

REVIEW ARTICLE OPEN ACCESS

Effectiveness of Oral Feeding Methods in Preterm Infants: A Systematic Review of the Literature

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ABSTRACT

Background: The autonomy of the preterm infant depends not only on the total daily intake over 24 h but also on the absence of hemodynamic instability, however subtle, and on the lack of signs of neurobehavioral stress. Feeding autonomy, combined with adequate and consistent weight gain, is a criterion for hospital discharge. As a nursing intervention, oral feeding requires responsible decision-making and the selection of the most appropriate feeding method to ensure adequate nutrition. Therefore, it is essential to understand how oral feeding methods promote feeding autonomy and consistent weight gain.

Objective: To analyze the effectiveness of oral feeding methods in acquiring feeding autonomy and consistent weight gain in preterm infants admitted to the neonatology unit.

Methods: PRISMA-P guidelines were followed. A three-stage search strategy was carried out, supported by MEDLINE, CINAHL, Cochrane Central Register of Controlled Trials, and MedicLatina electronic databases via the EBSCO platform; electronic databases SciELO and Scopus; and platforms Wiley Online Library, ScienceDirect, and PubMed, from 2015 to 2025. Quality of the included studies was assessed using standardized critical appraisal instruments from the Joanna Briggs Institute. The inclusion criteria for this systematic literature review followed the PICO framework. Eligible studies focused on feeding method interventions in preterm infants. Data extraction was independently performed by reviewers.

Results: Six articles were included, 5 were randomized trials, and 1 was a cohort study. The most frequently studied feeding method was cup feeding ($n = 6$), followed by finger feeding ($n = 4$).

Conclusions: The results of the different studies were inconsistent, showing significant variations and, in some cases, contradictory conclusions about the ideal method for transitioning to full oral feeding. It is therefore essential to consider the factors that influence the effectiveness of feeding methods, namely, oral motor skills, hemodynamic stability, complications that occur during feeding, and the nurse's own experience.

1 | Background

This review's relevance arises from growing concern about nutritional management in preterm infants. Some authors acknowledge

its influence on survival, growth, and development. Acquisition of oromotor skills is recognized as one of the milestones in preterm infant development [1], as these skills enable safe, functional, and pleasurable feeding for both preterm infants and their parents.

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Approximately 30% of preterm infants admitted to neonatal units experience difficulties with oral feeding [2]. These difficulties should be targeted by the nursing team, as they can interfere with the acquisition of feeding autonomy, prolonged hospitalization, and have long-term consequences, such as childhood eating disorders [2]. Prolonged hospitalization is also associated with weaker parent-child relationships, parental bereavement, and a sense of inadequacy [3].

Feeding autonomy in a preterm infant means the ability to achieve adequate oral intake over 24 h [4] without signs of hemodynamic instability or neurobehavioral stress. Feeding autonomy, combined with adequate and consistent weight gain, is a criterion for hospital discharge [1] as recommended by the American Academy of Pediatrics.

As a nursing intervention, oral feeding requires careful in decision-making, particularly in selecting the most appropriate oral feeding method for adequate nutrition, which is essential for the growth and development of the preterm infant.

The choice of the oral feeding method should consider factors such as the mother's intention to breastfeed, corrected age, weight, and the preterm's feeding readiness behavior, among other variables that may interfere with feeding performance.

If the chosen feeding method is not suited to the oromotor skills of the preterm infant, it may lead to increased energy expenditure during feeding, signs of neurobehavioral stress, or increased respiratory effort [5].

Experts consider breastfeeding and breastmilk the gold standard for nutrition for preterm infants [6]. However, when the mother cannot breastfeed, there is a lack of consensus on the most suitable oral feeding method to support the development of oromotor skills. In clinical practice, the selection of oral feeding methods often relies on nurses' opinions and personal beliefs [7] rather than on scientific evidence [5]. This can result in the use of different feeding methods throughout a 24-h period, which may impact the development of oral motor skills in preterm infants, not only delaying the transition to full oral feeding but also causing parents stress.

Understanding how feeding methods can positively influence the development of feeding skills, autonomy, and consistent weight gain is therefore essential. Standardizing nursing interventions around oral feeding should therefore be achieved. This systematic literature review's objective is to analyze the effectiveness of oral feeding methods in acquiring feeding autonomy and consistent weight gain in preterm infants admitted to the neonatology unit.

