

Exclusive Breastfeeding and Timing of Postpartum Menstrual Resumption among Lactating Mothers: A Cross-Sectional Study

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Abstract:

Exclusive breastfeeding influences maternal reproductive physiology by suppressing ovulation and potentially delaying postpartum menstrual resumption through lactational amenorrhea. This study examined the association between exclusive breastfeeding and the timing of postpartum menstrual resumption among lactating mothers in Trunamanggala Village, Cimalaka District, Sumedang Regency, Indonesia. A quantitative correlational study with a cross-sectional design was conducted among 60 breastfeeding mothers aged 20–35 years with infants aged 6–12 months, recruited using total sampling. Data were collected using a validated 20-item questionnaire covering maternal characteristics, exclusive breastfeeding practices, and the timing of postpartum menstrual resumption. Univariate analysis was used to summarize participant characteristics and study variables, while Spearman's rank correlation was applied to assess the association between exclusive breastfeeding and menstrual resumption. Most participants (93.3%, $n = 56$) reported exclusive breastfeeding for at least six months, and 65.0% ($n = 39$) experienced menstrual resumption at six months postpartum or later. Exclusive breastfeeding was significantly and positively associated with later postpartum menstrual resumption (Spearman's $\rho = 0.364$, $p = 0.004$), indicating a modest relationship between longer exclusive breastfeeding and prolonged postpartum amenorrhea. Maternal age was not significantly associated with menstrual resumption ($\rho = -0.196$, $p = 0.133$). These findings support the role of sustained exclusive breastfeeding in delaying the return of menstruation and highlight its relevance to postpartum reproductive health and birth-spacing counseling. Interpretation should remain cautious because the cross-sectional design does not establish causality.

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INTRODUCTION

Exclusive breastfeeding during the first six months of life is a fundamental component of optimal infant nutrition and an important determinant of maternal and child health. Breast milk provides the nutrients required for early growth and development while supporting immune protection during a period of high vulnerability to infection and nutritional disturbances (Dib et al., 2024). International infant-feeding recommendations emphasize exclusive breastfeeding for the first six months, followed by continued breastfeeding alongside appropriate complementary foods for up to two years or beyond (Pérez-Escamilla et al., 2023). Exclusive breastfeeding is generally defined as feeding infants only breast milk, except for medically indicated vitamins, minerals, or medications. Its benefits extend beyond infant nutrition because breastfeeding is also associated with maternal

health advantages, including metabolic and long-term cardiovascular protection (Tschiderer et al., 2022). Recent systematic evidence confirms both improvements in exclusive breastfeeding and reductions in selected infant morbidities associated with breastfeeding-promotion interventions.

The implementation of exclusive breastfeeding remains influenced by maternal, social, and reproductive characteristics that may affect breastfeeding continuity and postpartum physiological recovery. Breastfeeding outcomes arise from interactions between individual maternal characteristics and broader health-system, social, and structural determinants (Pérez-Escamilla et al., 2023). Maternal knowledge, educational attainment, occupation, antenatal care, and place of delivery have also been identified as important determinants of exclusive breastfeeding across populations (Gebeyehu et al., 2023). Maternal age represents one potential determinant because reproductive experience, health literacy, physical condition, and psychosocial readiness may differ across age groups. Breastfeeding behavior is additionally shaped by access to information, family and social support, employment conditions, and contact with healthcare services. Evidence from West Java demonstrates that maternal knowledge, employment-related characteristics, self-efficacy, healthcare factors, and sociodemographic characteristics contribute to variation in exclusive breastfeeding practices in Indonesia (Apriningsih et al., 2024). These interacting determinants make breastfeeding outcomes highly context dependent, particularly in community settings where maternal characteristics and local health practices vary substantially.

