of risk of bias across the trial are mentioned in Fig. 2.

TABLE I: RISK OF BIAS ASSESSMENT FOR ALL THE STUDIES

Sr: No	Studies	Selection Bias	Selection Bias	Performance Bias	Detection Bias	Attrition Bias	Reporting Bias	Other Bias
1	Arora <i>et al.</i> , 2018	+	+	?	+	+	?	+
2	Ghomi <i>et al.</i> , 2019	+	?	+	+	+	+	+
3	Huang <i>et al.</i> , 2023	-	-	-	-	+	+	+
4	Lessen, 2011	+	+	+	+	+	+	+
5	Lessen <i>et al.</i> , 2019	-	-	?	?	+	+	+
6	Mahmoodi <i>et al.</i> , 2019	+	-	?	?	+	+	?
7	Osman <i>et al.</i> , 2016	-	?	?	+	+	+	+
8	Shokri <i>et al.</i> , 2022	+	+	+	+	+	+	+
9	Thakkar <i>et al.</i> , 2018	+	+	+	+	+	+	+

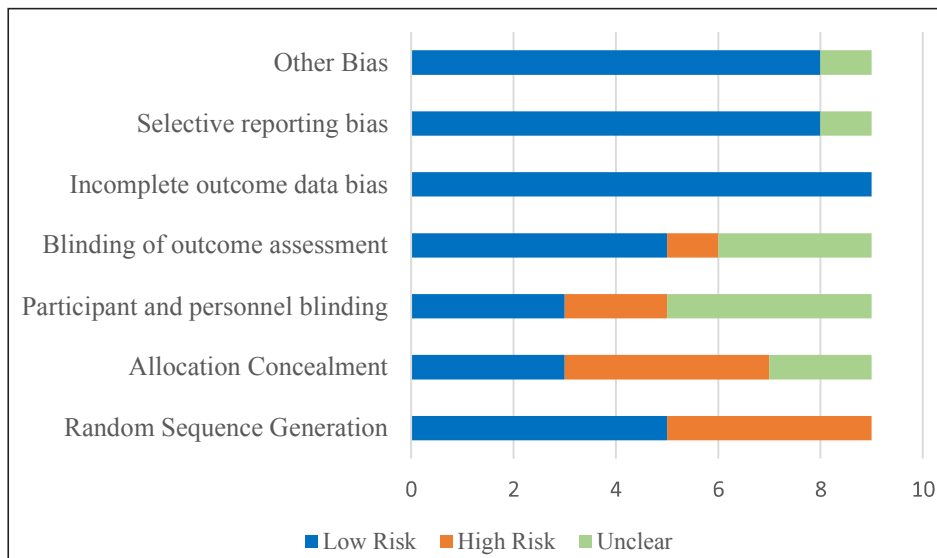


Fig. 2: Graphical Representation of Assessment of Risk of Bias

*B. Characteristics of Studies Included*

Several researches have been published with the aim of determining efficacy of oral stimulation on premature infants of varying gestational ages (Table II). One study focused on infants born between 28-32 weeks administering oral stimulation starting at 32 weeks twice a day for 7 days, using the Neonatal Oro motor Assessment Scale to assess outcomes such as independent oral feeding, duration of stay in hospital and gain in weight [6]. Another study studied preterm infants within 26-29 weeks GA, providing intervention starting at

29 weeks one time in a day for 10 days, utilizing the Preterm Oral Feeding Readiness Assessment Scale (POFRAS) to measure gain in weight and duration of hospitalization [9]. Additionally, one more study included infants born at 30 and 32 weeks, administering oral stimulation once a day for 7 days, also employing POFRAS to evaluate postmenstrual age and body weight [22]. Other studies focused on infants with similar gestational age group, employing different intervention durations and assessment scales and found improvement [7, 23].