A preliminary search of PROSPERO, PubMed, Cochrane Database of Systematic Reviews, and *JB I Evidence Synthesis* was conducted, and no current or in-progress systematic reviews on this topic were identified.

2 | Methods

This systematic literature review was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under ID CRD42020168690. The PRISMA-P guidelines were followed during its preparation [8].

The inclusion criteria for this systematic literature review followed the PICO framework (population, intervention, comparison, and outcomes) and study types.

2.1 | Participants

The World Health Organization (WHO) defines preterm birth as all live births before 37 weeks of gestation, regardless of birth weight [9].

This review includes studies involving hemodynamically stable preterm infants. It excludes infants with central nervous system and orofacial malformations, intraventricular hemorrhages greater than Grade I, chromosomal disorders, and bronchopulmonary dysplasia admitted to the neonatal unit.

Participants included are those with gestational or corrected age greater than 31 weeks and 6 days and less than 37 weeks, who are being fed by one of the oral feeding methods.

2.2 | Interventions

Oral feeding methods refer to how oral feeding is offered to preterm infants to develop their feeding skills [5]. These methods should be applied to preterm infants during their stay in the neonatology unit until they achieve feeding autonomy.

This review considers studies that evaluate preterm infants' oral feeding methods and interventions. The most used methods are bottle feeding, cup feeding, and finger feeding [10]. Therefore, this review will focus on these methods.

Articles that reference only the use of a spoon, syringe, or feeding nozzle were not included, as these are recommended only for full-term or late preterm infants with good sucking-swallowing coordination [11].

2.3 | Comparator(s)

This review will consider studies that compare oral feeding methods.

2.4 | Outcomes

This review will consider studies that include the following outcomes.

2.5 | Primary Outcomes

Feeding autonomy and weight gain are key outcomes for evaluating the effectiveness of oral feeding methods.

Feeding autonomy serves as an indicator of the preterm infant's maturity and overall health [1]. To achieve independence, the preterm must not only consume the prescribed daily volume of milk orally over 24 h [4] but also show no signs of hemodynamic instability, even subtle ones, or neurobehavioral stress.

Weight gain is also one of the leading indicators of successful oral feeding [1]. It will be considered according to the rate at which it is achieved [5].

2.6 | Secondary Outcomes

Shorter hospital stays may result from the rapid acquisition of feeding autonomy and weight gain and will, therefore, be considered a secondary outcome.

Reducing the length of hospital stays decreases the financial costs of hospitalization. It will minimize preterm infants' exposure to the neonatal unit environment and, consequently, reduce its impact on their growth and development. It is also expected to reduce the risk of healthcare-associated infection. On a family level, it will bring social, psychological [5], and financial benefits [3].

2.7 | Types of Studies

This review will consider experimental and quasiexperimental study designs and cohort studies, including randomized and nonrandomized controlled trials, published between 2015 and 2025 in Portuguese, English, and Spanish.

2.8 | Search Strategy and Studies Identification

The research was divided into three distinct stages. An initial limited search of MEDLINE and CINAHL was undertaken to identify the text words contained in the titles and abstracts of relevant articles and the index terms used to describe them, which were used to develop a complete search strategy: ((Preterm OR "Infant, Premature" OR Premature OR Neonat*) AND ("Intensive Care Units, Neonatal" OR NICU OR "Neonatal Intensive Care Unit" OR "Intensive care, Neonatal" OR "Neonatal Unit") AND ("Feeding Methods" OR "Feeding Techniques" OR "Bottle Feeding" OR "Cup Feeding" OR "Finger-feeding") AND ("Full Oral Feeding" OR "Exclusively Oral Feeding") OR "Weight Gain" OR (Discharge OR "Patient Discharge" OR "Hospital Discharge"))).

The search strategy, including all identified keywords and index terms, was adapted for each included information source. The search was then conducted in MEDLINE, CINAHL, Cochrane Central Register of Controlled Trials, and MedicLatina electronic databases via the EBSCO platform and electronic databases SciELO and Scopus (Appendix I). In addition, search was then conducted publisher platforms Wiley Online Library platform, ScienceDirect and PubMed (Table 1).

Finally, in the third stage, the reference lists of the previously selected articles were searched for possible additional studies that might be relevant to increase the sensitivity of the research.

2.9 | Study Selection

Two reviewers independently selected, extracted, and coded the articles. If a study was deemed relevant by one reviewer but not the other, both reviewers justified their assessments. A third reviewer was not required. The research team evaluated methodological and evidence quality.

