Jurnal Kesehatan Kusuma Husada
Universitas Kusuma Husada Surakarta

Volume 17 No 1, Hal 53-69, Januari 2026
ISSN: 2087 – 5002 | E-ISSN: 2549 – 371X
https://doi.org/10.34035/jk.v17i1.1933

PERCEIVED INSUFFICIENT MILK SUPPLY (PIMS) AND THE RISK OF NON-EXCLUSIVE BREASTFEEDING PRACTICES: A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

Background: PIMS, or what is usually called insufficient breast milk supply, is one of the reasons why breastfeeding fails. There are still a few mothers who know about the perception of insufficient breast milk supply and how this has an impact on breastfeeding practices. This study aimed to examine the association between perceived insufficient milk supply (PIMS) and the risk of non-exclusive breastfeeding during the first six months postpartum.
Methods: This review was conducted following the PRISMA guidelines to select articles in this study and based on PICO (Population, Intervention, Comparison, Outcome). We searched for relevant articles in five databases, such as PubMed, ScienceDirect, Springer Link, ProQuest, and SAGE journals, from January 2014 to August 2024. Then, they carried out a meta-analysis of the collected data and analyzed the Odds Ratio (OR) using Review Manager 5.3. Overall, 6 studies were appropriate in this review.
Results: Six studies were included in the meta-analysis. The forest plot demonstrated a consistent inverse association between perceived insufficient milk supply (PIMS) and exclusive breastfeeding across all included studies. Using a random-effects model, mothers with PIMS had significantly lower odds of exclusive breastfeeding during the first six months postpartum (pooled OR = 0.10; 95% CI: 0.04–0.24; $p < 0.00001$), indicating a substantially increased risk of non-exclusive breastfeeding.
Conclusion: Perceived insufficient milk supply (PIMS) has a relationship with the incidence of failure to provide exclusive breastfeeding.
Keywords: breastfeeding practices, maternal perception, meta-analysis, Perceived insufficient milk supply (PIMS), systematic review

INTRODUCTION

The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) advocate for initiation of breastfeeding within the first hour after birth and exclusive breastfeeding for the first six months of life, defined as providing only breast milk without any additional foods or liquids, including water. Breast milk represents a critical and irreplaceable source of nutrition essential for optimal infant growth and development. Breast milk functions as the first immunization for children to protect them from respiratory tract infections, diarrhea, and other potentially life-threatening diseases. Globally, 38% of babies aged 0-6 months receive exclusive breast milk. Suboptimal

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ISSN: 2087 – 5002 | E-ISSN: 2549 – 371X
https://doi.org/10.34035/jk.v17i1.1933

breastfeeding contributes 11.6% to the deaths of children under 5 years of age (WHO, 2014). Long-term breastfeeding is linked to favorable maternal health effects, with studies indicating a lower risk of breast and ovarian malignancies and a decreased prevalence of type 2 diabetes mellitus (Chowdhury et al., 2015).

Exclusive breastfeeding coverage in Indonesia in 2022 is 67.96%, a decrease compared to the achievement in 2021. Exclusive breastfeeding coverage in Central Java in 2022 has decreased compared to 2021, which is 71.40%. The target for babies to get exclusive breast milk from the Ministry of Health is 80%, while exclusive breastfeeding coverage in Surakarta City in 2023 is 81.84% (data collection for babies 0-6 months) so that it has met the set target, but has decreased compared to the achievement in 2022, which is 85.46% where some of the reasons put forward by a mother when not giving exclusive breastfeeding include because the mother feels that breast milk is not enough, cranky babies, small breasts so they lack confidence in breastfeeding (Dinas Kesehatan Kota Surakarta, 2023).

Breastfeeding is a natural process, but providing it is not always easy, especially for first-time mothers. One of the factors related to early cessation of breastfeeding is maternal factors. Maternal factors include late decision making, negative attitudes towards breastfeeding, lack of breastfeeding experience, low self-efficacy, breastfeeding problems, and low level of breastfeeding satisfaction, younger age, low income, low level of education, returning to work, and maternal perception of insufficient breastmilk (Agampodi et al., 2021; Thomas, 2016).