Postpartum resumption of menstruation is an important reproductive outcome closely linked to the neuroendocrine adaptations associated with lactation. Prolactin plays a central role in maintaining milk production and participates in the hormonal regulation that accompanies lactation (Hannan et al., 2023). Infant suckling maintains elevated prolactin levels and contributes to the suppression of reproductive neuroendocrine signaling, with mechanistic evidence demonstrating prolactin-mediated inhibition of kisspeptin neuronal activity, a mechanism implicated in lactational infertility (Hackwell et al., 2025). Sustained breastfeeding can therefore suppress hypothalamic–pituitary–ovarian activity, delay ovulation, and maintain lactational amenorrhea. Clinical evidence further indicates that ovarian suppression depends on actual breastfeeding behavior, particularly frequent suckling and nighttime feeding. At the same time, the introduction of formula or complementary foods can reduce this suppressive effect and facilitate resumption of ovarian activity (Grandi et al., 2024). The duration of postpartum amenorrhea consequently varies among women because breastfeeding intensity, feeding patterns, maternal physiological characteristics, and contraceptive exposure may influence reproductive recovery.

Current evidence indicates that exclusive or intensive breastfeeding is generally associated with a longer interval before ovulation and menstrual resumption than partial or non-exclusive breastfeeding. Frequent breastfeeding, including nighttime suckling, prolongs ovarian inhibition, whereas reduced breastfeeding frequency and the introduction of supplementary feeding facilitate the recovery of ovarian activity (Grandi et al., 2024). Lactational amenorrhea consequently has practical relevance for birth spacing. It provides the physiological basis for the Lactational Amenorrhea Method, which requires exclusive or nearly exclusive frequent breastfeeding, continued amenorrhea, and use within the first six months postpartum (Hammad et al., 2023). Additional contraception is recommended when menstruation returns, exclusive breastfeeding ceases, or the infant reaches six months of age. Menstrual resumption remains clinically important because recovery of reproductive function can increase pregnancy risk in the absence of effective contraception. Short interpregnancy intervals are associated with increased risks of adverse pregnancy and neonatal outcomes, including preterm birth, low birth weight, small-for-gestational-age birth, and fetal or neonatal complications (Ni et al., 2023; Wang et al., 2022).

Evidence regarding the relationship between exclusive breastfeeding and menstrual resumption remains heterogeneous because multiple concurrent physiological and behavioral factors influence postpartum reproductive recovery. Current endocrine evidence supports the central role of prolactin and lactation-related hormonal adaptations in reproductive suppression, although individual responses to lactation vary (Hannan et al., 2023). Hormonal contraceptive methods further complicate assessment of menstrual recovery because contraceptive exposure can substantially alter bleeding patterns, making bleeding-based measures difficult to interpret as direct indicators of ovarian function (Creinin et al., 2022). Postpartum menstrual resumption may also vary in relation to non-lactational maternal characteristics, with prospective evidence demonstrating associations between postpartum psychological status and the timing of menstrual return (Ishihara et al., 2022). Recent Indonesian evidence has identified maternal age, residence, education, exposure to prenatal care, socioeconomic characteristics, and breastfeeding-related practices as relevant correlates of exclusive breastfeeding, underscoring the importance of examining breastfeeding within its local demographic context (Syahri et al., 2024). Community-level evidence that simultaneously integrates exclusive breastfeeding, menstrual resumption, maternal characteristics, and contraceptive exposure appears to be limited in specific Indonesian settings, such as Trunamanggala Village.

The present study addresses this contextual gap by examining the association between exclusive breastfeeding and the resumption of menstruation postpartum among lactating mothers in Trunamanggala Village, Cimalaka District, Sumedang Regency. The study provides local empirical evidence from mothers aged 20–35 years with infants aged 6–12 months, a period in which differences in breastfeeding duration and menstrual recovery can be meaningfully observed. Its contribution lies in linking breastfeeding practice to the timing of menstrual return and in describing maternal and contraceptive characteristics that may influence the interpretation of the association, particularly because breastfeeding and hormonal contraceptive use have been identified as important predictors of postpartum menstrual resumption (Belay & Asratie, 2022). This community-based perspective may strengthen understanding of postpartum reproductive patterns because menstrual resumption is closely related to subsequent postpartum contraceptive use and can vary substantially with maternal and healthcare characteristics across populations (Gebeyehu et al., 2023).