TABLE II: CHARACTERISTICS OF INCLUDED STUDIES

Sr. No.	Author	Gestational Age (G.A) at Birth	G.A When PIOMI Started	Duration of the Intervention	Assessment Scales Used	Sample Size of Preterm Infants	Primary Outcome
1	Arora <i>et al.</i> (2018) [6]	28-32 weeks	32 weeks	Three times a day for 7 days	Neonatal Oro motor Assessment Scale (NOMAS)	76	Independent feeding through spoon or wati, length of stay and gain in weight after intervention.
2	Ghomi <i>et al.</i> (2019) [9]	26-29 weeks	29 weeks	Once/day for 10 days daily	POFRAS	33	Feeding progression days 1, 4 and 8 Gain in weight and length of stay, weight gain.
3	Huang <i>et al.</i> (2024) [22]	25-32 weeks	29-32 weeks	Once/ day for 7 days	POFRAS	46	Feeding readiness days 1, 3 and 7 and weight gain.
4	Lessen (2011) [7]	26-29 weeks	33 weeks	Once / day for 7 days	Successful oral feeding is measured as taking complete 8 oral feedings 8 times/ bottle/ day for 48 hours.	19	feeding progression and Length of stay.

Sr. No.	Author	Gestational Age (G.A) at Birth	G.A When PIOMI Started	Duration of the Intervention	Assessment Scales Used	Sample Size of Preterm Infants	Primary Outcome
5	Lessen <i>et al.</i> (2019) [10]	26-34 weeks	33 weeks	once daily for 7 consecutive days	Feeding progression measured by total intake of (ml/kg/feed) and rate of milk transfer (ml/min).	30	Feeding progression days 1, 3 and 5.
6	Mahmoodi <i>et al.</i> (2019) [23]	28-32 weeks	29-32 weeks	5-minute oral stimulations for 7 days	POFRAS	40	Feeding readiness, feeding progression, length of stay.
7	Osman <i>et al.</i> (2016) [24]	30 to $\leq$ 32 weeks	30-32 weeks	Once / day for 7 days daily (low dose) OR until full feedings (high dose)	Feeding progression measured by total volume consumed (ml/kg/feed) and rate of feed (ml/min).	75	Feeding progression and length of stay.
8	Shokri <i>et al.</i> (2023) [25]	26-30 weeks	30 weeks	once a day for 10 days	POFRAS	52	Feeding readiness, feeding progression, length of stay, weight gain.
9	Thakkar <i>et al.</i> (2018) [16]	30-34 weeks gestation	33 weeks	twice in a day for 5 days when feedings started and 5 throughout feeding progression	Feeding progression as measured by amount of feed taken (ml/kg/feed) and rate of milk transfer (ml/min).	102	Feeding progression, length of stay, weight gain.

In feeding and reduced number of days at hospital, Osman *et al.* (2016) did a dose response study on babies born 30- 32 weeks comparing 7 days of PIOMI versus performing PIOMI till full oral feeding and found the longer days of PIOMI reduced time to achieve full feeding and reduced length of hospital. One research study investigated infants born between 26-30 weeks, administering oral stimulation at 30 weeks once a day for 10 days and included music therapy in the last 2 minutes of non-nutritive sucking using POFRAS to measure weight gain, feeding progression, milk volume, and length of hospitalization [25].

## B. Effectiveness of Intervention

### i. Feeding Progression

In 8 out of 9 studies involving 369 premature infants, a reduction in time to achieve complete an assisted oral feeds was observed [6-7, 9, 16, 22-26]. The research studies have showed that after PIOMI experimental groups had early

transition either to spoon wati feeding or from first oral feed to total oral feedings. The forest plot in Fig. 3 shows that the PIOMI intervention group had early feeding progression (MD = -0.95; 95% CI: -1.20 - -0.70,  $I^2 = 96\%$ , p value < 0.00001) showing statistical significance, utilizing a fixed-effect model due to meta-regression limitations. Arora *et al.* (2018) reported full study group after intervention reached independent spoon feeding earlier than control group (MD = 3.74; 95% CI: 1.03-6.45) Meta-analysis findings on oral feeding consistency were consistent across studies. Results generated from meta-analysis is found to be consistent with a review by Muñoz-Gómez *et al.* (2024) reported unimodal sensor motor stimulation which are based on manual oral stimulation in combination with non-nutritive sucking is more effective in reducing transition time to full oral feeding (MD = -1.08; 95% CI: 1.74-0.41) as compared to routine care. Bandyopadhyay *et al.* (2023) also showed successful transition from gavage feed to full spoon feed earlier (MD = -6.5; 95% CI: -12.58 - -0.41) when compared to control groups.