Perceived insufficient milk supply (PIMS) operates as a psychosocial determinant of infant feeding behavior. Mothers may misinterpret normal infant cues, such as frequent crying or cluster feeding, as indicators of inadequate milk intake. This perception reduces breastfeeding self-efficacy and increases anxiety, prompting early formula supplementation as a compensatory strategy. Formula use subsequently decreases breastfeeding frequency and milk removal, disrupting the physiological demand-supply mechanism of lactation. Reduced milk stimulation may then reinforce maternal perceptions of insufficiency, creating a self-perpetuating cycle that ultimately increases the risk of non-exclusive breastfeeding and early breastfeeding cessation.

Previous research has generated a large body of literature in the fields of medicine, public health, and social and behavioral sciences. The results of the study differentiate between perceived and clinical breast milk adequacy because both influence perceptions regarding breast milk supply and help in infant feeding decisions. PIMS was developed based on a socio-ecological model to examine biocultural influences and social as well as health-related determinants that contribute to lactation difficulties and premature discontinuation of breastfeeding (Quinn et al., 2023; Stuebe et al., 2014).

Moreover, PIMS has been linked to reduced breastfeeding self-efficacy and diminished maternal confidence, which in turn increases the likelihood of early discontinuation of exclusive breastfeeding (Kent et al., 2021). Based on qualitative studies carried out, it is also stated that most mothers are worried about the supply of breast milk, so that the duration of breastfeeding becomes shorter (Choo & Ryan, 2016).

Although perceived insufficient milk supply (PIMS) has been frequently cited as a reason for early breastfeeding cessation, most previous reviews have primarily described breastfeeding barriers narratively or focused on clinical lactation insufficiency rather than maternal perception. Furthermore, existing reviews often include heterogeneous outcomes without providing pooled quantitative estimates of the association between PIMS and exclusive breastfeeding practices. To date, few systematic reviews or meta-analyses have explicitly quantified the magnitude of the association between maternal perceptions of

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insufficient milk supply and exclusive breastfeeding outcomes across varied populations. This paucity of synthesized evidence constrains the development of targeted, evidence-based interventions addressing maternal perceptions. Consequently, a comprehensive systematic review and meta-analysis is necessary.

The novelty of this meta-analysis lies in its ability to transform maternal perception of milk insufficiency into a quantifiable risk factor for non-exclusive breastfeeding. While PIMS has been widely studied as a descriptive phenomenon, few studies have synthesized its impact using pooled odds ratios. By integrating recent evidence from low-, middle-, and high-income countries published over the last decade, this study provides updated and robust estimates that strengthen the clinical and public health relevance of PIMS in breastfeeding promotion strategies. The aim of this study is to examine the association between perceived insufficient milk supply (PIMS) and the risk of non-exclusive breastfeeding during the first six months postpartum.

RESEARCH METHOD

Study Design

This research employed a systematic review and meta-analytic design and was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines.

Eligibility Criteria

The study searched electronic databases such as ScienceDirect, SpringerLink, ProQuest, SAGE journals, and PubMed for relevant articles on perceived insufficient milk supply published between 2014 and 2024. The main terms used for the search are perception OR perceived AND not enough or insufficient or inadequate OR not enough AND milk OR breast milk.

Search Strategy and Selection Criteria

The database search across five electronic sources identified 1,527 records related to perceived insufficient milk supply. After removing 953 duplicate entries, titles and abstracts of the remaining 574 records were screened, resulting in 68 articles retrieved for full-text review. Of these, six quantitative observational studies met the eligibility criteria and were included in the final analysis. Eligible studies comprised observational designs (cross-sectional, cohort, or longitudinal), assessed perceived insufficient milk supply as a maternal self-reported belief of inadequate breast milk regardless of physiological sufficiency, and reported exclusive breastfeeding outcomes within the first six months postpartum; Studies providing effect estimates (OR, RR, or sufficient raw data); Articles published in English. Exclusion criteria are Studies assessing only biological or clinical lactation insufficiency; Qualitative studies, reviews, editorials, or case reports; Studies without extractable quantitative data. The process for selecting included studies followed the PRISMA Flowchart as shown in Figure 1.

