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Review

Nutritional and Immunological Composition of Preterm Colostrum and Oropharyngeal Administration in Preterm Infants

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Abstract

Premature infants are highly susceptible to infection, gastrointestinal dysfunction, and impaired growth because of physiological and immunological immaturity. Human milk, particularly colostrum produced during the first postpartum days, provides essential nutrition and passive immune protection. However, the composition of preterm colostrum and clinical significance of early oropharyngeal administration remain incompletely understood. This narrative review synthesized studies identified through PubMed, Scopus, Google Scholar, and the Cochrane Library examining colostrum composition and outcomes of oropharyngeal administration in preterm infants. Preterm colostrum contains relatively high protein concentrations, variable lipid content, and abundant immunological factors, including secretory immunoglobulin A, lactoferrin, epidermal growth factor, and cytokines that support mucosal defense, inflammatory regulation, and gastrointestinal protection. Clinical studies indicate that oropharyngeal administration is safe and may improve immune biomarkers, feeding progression, birth weight recovery, and length of hospitalization. However, randomized trials have reported inconsistent effects on late-onset sepsis, necrotizing enterocolitis, and mortality. Preterm colostrum represents an important immunonutritional source, and oropharyngeal administration provides a feasible strategy for early immune exposure when enteral feeding is delayed. Larger multicenter studies using standardized administration and milk-handling protocols are needed to establish effects on major neonatal outcomes.

Keywords: colostrum; human milk; oropharyngeal administration; preterm infants; immunological factors; neonatal outcomes

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1. Introduction

Very preterm infants, particularly those born before 32 weeks of gestation, are vulnerable to late-onset sepsis (LOS), necrotizing enterocolitis (NEC), feeding difficulties, and prolonged hospitalization because of immature gastrointestinal and immune systems [1,2]. LOS is commonly defined as infection arising more than 72 h after birth, whereas NEC involves intestinal inflammation and injury that can progress to necrosis and systemic illness [1,2].

Colostrum, produced in the first days after delivery, contains concentrated nutrients and bioactive factors, including secretory immunoglobulin A (sIgA), lactoferrin, epidermal growth factor (EGF), and cytokines [3,4]. Milk composition varies with lactation stage, gestational age, maternal factors, and collection practices [3–6]. Preterm infants may initially

be unable to breastfeed directly or tolerate substantial enteral feeding, motivating interest in oropharyngeal colostrum administration (OPCA): application of small amounts of mother's milk to the buccal or oropharyngeal mucosa [7]. This review considers preterm colostrum composition, plausible mechanisms of OPCA, and clinical evidence, emphasizing distinctions between biomarker changes and meaningful health outcomes.

2. Methods

This narrative review was conducted to summarize and synthesize current evidence regarding the nutritional and immunological composition of preterm colostrum and the clinical effects of oropharyngeal colostrum administration in preterm infants. The literature search was conducted in PubMed, Scopus, Google Scholar, and the Cochrane Library. Search terms included combinations of "preterm colostrum," "human milk," "oropharyngeal colostrum," "premature infant," "very low birth weight infant," "lactoferrin," "secretory immunoglobulin A," "human milk oligosaccharides," "necrotizing enterocolitis," and "late-onset sepsis." Original investigations, randomized controlled trials, observational studies, systematic reviews, and meta-analyses published in English were considered until August 2026. Studies were selected based on relevance to preterm colostrum composition, immunological properties, mechanisms of action, and clinical outcomes associated with oropharyngeal administration. Findings were synthesized narratively because of heterogeneity in study designs, intervention protocols, and outcome measures.

3. Results and Discussion

3.1. Macronutrient Composition of Human Milk

A summary of studies investigating preterm colostrum and human milk nutrient/immunological composition is presented in Table 1. Colostrum differs from mature human milk in volume and composition, generally containing more protein and immune-active constituents during early lactation [3,4]. Human milk is dynamic: fat concentration varies markedly within and between feeds, whereas protein generally decreases with advancing lactation [3,5]. In a 24-h study of mothers of healthy term infants, Khan et al. examined associations among fat, lactose, protein, and infant feeding patterns [8]. Observed associations do not establish that milk protein independently determines infant satiety or feeding frequency. Milk expression, sampling time, and the fraction of milk collected should be considered when comparing studies.

Table 1. Summary of studies assessing preterm colostrum and human milk nutrient/immunological composition [1].