2.10 | Study Selection and Management

Following the search, all identified citations were selected and uploaded to Covidence, and duplicates were removed. After a pilot test, titles and abstracts were screened by two independent reviewers against the review's inclusion criteria.

Those considered relevant were selected for further reading.

Covidence was also used for title and abstract screening and full-text review.

2.11 | Data Extraction

For each study, extraction and coding were performed using an Excel form to better characterize them.

2.12 | Assessment of Methodological Quality

The reviewers critically appraised eligible studies for methodological quality using standardized critical appraisal instruments from the Joanna Briggs Institute [12] for experimental, quasiexperimental, and cohort studies.

The methodological quality of the included studies was assessed (Tables 2 and 3), and the following classification criteria were defined for randomized controlled trials: high quality with more than eight favorable items, moderate quality with more than five favorable items, and low quality with only 4 favorable items. For cohort studies, high quality was defined as more than six favorable items and moderate quality as more than 4.

Only high-quality studies were included in this systematic review.

3 | Results

After removing 83 duplicate articles, a total of 295 articles were eligible. After screening titles and abstracts, 15 articles met the eligibility criteria for full-text evaluation, of which seven were selected (Table 2). Figure 1 shows how PRISMA is constructed in Covidence. Covidence prioritizes references and presents them in a PRISMA flowchart. It checks for and removes duplicates, which are then reflected in PRISMA. As the review progresses, each phase is continuously updated in PRISMA.

After assessing the quality of the articles, six were included in the review (Table 4).

4 | Characteristics of the Included Articles

Most of the included studies were conducted in Asia ($n = 5$), with Iran contributing the most ($n = 3$), followed by Turkey ($n = 2$). In South America, one study was conducted in Brazil ($n = 1$).

Among the six included studies, 5 were randomized trials, and 1 was a cohort study. No quasiexperimental studies were included. Sample sizes ranged from 25 to 158 preterm infants, with gestational ages of 29 to < 37 weeks.

The most frequently studied feeding method as an intervention was cup feeding ($n = 6$), followed by finger feeding ($n = 4$) and bottle feeding ($n = 2$). Regarding primary outcomes, weight gain was analyzed in all included articles [13–18], while feeding autonomy was evaluated in two studies [13, 16]. The length of hospital stays, a secondary outcome, was examined in only one study [15, 16].

Four studies compared cup feeding with finger feeding, and the primary outcome, weight gain, was assessed [13–15, 18]. Of these, only one study made feeding autonomy the primary outcome [13].

Two studies compared cup and bottle feeding. In both, the primary outcome, weight gain, was assessed [16, 17], and in just one, feeding autonomy was assessed [16]. The secondary

TABLE 1 | Search strategy.

MEDLINE, CINAHL, Cochrane Central Register of Controlled Trials, MediciLatina	Wiley Online Library	PubMed	SciELO	Scopus	ScienceDirect
((Preterm OR "Infant, Pre-mature" OR Premature OR Neonat*) AND ("Intensive Care Units, Neonatal" OR NICU OR "Neonatal Intensive Care Unit" OR "Intensive care, Neonatal" OR "Neonatal Unit") AND ("Feeding Methods" OR "Cup Feeding" OR "Finger-feeding" OR "Full Oral Feeding" OR "Weight Gain" OR "Hospital Discharge" OR "Patient Discharge") AND ("Neonatal Intensive Care" OR "Neonatal Unit" OR NICU))	((("Preterm" OR "Prema-ture") AND ("Feeding Methods" OR "Bottle Feeding" OR "Cup Feed-ing" OR "Finger-feeding" AND ("Full Oral Feeding" OR "Weight Gain" OR "Hospital Discharge" OR "Patient Discharge") AND ("Neonatal Intensive Care" OR "Neonatal Unit" OR NICU))	((("Preterm" OR "Prema-ture") AND ("Feeding Methods" OR "Bottle Feeding" OR "Cup Feed-ing" OR "Finger-feeding" AND ("Full Oral Feeding" OR "Weight Gain" OR "Hospital Discharge" OR "Patient Discharge" OR "Neonatal Intensive Care" OR "Neonatal Unit" OR NICU))	(Preterm OR Infant, Pre-mature OR Premature OR Neonate) AND (Feeding Methods OR (Feeding Techniques OR Bottle Feeding OR Cup Feeding OR Finger-feed-ing) AND ((Full Oral Feeding OR Exclusively Feeding OR Exclusively Oral Feeding) OR (Dis-charge OR Patient Dis-charge OR Hospital Discharge)) AND (Neo-natal Intensive Care OR Neonatal Unit OR NICU)	(preterm OR premature OR neonate) AND ("Feeding Methods" OR "Bottle Feeding" OR "Cup Feed-ing" OR "Finger-feeding" AND ("Full Oral Feeding" OR "Exclusively Oral Feeding" OR "Weight Gain" OR discharge OR "Patient Discharge" OR "Hospital Discharge") AND ("Neonatal Intensive Care" OR "Neonatal Unit" OR NICU)	((("Preterm" OR "Prema-ture") AND ("Feeding Methods" OR "Bottle Feeding" OR "Cup Feed-ing" OR "Finger-feeding") AND ("Full Oral Feeding" OR ("Weight Gain") OR ("Hospital Discharge"))