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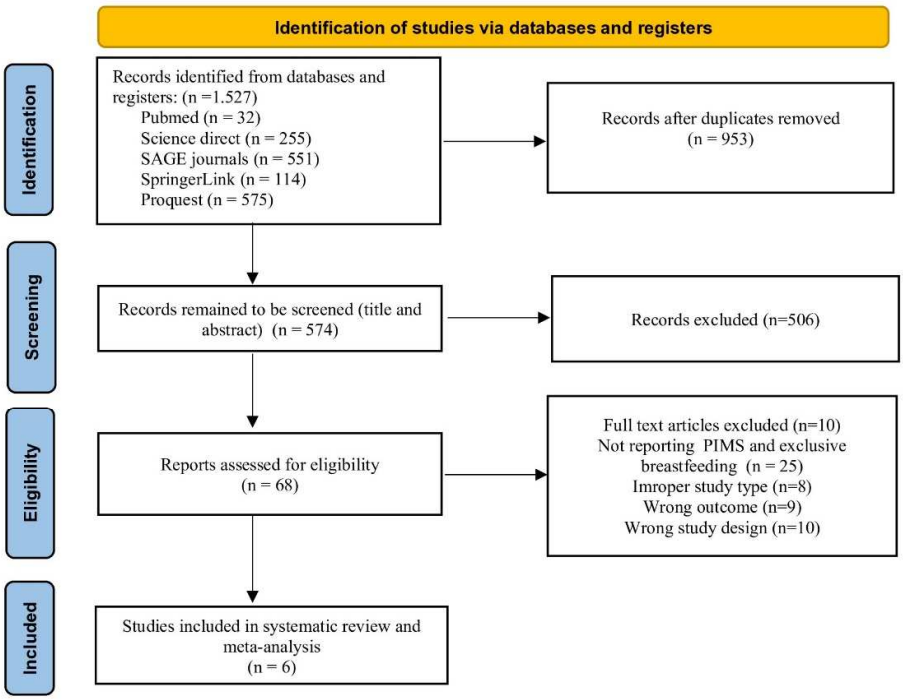

Fig 1. Flow diagram for the selection of the included studies

Data Extraction And Quality Assessment

Data extraction was independently performed by two reviewers using a standardized, pre-specified extraction form. Extracted information included authors, year of publication, country, study design, sample size, operational definitions of perceived insufficient milk supply and breastfeeding outcomes, reported effect estimates, and adjusted covariates. When multiple effect estimates were reported, the most fully adjusted estimate was selected for analysis. Study quality was independently assessed by two reviewers using the National Institutes of Health (NIH) Quality Assessment Tool for Observational Studies, with studies categorized as good, fair, or poor. Methodological quality and potential risk of bias were considered in the interpretation of the pooled findings.

Data Analysis

Meta-analysis was conducted using Review Manager (RevMan) version 5.3. Odds ratios were pooled using a random-effects model due to substantial methodological and clinical heterogeneity. The outcome was coded as exclusive breastfeeding (yes/no); therefore, odds ratios less than 1 indicate lower odds of exclusive breastfeeding.

Statistical heterogeneity was assessed using the I^2 statistic. Given the small number of included studies (n=6) and extreme heterogeneity (I^2 = 100%), subgroup, sensitivity, and publication bias analyses were not performed, as such analyses would be statistically unreliable. Findings are therefore interpreted primarily in terms of direction and consistency rather than precise effect magnitude.

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RESULTS

This research searched five databases, such as ScienceDirect, SpringerLink, ProQuest, SAGE journals, and PubMed. This study conducted 6 studies on PIMS and breastfeeding practices. Some of the studies were performed in Singapore, Italy, Indonesia, China, Malaysia, and Somaliland. The systematic review generated 6 articles to determine PIMS and breastfeeding practices. Detailed characteristics of the studies used are shown in Table I.