Ref.	Study	Design	Population/Samples	Primary Focus	Main Findings
[5]	Gidrewicz & Fenton (2014)	Systematic review and meta-analysis	Preterm and term human milk studies	Macronutrient composition by gestational age and lactation stage	Nutrient composition varied by gestational age and lactation stage; heterogeneity in sampling and methods limits uniform conclusions.
[8]	Khan et al. (2013)	Observational study	15 mothers of healthy term infants; serial samples over 24 h	Fat, lactose, protein, and feeding patterns	Milk macronutrients varied across feeds; associations with feeding patterns were observed but did not establish causality.
[9]	Saarela et al. (2005)	Longitudinal observational study	483 milk samples over 6 mo	Macronutrients and energy in milk fractions	Protein declined with advancing lactation; foremilk/hindmilk differed substantially in fat and energy content.
[10]	Kociszewska-Najman et al. (2012)	Prospective comparative study	Mothers of preterm and term infants	Creamatocrit, fat, and energy concentration	Fat and energy varied by gestational group and time of milk expression, emphasizing dynamic milk composition.

Table 1. *Cont.*

Ref.	Study	Design	Population/Samples	Primary Focus	Main Findings
[11]	Kovács et al. (2005)	Comparative longitudinal study	Mothers after preterm and term delivery	Early milk fatty-acid composition	Several long-chain polyunsaturated fatty acids differed between preterm and term milk during early lactation.
[12]	Moltó-Puigmartí et al. (2011)	Comparative longitudinal study	Very preterm, preterm, and term mothers	Fat content and fatty-acid proportions across lactation	Fat content and fatty-acid profiles varied by gestational age and lactation stage; very preterm milk showed distinctive early lipid patterns.
[13]	Uchiyama et al. (2011)	Comparative observational study	Preterm and term human milk	Gangliosides during early lactation	Preterm milk showed distinct chronological patterns of gangliosides, including early differences in lipid-bound sialic acid and GD3/GM3.
[6]	Castellote et al. (2011)	Longitudinal observational study	Very preterm, preterm, and term mothers	Immunoglobulins, growth factors, and cytokines	Immune-factor concentrations changed across lactation and gestational groups; very preterm colostrum was not uniformly richer in all immune factors.
[14]	Moran-Lev et al. (2015)	Observational study	Milk for preterm infants during first 7 wk	Circadian macronutrient variation	Macronutrient concentrations varied with time of day, supporting standardized timing of milk sampling.

[1] Abbreviations: GD3, disialoganglioside 3; GM3, monosialoganglioside 3.

Human milk micronutrient and lipid profiles also change during lactation. Macias and Schweigert documented changes in carotenoids, vitamin A, α-tocopherol, and total lipids during early lactation [15]. A review of human milk lipidomics describes the analytical complexity of characterizing milk lipid species [16]. These findings support caution when comparing colostrum with mature milk using single time-point samples.

3.2. Preterm Versus Term Milk Composition

A systematic review and meta-analysis by Gidrewicz and Fenton found that nutrient composition differs by gestational age and lactation stage, although results vary among studies and collection methods [5]. Saarela et al. reported changes in macronutrients over six months and differences between foremilk and hindmilk [9]. Kociszewska-Najman et al. documented variation in creamatocrit, fat, and energy concentration in milk from mothers of preterm and term infants [10]. These studies caution against treating preterm milk as uniformly higher in every macronutrient.

Lipid composition may also vary. Kovács et al. investigated early milk fatty acids after preterm and term delivery [11], and Moltó-Puigmartí et al. compared fat content and fatty-acid proportions across gestational groups and lactation stages [12]. Uchiyama et al. documented chronological changes in gangliosides in preterm human milk [13]. Such differences may be biologically relevant to neonatal development, but compositional variation alone does not demonstrate improved clinical outcomes. These findings should be interpreted alongside the higher nutritional requirements of very preterm infants, which may necessitate fortification even when mother's own milk is available [17]. Differences in gestational age, maternal diet, milk sampling, and assay methods complicate direct comparisons. Secretory activation in pump-dependent mothers of preterm infants may also contribute to milk-composition variation [18].

Other observational work has documented circadian variation in macronutrient concentrations in milk for preterm infants [14]. Clinical studies of human milk feeding and neurodevelopment underscore the importance of nutritional adequacy, but do not establish that any specific preterm-colostrum lipid profile causes improved neurodevelopment [19].