TABLE 2 | Studies selected for assessment of methodological quality.

Article	Year	Journal	Author	Aim	Method	Intervention (feeding method)	Quality
Effect of cup, syringe, and finger feeding on time of oral feeding of preterm neonate's: a randomized controlled clinical trial [1]	2022	Journal of Health, Population and Nutrition	Shebilouysofla et al.	To evaluate the effect of cup-, syringe-, and finger-feeding methods on reaching the time of full oral feeding and weight gain among preterm neonates.	Randomized clinical trial.	Finger feeding, cup, and syringe.	High
Comparison of the finger-feeding versus cup feeding methods in the transition from gastric to oral feeding in preterm infants [2]	2017	Jornal de Pediatria	Moreira et al.	To assess the finger-feeding technique when compared with the cup-feeding method during the early stage of preterm infant feeding transition regarding milk loss, milk ingestion period, and complications.	Randomized, prospective study.	Cup and finger feeding.	High
The Effects of Cup Feeding and Finger Feeding Techniques on Weight Gain in Preterm Infants Admitted to the Neonatal Intensive Care Unit [3]	2022	MEDSURG Nursing Journal	Mirzaei et al.	This study aimed to compare the effects of cup-feeding and finger-feeding techniques on weight gain in premature infants.	Randomized clinical trial study.	Cup and finger feeding	High
Oxygen saturation and heart rate in premature: comparison between cup and finger feeding techniques [4]	2019	CODAS	Nunes et al.	To evaluate the oxygen saturation, heart rate, length of hospital stay, and weight preterm infants or preterm newborns in the neonatal intensive care unit in the diet supply by cup- and finger-feeding techniques, simultaneously with breastfeeding.	Simultaneous randomized clinical trial.	Cup and finger feeding	Moderate
Comparison of Effect of Feeding Premature Infants with Either Cup, Bottle, and Syringe on Transition to Breastfeeding, Breastfeeding Success, Weight Gain, and Duration of Hospitalization [5]	2023	Breastfeeding Medicine	Inal et al.	Determining the effect of cup-feeding, bottle-feeding, and syringe-feeding methods on the transition to breastfeeding, breastfeeding success, physiological parameters, weight gain, and discharge duration for preterm neonates in the neonatal intensive care unit.	Randomized, controlled, and single-blinded	Cup feeding, bottle feeding, and syringe feeding	High

(Continues)

TABLE 2 | (Continued)

Article	Year	Journal	Author	Aim	Method	Intervention (feeding method)	Quality
The Effects of Oral Feeding Methods in Preterm Infants on Transition to Direct Breastfeeding and Discharge Time: A Retrospective Cohort Design [6]	2022	Clinical Lactation	Camur and Cetinkaya	The effects of oral feeding methods on the transition to direct-breastfeeding and length of stay in preterm infants.	Retrospective cohort design, comparing two preterm infants groups	Bottle feeding and cup feeding	High
Investigating the Effect of Two Feeding Methods with Cup and Finger on Feeding Tolerance and Gain Weight in Preterm Infants Admitted to the Neonatal Intensive Care Unit [7]	2021	International Journal of Pediatrics	Hassanzadeh et al.	Determine and compare the effect of cup and finger-feeding methods on weight gain and feeding tolerance of preterm infants.	Randomized clinical trial	Cup feeding and finger feeding	High

outcome, length of hospital stay, was assessed in both studies [16, 17].

Finger feeding was never compared with bottle feeding.