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Table 1. Studies exploring perceived insufficient milk supply (PIMS) and breastfeeding practices

No.	Author (year) country	Study design	Participant characteristics (n)	Results	Conclusion
1.	De Roza et al. (2019) Singapore (De Roza et al., 2019)	Longitudinal study	The initial number of mother-infant pairs was 400, with mothers completing the questionnaire when the infant was 3 months old (n=323) and 258 mothers completing the questionnaire when the infant was 6 months old.	At six months postpartum, exclusive breastfeeding was reported in 38.2% of infants. Mothers who sustained exclusive breastfeeding to six months had significantly higher baseline breastfeeding self-efficacy and perceived milk supply scores compared with those who discontinued exclusive breastfeeding earlier ($p < .01$). Results from the Generalized Estimating Equation (GEE) model showed that exclusive breastfeeding at six months was significantly associated with higher maternal education, intention to breastfeed for at least six months, baseline BSES-SF scores above 50, and perceived insufficient milk (PIM) scores exceeding 20.	This study demonstrated higher prevalences of both any breastfeeding and exclusive breastfeeding at six months compared with estimates from the 2011 National Breastfeeding Survey. Furthermore, maternal breastfeeding self-efficacy at baseline, perceptions of milk adequacy, breastfeeding intentions, and previous breastfeeding experience emerged as significant determinants of exclusive breastfeeding at six months. Notably, breastfeeding self-efficacy and perceived milk supply are modifiable factors, underscoring the potential for targeted intervention strategies. Integrating such interventions within healthcare systems may help ensure continuity of breastfeeding support from the antenatal period through postnatal care.
2.	Gianni et al. (2019) Italy (Gianni et al., 2019)	Prospective observational study	Mothers considered to be at low risk of early breastfeeding cessation were recruited at hospital discharge, which occurred within 72 hours postpartum. Eligibility	Approximately 70.3% of mothers reported experiencing breastfeeding-related challenges, including nipple trauma, perceived insufficient milk supply, pain, and fatigue, with most difficulties emerging during the first month	The results of this study offer additional insights into breastfeeding challenges encountered by mothers during the first three months postpartum in a high-income setting characterized by supportive breastfeeding norms

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No.	Author (year) country	Study design	Participant characteristics (n)	Results	Conclusion
			criteria included having delivered a singleton, healthy, term infant (gestational age ≥37 weeks) with a birth weight at or above the 10th percentile for gestational age, based on Bertino's neonatal growth charts. All enrolled mothers were breastfeeding at the time of discharge (n = 552).	postpartum. Among mothers who encountered breastfeeding problems, only half reported receiving adequate support from healthcare professionals. Factors associated with an increased likelihood of non-exclusive breastfeeding at three months included maternal perceptions of inadequate milk supply, poor infant weight gain, mastitis, and return to work. In contrast, vaginal birth and the availability of breastfeeding support following hospital discharge were linked to a reduced risk of non-exclusive breastfeeding.	and attitudes. These findings emphasize the critical role of sustained, individualized professional support within the community to address maternal breastfeeding difficulties following hospital discharge.
3.	Sandhi et al. (2020) Indonesia (Sandhi et al., 2020)	Cross-sectional study	The study sample comprised mother–infant dyads with infants younger than six months of age (n = 230).	Early breastfeeding initiation within the first hour postpartum was reported by 34.0% of mothers, while 62.4% exclusively breastfed their infants. Higher levels of perceived milk adequacy were noted among mothers who practiced skin-to-skin contact or rooming-in, observed effective infant suckling, and reported greater breastfeeding self-efficacy ($p < 0.05$). Multivariable regression analysis indicated that mothers with higher perceived milk supply (OR 3.20; 95% CI	The results of this study suggest that skin-to-skin contact and maternal breastfeeding self-efficacy play central roles in shaping mothers' perceptions of milk adequacy. In turn, higher perceived milk sufficiency was positively associated with exclusive breastfeeding practices. These findings highlight the need for routine assessment of maternal perceptions of milk supply, breastfeeding self-efficacy, and early skin-to-skin contact as part of