3.3. Immunological Composition Across Lactation Stages

Human colostrum contains sIgA, lactoferrin, EGF, transforming growth factors, and cytokines involved in mucosal defense and epithelial development [3,4]. Their concentrations generally change during the transition to mature milk. Human milk oligosaccharides may also influence the infant gut microbiome and intestinal defense, although much of the mechanistic evidence comes from experimental studies [20,21]. Importantly, preterm colostrum is not uniformly richer in all immune factors. Castellote et al. found that, compared with term colostrum, preterm colostrum had higher concentrations of selected factors, including transforming growth factors, whereas colostrum from very preterm deliveries had lower concentrations of IgA, IL-8, IL-10, and TNF-α [6]. Gestational age must therefore be considered when interpreting immunological comparisons.

Lactoferrin can limit microbial access to iron and has additional immune-modulating properties [3]. sIgA contributes to mucosal protection, while growth factors may support intestinal epithelial maturation [3,4]. These mechanistic functions provide a rationale for early colostrum exposure, but the presence of a bioactive factor in milk does not itself establish that topical oral administration delivers a clinically effective dose. For example, experimental studies of human milk oligosaccharides and NEC implicate intestinal perfusion and toll-like receptor 4 pathways; these findings should not be interpreted as direct evidence that oropharyngeal administration prevents NEC in infants [20,21].

Additional components of human milk may contribute to neonatal defense. Reviews address human milk oligosaccharides (HMOs) and their interactions with immune and microbial pathways [22–27]. Fucosylated HMOs have also been associated with protection against diarrhea in breastfed infants [28]. Experimental studies have examined how HMOs are used by gut-associated bacteria and may influence intestinal ecology [22,24,27]. These findings are mechanistically relevant but should not be interpreted as proof that buccal application produces the same intestinal effects. A recent review also discusses the neuroprotective potential of lactoferrin, predominantly on the basis of preclinical evidence [29].

3.4. OPCA: Methods and Biomarker Evidence

A summary of studies investigating OPCA in preterm infants is presented in Table 2. OPCA is used to expose the oral mucosa of infants who cannot yet feed effectively to small volumes of mother's colostrum [7]. Techniques include swab and syringe application; schedules and volumes vary. In an observational pilot study, Maffei et al. compared approaches to early oral colostrum delivery and reported differences in urinary sIgA and lactoferrin concentrations [30]. Because the administration method was not randomized, the study does not establish superiority of syringe delivery or justify a claim that it changed subsequent standard practice.

In a randomized study of 130 infants, Chen et al. reported higher salivary sIgA with oropharyngeal mother's milk on day 7, but not day 14 [31]. Martín-Álvarez et al. reported changes in inflammatory markers following OPCA [32], and Romero-Maldonado et al. investigated immunoglobulin responses and neonatal morbidity in a double-blind trial [33]. Taking them together, these studies suggest measurable immunological responses, although salivary and urinary biomarkers cannot be assumed to represent systemic absorption, durable immunity, or clinical benefit.

Table 2. Summary of studies assessing oropharyngeal colostrum administration in preterm infants [1].