Table 4 summarizes the key information extracted from the studies.

5 | Efficacy of the Feeding Methods

5.1 | Feeding Autonomy

The transition time to breastfeeding was statistically longer in the bottle-feeding group (19.70 ± 16.87 days) than in the cup-feeding group [16]. In contrast, Shebilouysofla et al. found no statistically significant difference between the cup- and finger-feeding groups [13]. In this review, none of the included studies compared bottle feeding with finger feeding.

5.2 | Weight Gain

Most studies reported no statistically significant differences in weight gain regardless of the feeding methods used [13, 14, 16–18]. However, in the study conducted by Camur and Cetinkaya, the preterm infants fed by cup had a slightly higher weight at the time of hospital discharge compared to those fed by bottle [17].

The results presented by Mirzaei et al. differ from those of the other studies, showing statistically significant weight gain in the cup-fed and finger-fed groups compared with the control group. Notably, the finger-fed group showed the greatest weight gain [15].

5.3 | Length of Hospital Stays

No statistically significant difference was found between bottle feeding and cup feeding in terms of length of hospital stay. However, hospital stays are longer with bottle feeding, which may be related to the longer transition time to breastfeeding [17].

6 | Discussion

This systematic review aimed to analyze the effectiveness of oral feeding methods (bottle, cup, and finger feeding) in promoting feeding autonomy, consistent weight gain in preterm infants, and length of hospital stays.

The cup was the most frequently studied feeding method in this literature review. In all studies, weight gain was assessed as a primary outcome [13–18], and only one study also addressed feeding autonomy [13], comparing the cup to finger feeding. The secondary outcome, length of stay, was analyzed in just one study [13].

One study compared the transition time to exclusive breastfeeding between bottle and cup feeding, finding that it was longer with bottle feeding, with a statistically significant difference [16].

It would have been important, in this systematic review, to clarify this point in the definition of feeding autonomy as a primary outcome because a preterm infant may have feeding autonomy when milk is offered by a feeding method but may

TABLE 3 | Quality assessment of the studies.

JBI Critical Appraisal Checklist for Cohort Studies														
Question Study (N)	1	2	3	4	5	6	7	8	9	10	11	12	13	Quality
6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
JBI Critical Appraisal Checklist for Randomized Controlled Trials														
1	Yes	Yes	Yes	No	No	No	Yes	NA	Yes	Yes	Yes	Yes	Yes	High
2	Yes	Yes	Yes	NA	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
3	Yes	Yes	Yes	NA	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
4	Yes	Unclear	Yes	No	No	Unclear	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Moderate
5	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
7	Yes	Unclear	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High

not yet have established exclusive breastfeeding. Since this and breastfeeding are considered by experts to be the standard of excellence to be achieved at the nutritional level [19], it is necessary to understand the impact that establishing breastfeeding has on the length of hospital stay.

Despite the statistically significant difference in the transition to breastfeeding, this difference does not appear to be reflected in the length of hospital stay, which is longer for bottle-fed preterms (26.94 ± 18.25) than for cup-fed preterms (19.23 ± 13.98) [16].

In this regard, several questions arise: Does it make sense to extend the length of hospital stay so that the preterm can be discharged while breastfeeding? What are the short-, medium-, and long-term impacts of breastfeeding on the well-being of the preterm and their family? What are the health benefits for this dyad? It is therefore important to conduct studies that analyze this relationship and compare bottle feeding with finger feeding.

The findings of this review indicate that, in recent years, more studies have explored finger feeding, demonstrating its effectiveness in promoting weight gain and reducing length of stay compared with the use of the cup-feeding method. Would similar results emerge if bottle-feeding and finger-feeding methods were compared?

However, one less favorable aspect identified in the application of finger feeding is the time required to implement this method [14]. It would be valuable to compare finger feeding with other methods to determine whether the additional required time is primarily due to organizing the necessary materials or also linked to the duration of the feeding process itself.

Feeding preterm infants depends on factors such as the nurse's experience and comfort level with the method, as well as the preterm infant's neurobehavioral and oromotor skills. Therefore, it is essential to understand the role of oromotor skill development in feeding effectiveness and how these feeding methods support breastfeeding.

The studies included in this review do not assess oromotor skills, but they do mention that the stimuli provided during finger feeding promote sucking training [13–15] and coordination with swallowing, which can improve breastfeeding rates [11].