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No.	Author (year) country	Study design	Participant characteristics (n)	Results	Conclusion
				1.76–5.83) and those who engaged in skin-to-skin contact (OR 2.36; 95% CI 1.13–4.91) were more likely to exclusively breastfeed, whereas maternal employment was inversely associated with exclusive breastfeeding (OR 0.47; 95% CI 0.24–0.93).	strategies to promote optimal breastfeeding outcomes.
4.	Fu et al. (2022) China (Fu et al., 2021)	Cross-sectional survey	Healthy mothers with infants aged 7-12 months (n=822)	The study sample comprised 822 mothers, of whom 586 (71.3%) maintained exclusive breastfeeding for up to six months. Multivariable logistic regression showed that older maternal age (adjusted odds ratio [AOR] 0.956; 95% confidence interval [CI] 0.917–0.997) and maternal perceptions of inadequate breast milk supply (AOR 0.104; 95% CI 0.072–0.149) were significantly associated with lower odds of maintaining exclusive breastfeeding up to six months. The most commonly cited reasons for early cessation of exclusive breastfeeding were perceived absence or insufficiency of breast milk (59.8%), return to work (23.9%), lack of flexible nursing breaks at the workplace (18.2%), infant-related challenges such as frequent crying or maternal	In our WeChat-based groups, approximately 71.3% of infants were exclusively breastfed through six months of age. Perceived insufficient milk supply and employment-related constraints emerged as the primary barriers to sustaining exclusive breastfeeding in this context. Nonetheless, additional comparative research is required to substantiate the influence of WeChat group participation on breastfeeding outcomes.

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No.	Author (year) country	Study design	Participant characteristics (n)	Results	Conclusion
				exhaustion related to breastfeeding (9.7%), and nipple or breast complications (9.3%).	
5.	Saddki et al. (2022) Malaysia (Saddki et al., 2022)	Prospective cohort study	Mothers who underwent an elective caesarean (n=171)	The proportion of non-exclusive breastfeeding increased progressively from 19.9% at one month postpartum to 40.4% at three months and 57.9% at six months. Mothers who reported having no breast milk or an inadequate milk supply had significantly higher odds of practicing non-exclusive breastfeeding at one month (adjusted odds ratio [AOR] 4.83; 95% confidence interval [CI] 1.06–21.96), three months (AOR 4.97; 95% CI 1.67–14.85), and six months, with the strongest associations observed among those who frequently perceived milk insufficiency (very often/often: AOR 10.06; 95% CI 2.41–41.99; sometimes/seldom: AOR 3.27; 95% CI 1.46–7.32). Conversely, mothers with previous childbirth experience were less likely to engage in non-exclusive breastfeeding at one month, irrespective of the interval since their last birth.	Perceived insufficient breast milk emerged as the sole factor consistently associated with non-exclusive breastfeeding across all assessed time points. This finding highlights the need for further investigation of maternal perceptions of milk insufficiency and underscores the importance of targeted support from lactation consultants and maternal–child health professionals. Potential strategies include the provision of breastfeeding education prior to delivery and the establishment of helplines to offer timely information and emotional support in the postpartum period. Moreover, the role of lactation support groups in the early identification and management of perceived milk insufficiency is critical and warrants greater emphasis.