Ref.	Study	Participants	Dose/Protocol	Frequency	Duration	Intervention/Focus	Main Findings	Level of Evidence
[30]	Maffei et al. (2020)	Preterm infants	OPCA	Variable	Early neonatal period	Early oral colostrum; comparison of administration approaches	Differences in urinary sIgA and lactoferrin were observed; study did not establish superiority of one delivery method.	Observational
[31]	Chen et al. (2022)	130 preterm infants	Mother's own milk	Every 3 h	14 d	Oropharyngeal mother's own milk; salivary sIgA	Salivary sIgA was higher on d 7 but not d 14; supports a transient mucosal immune-marker effect.	RCT
[32]	Martín-Álvarez et al. (2020)	Preterm neonates	0.2 mL mother's own milk	Every 4 h	First 15 d	Oropharyngeal colostrum; inflammatory mediators	Intervention was associated with favorable changes in inflammatory markers and earlier full enteral feeding.	Non-RCT
[33]	Romero-Maldonado et al. (2022)	Premature newborns ≤ 32 wk	0.3 mL colostrum or double-distilled water	Every 4 h	4 d; started within 24 h after birth	Oropharyngeal colostrum; immune response and morbidity	Higher immunoglobulin concentrations and favorable secondary feeding/hospital outcomes were reported; major morbidity effects were less definitive.	Double-blind RCT
[34]	Lee et al. (2015)	Extremely premature infants	0.2 mL colostrum or sterile water via oropharyngeal route	Every 3 h	3 d; started 48–96 h after birth	Oropharyngeal colostrum	Evaluated immune and clinical outcomes; provides evidence of biologic activity, with limited power for major morbidity outcomes.	RCT
[35]	Sohn et al. (2016)	Premature infants	Buccal colostrum administration	Protocol-specific	Several days	Buccal colostrum and oral microbiota	Early oral microbial communities differed between groups; clinical significance remains uncertain because of small sample size.	Pilot RCT
[36]	Barizeh et al. (2024)	70 premature infants	Colostrum vs. sterile water	Protocol-specific	NICU stay	Oral colostrum application vs. sterile water	Improved oral condition; no statistically significant reduction in LOS.	RCT
[37]	Thatrimontrichai et al. (2023)	VLBW infants	Long-duration oral care using mother's own milk	Extended schedule	Prolonged	Long-duration oral care using mother's own milk	Influenced oral microbiota and selected clinical outcomes; supports further study of duration and protocol effects.	RCT
[38]	Abd-Elgawad et al. (2020)	Preterm infants < 32 wk	Mother's milk to the oropharynx before gavage feeding	NICU protocol	Early hospitalization	Mother's milk to oropharynx before gavage feeding	No significant reduction in culture-proven nosocomial sepsis; some secondary outcomes, including feeding/hospital measures, favored intervention.	Pilot RCT
[39]	Aggarwal et al. (2021)	260 very preterm infants (26–31 wk)	0.2 mL human milk or placebo water	Every 3 h	Until oral feeds were initiated	0.2 mL human milk or placebo water to oropharynx every 3 h	No significant differences in mortality, NEC, probable sepsis, feeding milestones, or NICU length of stay.	RCT

Table 2. *Cont.*

Ref.	Study	Participants	Dose/Protocol	Frequency	Duration	Intervention/Focus	Main Findings	Level of Evidence
[40]	Tehranchi et al. (2024)	80 VLBW neonates	Early oral colostrum vs. placebo	Protocol-specific	Early neonatal period	Early oral colostrum vs. placebo	No significant differences in sepsis, NEC, mortality, feeding milestones, or hospitalization duration.	Open-label RCT
[41]	Sudeep et al. (2022)	Preterm infants	Not reported	Not reported	Not reported	Oral application of colostrum/mother's own milk	Evaluated clinical effects of oral maternal milk exposure; contributes to pooled evidence on feeding and morbidity outcomes.	RCT
[42]	Lamsehchi et al. (2025)	126 preterm neonates	0.2 mL mother's colostrum or distilled water	Every 6 h	3 d (birth through 72 h)	0.2 mL maternal colostrum or distilled water every 6 h for 3 days, from birth through 72 h	Lower NEC and clinically suspected sepsis rates, shorter hospital stay, antibiotic treatment, and time to full feeding; mortality did not differ significantly.	Double-blind placebo-controlled RCT
[43]	Fu et al. (2023)	Premature infants across included trials	Various protocols	Variable	Variable	OPCA	Meta-analysis of 16 RCTs (1736 infants) reported lower pooled NEC, LOS, feeding intolerance, and death, with earlier full enteral feeding and birth-weight recovery; protocols and review methods varied.	Meta-analysis
[44]	Anne et al. (2024)	2393 preterm infants across 21 studies	Various protocols	Variable	Variable	OPCA	Reported lower culture-proven sepsis, NEC, and mortality in pooled analyses; interpretation should consider study quality and protocol heterogeneity.	Systematic review and meta-analysis
[45]	Nasuf et al. (2018)	Preterm infants across eligible trials	Various protocols	Variable	Variable	Oropharyngeal maternal colostrum	Earlier evidence was insufficient to establish clear effects on major morbidity or mortality because trials were small and heterogeneous.	Cochrane systematic review
[46]	Kumar et al. (2023)	Preterm infants across trials	Various protocols	Variable	Variable	Oropharyngeal colostrum/mother's own milk	Synthesized randomized evidence and reported potential benefits for selected outcomes, with variability in protocols and certainty.	Systematic review and meta-analysis
[47]	Huo et al. (2022)	Preterm infants across included studies	Various protocols	Variable	Variable	OPCA	Pooled results suggested improvements in some neonatal outcomes; heterogeneity and trial quality limit definitive conclusions.	Meta-analysis

[1] Abbreviations: LOS, late-onset sepsis; NEC, necrotizing enterocolitis; NICU, neonatal intensive care unit; OPCA, oropharyngeal colostrum administration; RCT, randomized controlled trial; sIgA, secretory immunoglobulin A; and VLBW, very low birth weight.