However, the WHO manual "Protecting, promoting and supporting breastfeeding: the baby-friendly hospital initiative for small, sick and preterm newborns" mentions that one of the

concerns regarding the use of bottle-, cup-, and finger-feeding methods is that the oromotor movements differ from those used in breastfeeding [11].

Therefore, it is essential to conduct studies that not only evaluate the effectiveness of different methods but also analyze the development of oromotor skills and whether they resemble those used during breastfeeding.

The maturity of the preterm infant influences oromotor skills, which is why oral feeding is typically initiated between 32 and 34 weeks of corrected age, as observed in the studies included in this review. Neto et al. specifically identify 33 weeks of corrected age as the optimal time to begin oral feeding [20].

This period marks an important developmental milestone. At this stage, the coordination of sucking, swallowing, and breathing becomes established. In addition, muscle tone becomes predominantly flexor and midline-oriented, and the preterm demonstrates an increased capacity to interact with the surrounding environment [20].

The acquisition of these skills enables preterm infants to feed more effectively without increasing energy expenditure or causing hemodynamic instability. This raises the question of whether initiating oral feeding at 33 weeks of corrected age leads to earlier feeding autonomy, more consistent weight gain, and shorter hospital stays than those who do not.

When oral feeding is initiated between 32 and 34 weeks of corrected age, feeding autonomy usually occurs within 7–16 days thereafter [21], consistent with the majority of results presented by the studies in this review.

With bottle feeding, the transition time to breastfeeding was 19.70 days (± 16.87) [16]. With cup feeding, results varied significantly depending on the outcome assessed (total oral feeding over 24 h or exclusive breastfeeding). When feeding autonomy was assessed, the time was 6.27 days (± 5.03) [13]; when exclusive breastfeeding was assessed, the time was 14.70 days (± 12.90) [18]. With finger feeding, the time to achieve feeding autonomy was 9.12 days (± 6.53) [13]. The results show that only the bottle-feeding method requires more than 16 days to achieve feeding autonomy.

However, scientific evidence increasingly highlights the importance of assessing readiness behaviors to initiate oral feeding, rather than relying solely on corrected age, thereby providing