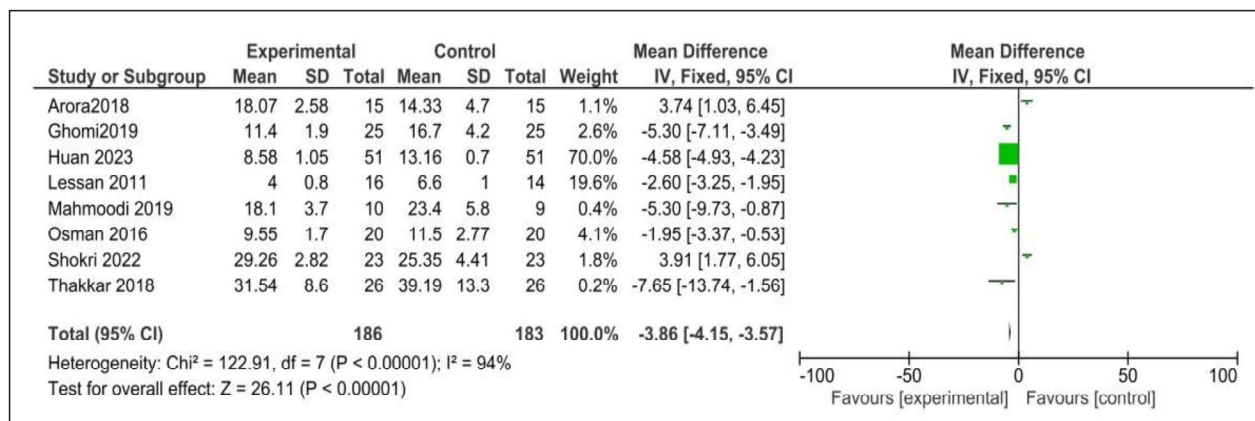


Fig. 3: Effectiveness of PIOMI on Feeding Progression Compared with Routine Care

ii. Gain in Weight

Five research articles [9, 12, 16, 22, 25] reported increment in weight parameter within experimental group after intervention. On the contrary, research studies [6, 23-24] were not clear with weight gain in experimental groups after intervention. That is the reason for not including these studies in MA for gain in weight parameter. Remaining five studies are included in MA with 252 participants [7, 9, 16, 22, 25]. Results indicates a significantly higher mean weight for the PIOMI group versus the control, with a MD = 38.57 (95% CI: 9.06 - 68.08, p = 0.01) (Fig. 4). However, caution is advised due to moderate

heterogeneity between the researches (I<sup>2</sup> = 68%). A fixed-effects model was utilised measure overall size of effect, assuming consistent effect sizes across studies despite this heterogeneity. Our results are supported by review (Jyoti *et al.*, 2023) with MD = 51.61 (95% confidence Interval: 19.84 - 83.38 at I<sup>2</sup> = 0% and p value = 0.001) revealed significant gain in weight among experimental groups. Contrary to previous review, Tian Xu *et al.* (2015) revealed that no significant mean difference (MD = -17.54 (95% CI: -151.34 - 116.26, I<sup>2</sup> = 88%, p = 0.80) in weight gain after intervention.