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No.	Author (year) country	Study design	Participant characteristics (n)	Results	Conclusion
6.	Hassan and Hossain (2023) Somaliland (Said Hassan & Moyazzem Hossain, 2023)	Cross-sectional study	Lactating mothers with children aged 0–6 months (n=153)	The results showed that only 28.1% of mothers identified breastfeeding as the recommended initial feeding for infants, and nearly 70% were unaware of the health benefits associated with maintaining exclusive breastfeeding for six months. Exclusive breastfeeding was significantly influenced by maternal educational level, marital status, employment status, perceptions of inadequate milk quantity, and perceived infant refusal to breastfeed. Mothers with no formal schooling or only primary education had substantially lower odds of practicing exclusive breastfeeding compared with those who had higher educational attainment.	The results suggest that maternal education level, marital status—particularly widowhood—employment status, perceptions of inadequate milk supply, and perceived infant refusal to breastfeed represent key obstacles to the promotion of exclusive breastfeeding. It is recommended that the Ministry of Health assess the adequacy and implementation of breastfeeding counseling services in healthcare settings. Furthermore, collaborative actions involving governmental bodies, non-governmental organizations, and community-based institutions are needed to develop and implement targeted strategies aimed at supporting vulnerable groups.

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Based on the results of the above analysis, from 6 articles that discuss the perceived insufficient supply of breast milk related to breastfeeding practices, supported by an OR value of 0.10; CI 95% 0-04-0.24; I2 100% and p value <0.00001. In this study, the meta-analysis results show that perceived insufficient milk supply decreased exclusive breastfeeding. The results of the analysis are presented in Figure 2

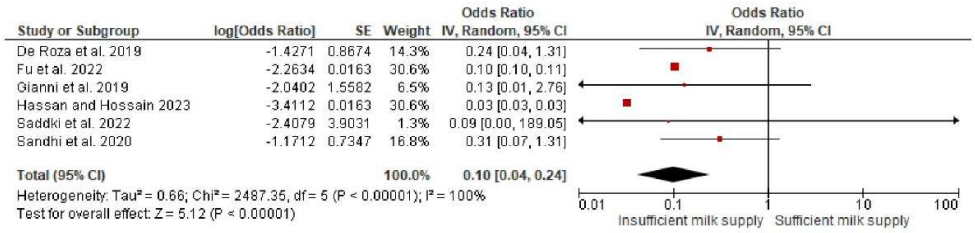

Fig 2. Meta – analysis of perceived insufficient milk supply and breastfeeding practices

Figure 2 displays the forest plot illustrating the relationship between perceived insufficient milk supply and exclusive breastfeeding during the first six months postpartum. In the plot, each square represents the effect estimate from an individual study, with the size of the square reflecting the study's relative weight. The horizontal lines depict 95% confidence intervals, while the vertical line at an odds ratio of 1.0 indicates no effect. The diamond at the bottom shows the pooled estimate from the random-effects model, with its width representing the overall 95% confidence interval. Although the pooled estimate indicates lower odds of exclusive breastfeeding among mothers reporting perceived insufficient milk supply, the wide dispersion of confidence intervals highlights substantial heterogeneity across studies.

DISCUSSION

Cultural context influences how mothers interpret infant behaviors and perceive milk adequacy. In some cultures, frequent crying or feeding is considered normal, while in others it signals insufficient milk, potentially prompting early formula use. Such cultural variation may partly explain the substantial heterogeneity observed across studies. Measurement differences further contribute to heterogeneity, as perceived insufficient milk supply and exclusive breastfeeding were assessed using diverse instruments, recall periods, and outcome definitions. Additionally, reliance on self-reported perception introduces reporting and recall bias. Maternal confidence, emotional state, and post hoc rationalization of feeding choices may affect responses, leading to misclassification. As a result, the observed association may primarily reflect psychosocial mechanisms rather than true physiological milk insufficiency, warranting cautious interpretation.

This systematic review aimed to examine the association between perceived insufficient milk supply (PIMS) and non-exclusive breastfeeding practices. A total of six eligible studies addressing breastfeeding challenges related to maternal perceptions of inadequate milk supply were included. Although the limited number of studies (n = 6) restricts the statistical power of the meta-analysis and may affect the generalizability of the pooled estimates, the findings remain informative. To our knowledge, this review represents the first quantitative synthesis assessing the relationship between PIMS and exclusive breastfeeding outcomes across diverse settings, thereby providing an important foundation for future large-scale meta-analyses. The meta-analytic results indicate a significant

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association between perceived insufficient milk supply and non-exclusive breastfeeding practices. PIMS emerged as a prominent factor contributing to formula supplementation and the early discontinuation of breastfeeding (Peacock-Chambers et al., 2017; Rodrigo et al., 2019).