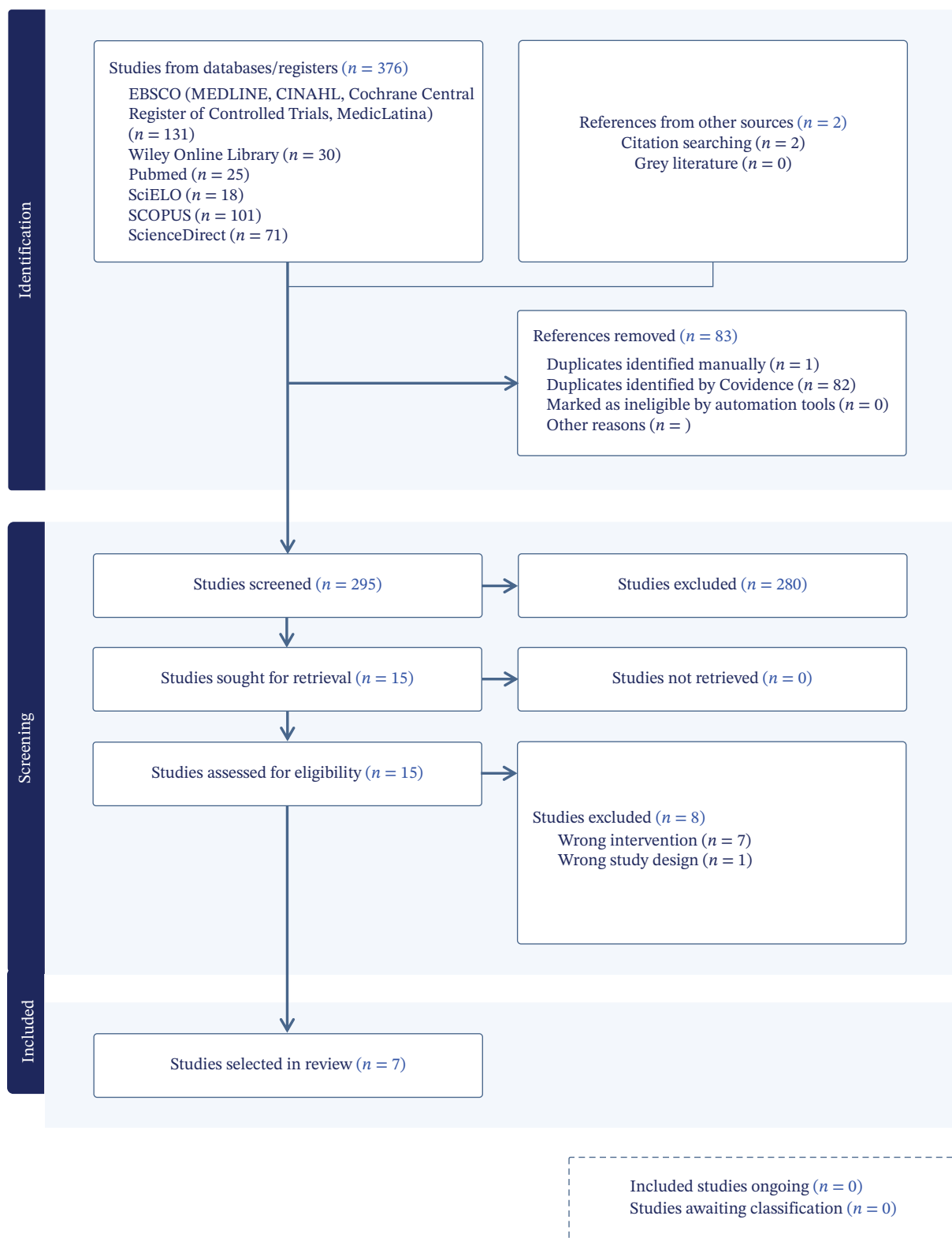


FIGURE 1 | PRISMA flow diagram.

preterm infants with more positive feeding experiences and, consequently, enabling them to become independent feeders more quickly [4, 22].

Some studies included in this review assess hemodynamic stability during the application of feeding methods, which may have an impact on weight gain and length of hospital stay.

Regarding peripheral oxygen saturation and heart rate, there was no statistically significant difference between finger-fed and cup-fed preterms.

Preterm infants fed by cup show greater hemodynamic stability than those fed with a bottle, with a statistically significant difference, but no impact on weight gain [16]. It would be important

TABLE 4 | Information extracted from the studies.

Article	Year	Country	Journal	Author	Aim	Method	Sample size	Intervention (feeding method)	Outcomes	
									Primary outcome	Secondary outcome
1. Effect of cup, syringe, and finger feeding on time of oral feeding of preterm neonate's: a randomized controlled clinical trial [1]	2022	Iran	Journal of Health, Population and Nutrition	Shebilouysofla et al.	To evaluate the effect of cup-, syringe-, and finger-feeding methods on reaching the time of full oral feeding and weight gain among preterm neonates.	Randomized clinical trial.	99 preterm infants: finger feeding ($n = 33$), cup feeding ($n = 33$), and syringe feeding ($n = 33$).	Finger feeding, cup and syringe.	Full oral feeding and weight gain: no significant difference on reaching the time of full oral feeding and weight gain of preterm.	Not applicable.
2. Comparison of the finger-feeding versus cup feeding methods in the transition from gastric to oral feeding in preterm infants [2]	2017	Brazil	Jornal de Pediatria	Moreira et al.	To assess the finger-feeding technique when compared with the cup-feeding method during the early stage of preterm infant feeding transition regarding milk loss, milk ingestion period, and complications.	Randomized, prospective study	53 preterm infants with gestation age < 37 weeks: control group (cup feeding) 27 newborns, experimental group (finger feeding) 26 newborns.	Cup and finger feeding.	Regarding weight gain, a similarity was observed between the assessed groups. In the control group, the median weight difference between the 1st and the last weight assessment was 145.0 g, ranging from -50 g to 850.0 g, while in the experimental group, the median was 85.0 g, ranging from -140 g to 1060 g ($p = 0.34$).	Not applicable.
3. The Effects of Cup Feeding and Finger Feeding Techniques on Weight Gain in Preterm Infants Admitted to the Neonatal Intensive Care Unit [3]	2022	Iran	MEDSURG Nursing Journal	Mirzaei et al.	This study aimed to compare the effects of cup-feeding and finger-feeding techniques on weight gain in premature infants.	Randomized clinical trial study	90 premature infants; divided into 3 groups: cup feeding, finger feeding, and control groups (each with 30 infants).	Cup and finger feeding.	The highest weight gain was recorded in the finger-feeding group (109.55 g), followed by the cup-feeding group (65.8 g) and the control group (31.1 g; $P = 0.001$).	Not applicable.