Measurements of sIgA in breast milk and stool provide additional context for interpreting immune-marker studies in preterm infants [48]. Studies of colostrum's anti-inflammatory properties also indicate that gestational age and timing of collection may alter the bioactive profile [49]. Such studies characterize biological plausibility rather than directly establishing a clinical treatment effect.

3.5. Oral Microbiota and Oral Health

Sohn et al. explored whether buccal colostrum exposure alters early oral microbial communities in premature infants [35]. Their pilot findings suggest possible differences in microbial composition, but small samples and rapidly changing neonatal microbiota limit inference. Barizeh et al. evaluated oral colostrum care in a randomized trial and reported improved oral condition without a statistically significant reduction in LOS [36]. Oral mucosal outcomes are relevant supportive-care measures; however, changes in microbiota or oral condition should not be equated with prevention of sepsis or NEC. In a separate randomized study, Thatrimontrichai et al. assessed longer-duration oral care using mother's milk and reported microbiota and clinical outcomes, highlighting the importance of intervention duration when comparing trials [37].

The broader literature on HMOs and the neonatal microbiome documents substantial interindividual and longitudinal variability [22,24–27,50]. This variability, alongside microbial differences between infants, may help explain why early oral-microbiota findings are difficult to generalize.

3.6. Clinical Outcomes: Trials and Evidence Synthesis

Individual randomized trials have produced mixed results. Abd-Elgawad et al. studied oropharyngeal mother's milk before gavage feeding and did not demonstrate a clear reduction in the primary sepsis outcome [38]. Aggarwal et al. reported no significant reduction in several major neonatal outcomes in a trial of 260 very preterm infants [39]. Tehranchi et al. likewise reported no significant improvement in several short-term outcomes in a smaller trial [40]. These null findings are important, but a nonsignificant result in one trial does not establish the absence of benefit. Sudeep et al. also tested oral application of colostrum and mother's own milk in a randomized controlled trial (RCT), adding to the evidence that protocols and comparison conditions differ across studies [41]. In a double-blind trial of 126 preterm neonates, Lamsehchi et al. administered 0.2 mL of colostrum every 6 h for 3 days [42]. The authors reported lower rates of NEC and clinically suspected sepsis, shorter hospitalization, antibiotic treatment, and time to full feeding; mortality did not differ significantly [42].

The importance of human milk in preterm care should be distinguished from the incremental effect of buccal colostrum application. Reviews of human milk and NEC [51], HMO-mediated immunity [52], studies of enteral feeding advancement [53], and reports on milk-derived intestinal-protective factors [54,55] address related but different interventions or mechanisms. They provide context but cannot substitute for direct OPCA trials.

Meta-analyses provide a broader perspective. Fu et al. synthesized randomized evidence on OPCA and clinical outcomes [43]. In a 2024 systematic review and meta-analysis of 21 trials involving 2393 infants, Anne et al. reported lower risks of culture-proven sepsis (RR 0.78, 95% CI 0.65–0.94), mortality (RR 0.73, 95% CI 0.59–0.90), and NEC (RR 0.59, 95% CI 0.43–0.82) [44]. Evidence was limited for extremely preterm and extremely low-birth-weight infants, and the studies differed in setting and intervention protocols [44]. In Fu et al.'s meta-analysis of 16 randomized trials involving 1736 preterm infants, the pooled analysis reported lower rates of necrotizing enterocolitis, LOS, feeding intolerance, and death, together with earlier full enteral feeding and birth-weight recovery [43]. Thus, pooled

findings are encouraging and should not be omitted, but they do not resolve uncertainty about the best regimen or effects in the most vulnerable subgroups.

Earlier evidence syntheses were more cautious: a 2018 Cochrane review found no clear reductions in NEC, LOS, or death from six small trials [45]. Later meta-analyses pooled more trials and reported favorable results for selected outcomes, though outcome definitions and certainty differ [46,47]. These syntheses overlap substantially in included trials and should not be treated as independent replications.

Differences across studies likely contributed to inconsistent findings. Trials varied considerably with respect to gestational-age eligibility criteria, timing of intervention initiation, administered volumes, duration of treatment, milk-handling procedures, definitions of sepsis and necrotizing enterocolitis, and neonatal intensive care practices. Furthermore, sample sizes ranged from pilot investigations to larger RCTs, resulting in varying statistical power. These methodological differences should be considered when interpreting individual studies and pooled estimates from meta-analyses.