The interpretation of the pooled effect estimates should be considered in light of the risk of bias of the included studies. Although the majority of studies were rated as fair quality with moderate risk of bias, the consistency of findings across studies with varying quality levels strengthens confidence in the observed association between PIMS and non-exclusive breastfeeding. Nevertheless, the predominance of observational designs and reliance on self-reported perception measures may have introduced residual confounding, potentially influencing the magnitude of the pooled effect.

The extreme heterogeneity observed ($I^2 = 100\%$) reflects substantial variability across studies in terms of study design, population characteristics, timing of outcome assessment, and operational definitions of perceived insufficient milk supply. Cultural beliefs, breastfeeding support systems, and socioeconomic contexts may further contribute to this variability. Consequently, the pooled effect size should be interpreted as an overall directional estimate rather than a precise measure of effect magnitude.

Rather than relying solely on pooled odds ratios, interpretation of the findings must consider contextual and methodological differences across studies. Studies conducted in low-resource settings emphasized socio-cultural beliefs and maternal knowledge, whereas studies from higher-income countries highlighted work-related constraints and breastfeeding self-efficacy. These contextual variations likely influenced both the magnitude of effect estimates and the observed heterogeneity.

The extreme heterogeneity observed in this meta-analysis reflects not only methodological variability but also the context-dependent nature of perceived insufficient milk supply. Differences in cultural beliefs, health system support, maternity leave policies, and measurement tools suggest that PIMS is not a uniform phenomenon but a context-sensitive construct. Consequently, the pooled effect size should be interpreted as an indicator of consistent directionality rather than a precise estimate applicable to all settings.

Methodologically, the predominance of observational designs and self-reported measures limits causal inference. These limitations underscore the need for standardized PIMS measurement tools and longitudinal designs to disentangle perception from physiological lactation insufficiency.

The inability to produce sufficient amounts of breast milk is a common obstacle in the early postpartum period that breastfeeding mothers often face. The primary reason reported by mothers for perceived insufficient milk supply was the belief that reduced breast milk production is a normal condition, often attributed to maternal stress, inadequate nutritional intake, and culturally rooted beliefs related to food (Piccolo et al., 2022). Mothers who discontinue breastfeeding before their infants reach six months of age frequently resort to formula feeding outside the hospital setting. The most commonly reported reasons for formula use include concerns regarding insufficient breast milk supply, perceived indicators of inadequate infant intake, and suboptimal breastfeeding behaviors (Chantry et al., 2014). In Indonesia, perceptions regarding breast milk supply are an important factor in exclusive breastfeeding for mothers. In Indonesia, there is a culture or belief that mothers who tend to have small breasts produce less breast milk.

The perception of "insufficient breastmilk" has serious consequences for the success of breastfeeding and has been shown to be beneficial for the survival of children. Breastfeeding failure can also be caused by a lack of maternal confidence, stress, and pain, which can inhibit the release of breast milk (Namyalo et al., 2023). Perceived insufficient

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milk supply (PIMS) has been identified as a key determinant influencing breastfeeding practices (Dashti et al., 2014; Kasahun et al., 2017). Perceived insufficient milk supply (PIMS) represents a global challenge in breastfeeding. When mothers believe that they are unable to provide an adequate quantity or quality of breast milk, they are more likely to discontinue breastfeeding, irrespective of the infant's age. In many instances, this perception stems from limited knowledge of normal lactation physiology or difficulties with breastfeeding techniques, rather than from an actual physiological inability to produce sufficient milk (Sun et al., 2017).

Rather than merely reflecting breastfeeding outcomes, perceived insufficient milk supply appears to function as a cognitive and behavioral determinant that shapes maternal feeding decisions. The consistent association across studies suggests that PIMS operates as a self-reinforcing mechanism, in which maternal doubt leads to supplementation practices that further reduce breastfeeding confidence and duration.