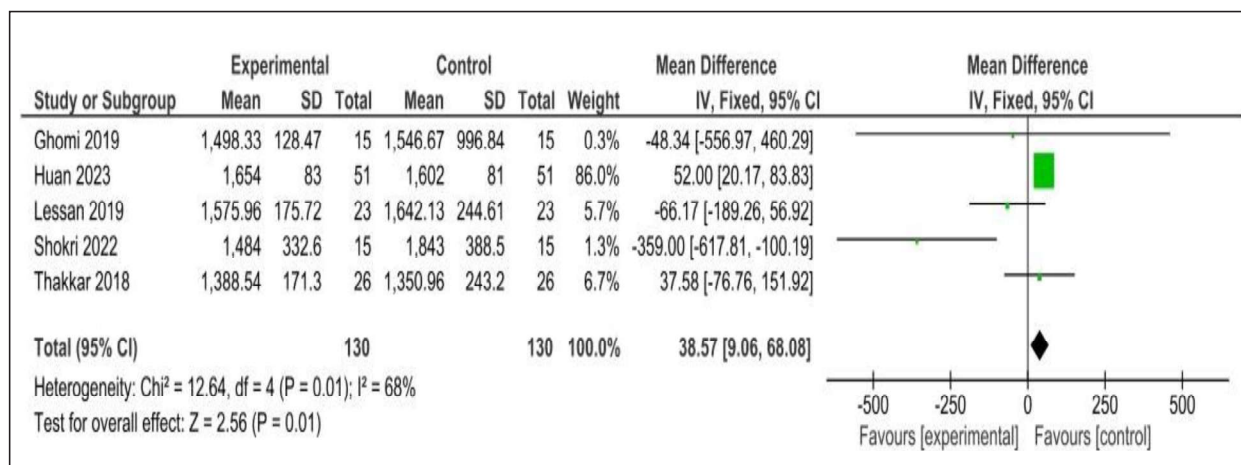


Fig. 4: Effectiveness of PIOMI on Gain in Weight Compared with Routine Care

iii. Length of Stay (LOS)

Regarding the hospital stay, six studies with 322 participants have shown decrease in LOS after receiving PIOMI when compared with non-recipient of intervention (MD = -2.85, CI = 3.96 to -2.00; I<sup>2</sup> = 0%, p < 0.00001) (Fig. 5) which was found to be statistically significant [6-7, 9, 16, 23, 25]. Other 2 studies [6, 22] found positive effects of PIOMI intervention in reducing length of stay in hospital (2.09 and 4.8 days earlier

respectively) as compared with control groups. The current findings align with previous reviews. These findings were found to be consistent with a review Greene *et al.* (2016) concluded with a mean difference (MD) of -5.26 (95% CI: -7.34 to -3.19, I<sup>2</sup> = 61%, p value < 0.001), while another article Muñoz-Gómez *et al.* (2024) revealed an MD of -0.35 (95% CI: -0.68, -0.03, I<sup>2</sup> = 21%, p = 0.0002), both indicating a significant decrease in length of stay.

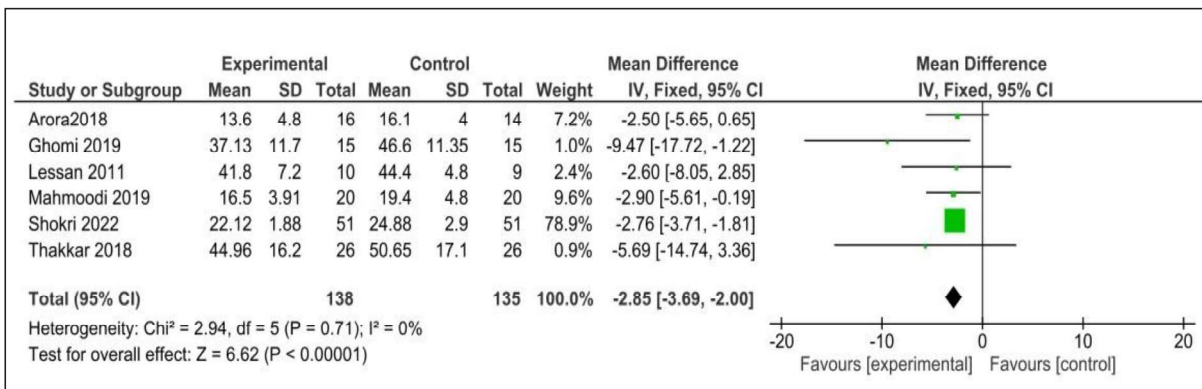


Fig. 5: Effectiveness of PIOMI on Length of Hospital Stay Compared with Routine Care

Administering the oral stimulation deemed quite beneficial in promoting preparedness for feeding per orally. Literature postulated that the steps of oral stimulation are more simpler and shorter, reducing stress on premature infants. This aligns with the principle of minimizing stress and handling for preterm baby care. While stimulation is necessary, it must adhere to the care principles for premature infants.