3.7. Heterogeneity of Studies Reviewed

Interpretation of the evidence regarding OPCA should consider the heterogeneity among published studies. Differences exist in study design, gestational-age eligibility criteria, sample size, timing of intervention initiation, administered colostrum volumes, frequency of administration, treatment duration, milk-handling procedures, and definitions of clinical outcomes. Colostrum volumes generally ranged from 0.1 to 0.4 mL per administration, treatment initiation varied from birth to 48 h of life, and treatment duration ranged from 48 h to several weeks.

Additional variability arises from differences in outcome assessment. Studies have evaluated immunological biomarkers, oral microbiota, feeding tolerance, NEC, LOS, mortality, and length of hospitalization, often using different diagnostic criteria and outcome definitions. Furthermore, sample sizes ranged from small pilot investigations to larger RCTs, resulting in varying statistical power to detect clinically meaningful effects.

These methodological differences likely contribute to inconsistencies among individual studies and systematic reviews. Consequently, findings should be interpreted cautiously, particularly when extrapolating results to extremely preterm or extremely low birth weight infants. Future multicenter RCTs using standardized intervention protocols and outcome definitions are needed to strengthen the evidence base and facilitate more robust comparisons across studies.

4. Limitations and Challenges in Oropharyngeal Colostrum Research

Several methodological issues limit confidence in causal and clinical interpretations. First, the available trials differ in blinding and allocation procedures. Colostrum has a distinctive appearance and texture, making concealment difficult; incomplete masking can affect co-interventions and subjective outcome assessment. Biomarker changes should be interpreted considering sample timing, assay variability, and the possibility of residual milk in oral samples rather than assuming systemic uptake.

Second, study populations and intervention protocols are heterogeneous. Gestational-age thresholds, birth-weight distributions, timing of the first dose, delivered volume, application by swab or syringe, treatment frequency, duration, and the use of mother's own milk rather than donor milk differ among studies. Background NICU practices including infection prevention, enteral feeding advancement, and lactation support, may also influence observed outcomes. Consequently, pooled results may not apply equally to extremely preterm infants or to units with different baseline care.

Third, milk handling remains incompletely standardized. Time since delivery, hand expression versus pumping, refrigeration, freezing, thawing, and delay before application may influence the amount and composition of colostrum delivered. Future trials should document these steps and, where feasible, measure relevant bioactive constituents before administration. Such measures would help distinguish variation in dose delivery from biological differences in response.

Finally, many individual studies are small, have limited power for uncommon outcomes such as NEC and death, or report numerous secondary outcomes. Future multicenter trials should prespecify clinically meaningful endpoints, use consistent definitions of culture-proven LOS and NEC, report adverse events and protocol adherence, and incorporate longer-term growth and neurodevelopmental follow-up. Individual-patient-data synthesis could help assess whether gestational age, baseline feeding practices, or exposure duration modifies effects.

5. Conclusions

Current evidence indicates that human milk produced after preterm delivery differs from term milk in several nutritionally and biologically relevant ways. Although protein and lactose concentrations vary with gestational age and stage of lactation, lipid content and fatty acid composition show considerable variability and may contribute to the metabolic, neurological, and developmental needs of premature infants. Preterm colostrum is also an important source of bioactive immunological components, including secretory IgA, lactoferrin, EGF, and cytokines involved in mucosal defense, inflammatory regulation, intestinal maturation, and host protection.

Oropharyngeal administration provides a practical strategy for early exposure to maternal colostrum when conventional enteral feeding is delayed. Available evidence indicates that this intervention is generally safe and feasible and may improve immune biomarkers, feeding progression, birth weight recovery, and length of hospitalization. However, effects on major neonatal outcomes remain inconsistent, with randomized trials not uniformly demonstrating reductions in LOS, NEC, or mortality. Differences in study populations, sample sizes, intervention protocols, and outcome definitions may contribute to these conflicting findings.

Preterm colostrum represents an important immunonutritional resource for premature infants, and early oropharyngeal administration is a feasible strategy for providing maternal milk exposure during a critical period of neonatal development. Nevertheless, current evidence is insufficient to establish consistent improvement in major neonatal morbidity or mortality. Large, adequately powered multicenter randomized trials using standardized protocols for colostrum collection, storage, preparation, and administration, together with longer-term follow-up, are needed to define the clinical effectiveness of this intervention.

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