In Canada, there was a study conducted showing that 22% of mothers stopped breastfeeding because they felt their milk production was low (Brown et al., 2014). Meanwhile, in research conducted in America, around 43.5% of mothers considered a lack of breast milk as a reason for stopping breastfeeding in the first year. This indicates that the perception of a lack of breast milk production exists and needs to be changed. Furthermore, a recent study among Australian mothers identified a high prevalence of perceived insufficient milk supply as the primary reason for breastfeeding cessation (Kent et al., 2021).

Based on the results of several studies, the main reason for starting formula feeding is insufficient breast milk at 42.3%, followed by the busyness of the mother at work at 34.6% and slow growth of the baby at 23.1% (Kera et al., 2023). 62% of mothers reported a lack of breast milk as a factor in early formula feeding in Poland (Rozensztrauch et al., 2022) Based on the results of research in Taiwan, the mother's perception of low levels of breast milk is one of the factors associated with stopping breastfeeding at the age of 1 to 2 months (Chang et al., 2019).

Perceived insufficient milk supply (PIMS) commonly prompts the initiation of supplementation or early weaning, and the findings of this study are consistent with evidence reported across diverse populations worldwide (Lagie Babakazo Id et al., 2022; Lou et al., 2014; Robert et al., 2014a). Perceived insufficient breast milk production was the most commonly reported breastfeeding-related concern among mothers during the study period (Lagie Babakazo Id et al., 2022) Exclusive breastfeeding cessation has been associated with perceived milk insufficiency, infant health problems, and maternal breast conditions (Paramashanti et al., 2022). A substantial body of evidence has identified perceived insufficient milk supply (PIMS) as the most common reason for discontinuing breastfeeding across multiple stages of the breastfeeding period. (Demirci & Bogen, 2017; Magarey et al., 2016; Robert et al., 2014b; Safon et al., 2017).

Addressing perceived insufficient milk supply (PIMS) is critical to improving breastfeeding rates. Central to this effort is strengthening maternal confidence in their ability to produce an adequate quantity of breast milk to meet their infant's needs, particularly during the early postpartum period (McGuire, 2018).

Although formal sensitivity and publication bias analyses were not feasible, the robustness of the findings is supported by the consistency in the direction of associations across all included studies, regardless of study design, geographic location, and study quality. Despite these limitations, this meta-analysis highlights perceived insufficient milk supply as a consistently important determinant of non-exclusive breastfeeding and

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underscores the need for standardized measurement and higher-quality longitudinal studies.

This meta-analysis contributes theoretically by reframing perceived insufficient milk supply as a measurable psychosocial determinant rather than a secondary or subjective complaint. By quantifying its association with breastfeeding outcomes, this study supports socio-ecological and self-efficacy frameworks that position maternal perception as a central driver of breastfeeding behavior.

From a practical perspective, the findings highlight the need to integrate routine assessment of maternal perceptions of milk supply into breastfeeding counseling. Interventions should prioritize early identification of PIMS, address cognitive misinterpretations of infant behavior, and strengthen maternal breastfeeding self-efficacy. Such targeted strategies may be more effective than interventions focusing solely on physiological lactation support.

CONCLUSION

The findings of this systematic review and meta-analysis indicate that perceived insufficient milk supply is consistently linked to reduced likelihood of exclusive breastfeeding throughout the first six months postpartum. These findings should be interpreted cautiously in light of the substantial heterogeneity across studies and variability in methodological quality. The observed association likely reflects psychosocial and contextual mechanisms rather than true physiological milk insufficiency. These results underscore the importance of culturally sensitive breastfeeding support interventions that address maternal perceptions and confidence, as well as the need for future studies using standardized measures and robust designs to clarify causal pathways.

RECOMMENDATIONS

Further research is recommended to examine PIMS in specific populations (e.g., post-cesarean, working, and teenage mothers) to develop more tailored interventions.

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