## VI. DISCUSSION

The major milestone for a preterm infant is to achieve full oral feeding from NG feeding independently. This is considered as main criterion for discharge from hospital. Delays in oral feeding by preterm infants extends hospital stays and poses great emotional and financial strains on families and society. Preterm infants must acquire oral feeding skills for development of adequate health. Various types of oral stimulations are provided for preterm infants in NICUs. The strategies adopted, time frame, gestational age of providing these stimulation may varies [24, 30]. But have shown improvement in POFRAS and NOMAS scores. This review is carried out specifically to assess the efficacy of one oral motor therapy for preterm infants called PIOMI as developed by Dr. Brenda Lessen (2011). This review included researches done on PIOMI till 2023 in English language only.

Meta-analysis of the included studies reveals that PIOMI intervention helps in early transition from NG feed to per orally, improving weight of preterm infant as well as significantly shortens length of stay (LOS) in hospital. None of the studies have shown signs of stress during PIOMI such as hiccups, nasal flaring, apnoea and bradycardia. This review underscores the clinical utility of PIOMI and proves that evidence based PIOMI can be successfully adopted for oral motor therapy among preterm infants overcoming the deficiencies present in routine care. The findings of MA was found to be consistent with individually published studies which found that PIOMI significantly improves feeding performance in experimental group [6-7, 9, 10-12, 16, 21-28, 30].

Despite comprehensive searching and inclusive selection criteria, the possibility of overlooking published papers remains. Limiting inclusion to English-language literature may introduce biasness in selection process. Resource limitations hindered separate abstract-level screening, potentially impacting study inclusion. There are three research articles out of nine that lacked sample size calculations. Although variation in PIOMI administration duration and frequency was observed across studies, ranging from once daily for 5 minutes to thrice daily, this variation in PIOMI frequency and duration across studies may enhance the generalizability of these findings, showing PIOMI is effective at different doses.

The meta-analysis provides a summary of the best evidence for oral motor therapy for healthy premature infants without comorbidities. Researchers advocate for larger sample for RCTs with rigorous scrutinization for supporting PIOMI in premature infants.

## VII. CONCLUSION

This systematic review and meta-analysis concluded that health care practitioners or even parents can utilize oral stimulation technique as an early intervention strategy to help premature infants establish independent oral feedings. One such oral stimulation, Preterm Infant Oral Motor Intervention (PIOMI) has significantly helped in preparing the premature baby for oral feeding.

### *Implications for Practice*

These studies suggest that PIOMI intervention may expedite preterm infants' attainment of exclusive oral feeding, shorten hospital stays, and reduce reliance on parenteral nutrition. These findings are derived from studies of moderate to high quality highlight the potential benefits of implementing PIOMI as standard practice. Additionally, more studies are required to implement nursing care process including PIOMI as a standard care practice for premature newborn babies.

### Implication for Research

Additional studies on PIOMI outcomes are needed. The timing of the interventions should be clearly mentioned, including not only gestational age at birth, but also at what gestational age PIOMI was started. Studies should measure clinically relevant outcomes beyond discharge, enrol larger samples, use robust randomization and allocation concealment methods, blind caregivers when feasible, ensure outcome assessors are blinded, and expand to measure neurological assessments into early childhood. Standardizing methods for assessing sucking and feeding and adopting uniform terminology can enhance comparability and clinical relevance across studies. Parents providing PIOMI should also continue to be studied for both infant and parental outcomes. Additionally, new arms of PIOMI research have begun to focus on using higher risk infants in the sample, and also longer term follow up studies assessing neuro developmental outcomes after discharge into childhood in domains far beyond feeding. These studies may significantly expand the eligible population to receive PIOMI. Because PIOMI significantly reduces the costly length of stay and does not require purchase of equipment, more cost-benefit analysis should be performed to reveal the degree of reduction in economic burden in various countries.

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Nil

### CONFLICTS OF INTEREST

Nothing to declare.

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