(Continues)

TABLE 4 | (Continued)

Article	Year	Country	Journal	Author	Aim	Method	Sample size	Intervention (feeding method)	Outcomes	
									Primary outcome	Secondary outcome
4. Comparison of Effect of Feeding Premature Infants with Either Cup, Bottle, and Syringe on Transition to Breastfeeding, Breastfeeding Success, Weight Gain, and Duration of Hospitalization [5]	2023	Turkey	Breastfeeding Medicine	Inal et al.	Determining the effect of cup-feeding, bottle-feeding, and syringe-feeding methods on the transition to breastfeeding, breastfeeding success, physiological parameters, weight gain, and discharge duration for preterm neonates in the neonatal intensive care unit.	Randomized, controlled, and single-blinded	102 premature infants	Cup feeding, bottle feeding, and syringe feeding	To transition to fully breastfeeding in the bottle group was 19.70 and in the cup group was 14.70. There were no significant differences between the groups for weight gain.	Duration of hospitalization (days): cup feeding 19.23 (13.98) and bottle feeding 26.94 (18.25).
5. The Effects of Oral Feeding Methods in Preterm Infants on Transition to Direct Breastfeeding and Discharge Time: A Retrospective Cohort Design [6]	2022	Turkey	Clinical Lactation	Camur and Cetinkaya	The effects of oral feeding methods on the transition to direct-breastfeeding and length of stay in preterm infants.	Retrospective cohort design, comparing two preterm infants groups	80 preterm infants cup-fed and 70 preterm infants bottle-fed	Bottle feeding and cup feeding	The highest weight at discharge was recorded in the cup feeding group (2272.12 ± 256.38); the discharge weight in the bottle group was 2263.33 ± 224.98.	There were no significant differences between the groups for length of stay in the hospital. In the bottle group, the length of stay was 22.25 ± 12.62 and in the cup group was 23.02 ± 11.78.
6. Investigating the Effect of Two Feeding Methods with Cup and Finger on Feeding Tolerance and Gain Weight in Preterm Infants Admitted to the Neonatal Intensive Care Unit [7]	2021	Iran	International Journal of Pediatrics	Hassanzadeh et al.	Determine and compare the effect of cup- and finger-feeding methods on weight gain and feeding tolerance of preterm infants.	Randomized clinical trial	83 preterm infants: divided into two experimental groups of cup feeding (28 cases) and finger feeding (27 cases) and a control group (28 cases).	Cup feeding and finger feeding	The weight before and after the intervention did not change significantly in none of the three groups. The variance further showed that the daily mean weights in each of the intervention days were not significantly different among the three groups ($p > 0.05$).	

to analyze what influences weight gain beyond hemodynamic stability.

In the study conducted by Moreira et al., preterm infants fed by finger feeding showed greater weight gain than those fed by cup. This difference may be attributed not only to reduced milk waste during feeding but also to the fact that finger feeding promotes a more physiological sucking and swallowing pattern [14].

In the study conducted by Nunes et al., the greater weight gain observed in the group fed by cup was associated with a longer stay compared to the group fed by finger feeding [23].

In analyzing these results, it is essential to bear in mind that many of the studies included call for new studies with larger samples [13] and for replication in other hospitals [16, 17]. Therefore, the results should be interpreted with caution.

6.1 | Limitations

It is essential to note the limitation of this review, namely, the small number of studies included.

It can also be noted that methods that are emerging in the scientific evidence, such as syringes and spoons, were not included, since their use is recommended only for full-term or late preterm infants with good sucking–swallowing coordination [11]. Spoons and syringes are identified by the WHO as supplemental feeding methods [11], but bottle, cup, and finger feeding remain the most used in neonatal units [10, 24].

Analysis of the results showed that aspects such as hemodynamic stability and oral skills influence the effectiveness of feeding methods. They should therefore have been included in the outcomes.

7 | Conclusions

The results of the different studies were inconsistent, showing significant variations and, in some cases, contradictory conclusions about the ideal method for transitioning to full oral feeding.

It is therefore essential to consider the factors that influence the effectiveness of feeding methods, namely, oral motor skills, hemodynamic stability, feeding-related complications, and the nurse's own experience. The development of studies with larger samples and multicenter trials should be strongly considered.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Research data are not shared.

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Supporting Information

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