The objective of this study was to determine the relationship between exclusive breastfeeding and the timing of postpartum menstrual resumption among breastfeeding mothers. The study also aimed to describe exclusive breastfeeding practices and patterns of menstrual return within the study population. Evidence from this research is expected to support more comprehensive lactation counseling by highlighting breastfeeding as both a nutritional practice and a factor in postpartum reproductive physiology, particularly given women's experiences indicating a need for clearer integration of breastfeeding information with postpartum contraceptive counseling (Pearlman Shapiro et al., 2022). Improved understanding of this relationship may assist nurses, midwives, and other healthcare professionals in integrating breastfeeding promotion with postpartum family-planning education and maternal reproductive health counseling, an approach supported by evidence demonstrating the central role of midwives in delivering postpartum contraceptive counseling (Cheney et al., 2024).

METHOD

Research design

This study employed a quantitative correlational design to examine the association between exclusive breastfeeding and the timing of postpartum menstrual resumption among lactating

mothers. A cross-sectional approach was applied to measure the exposure and outcome variables within a defined study period. This design enabled the estimation of the direction and strength of the statistical association between the study variables without implying a causal relationship.

Population and sample

The study included 60 breastfeeding mothers, all of whom were recruited using a total sampling technique. Eligible participants were mothers aged 20–35 years with infants aged 6–12 months, regardless of contraceptive use, who could recall the timing of postpartum menstrual resumption and provided consent to participate in the study. Participants who were unavailable during the data collection period due to illness, travel, or other circumstances that prevented them from participating in the study were excluded.

Place and time

The study was conducted in Trunamanggala Village, Cimalaka District, Sumedang Regency, Indonesia, from August to September 2024. Eligible participants were breastfeeding mothers aged 20–35 years with infants aged 6–12 months. Participants were asked to report the timing of their first postpartum menstrual resumption based on recall.

Instrument

Data were collected using a 20-item questionnaire comprising 10 demographic items, eight items assessing exclusive breastfeeding, and two items assessing the timing of postpartum menstrual resumption. Exclusive breastfeeding and menstrual resumption were measured using a Guttman scale, with favorable items scored as Yes = 1 and No = 0, and unfavorable items reverse-scored. Instrument validity was evaluated among breastfeeding mothers in Mandalaherang Village, Sumedang Regency, whose demographic and sociocultural characteristics are comparable to those of the study site. All items demonstrated acceptable item validity based on Pearson product–moment correlations ($r > 0.349$). Internal consistency testing yielded Cronbach's $\alpha = 0.657$ for the exclusive breastfeeding measure and Cronbach's $\alpha = 0.543$ for the postpartum menstrual resumption measure.

Data collection

Primary data were collected using a structured questionnaire administered through Google Forms to participants who met the predefined eligibility criteria. The researcher provided standardized instructions regarding the study procedures before questionnaire completion. Assistance was available during data collection to clarify procedural issues and support respondents in completing the questionnaire accurately without influencing their responses.

Data analysis

Data were analyzed using univariate and bivariate statistical procedures. Univariate analysis was used to summarize the distribution of study variables using frequencies and percentages. Bivariate analysis was performed using Spearman's rank correlation test to assess the direction, strength, and statistical significance of the association between exclusive breastfeeding and the timing of postpartum menstrual resumption, with statistical significance set at $p < 0.05$.

Ethical declaration

Ethical approval for this study was obtained from the Health Research Ethics Committee of Universitas Jenderal Achmad Yani (No. 039/KEPK/FitKes-Unjani/XII/2024). All research procedures complied with established ethical standards for studies involving human participants. Informed

consent was obtained from all participants after they received comprehensive information regarding the study objectives, procedures, potential benefits, and possible risks. Participation was entirely voluntary, with participants retaining the right to decide whether to take part in the study. Participant confidentiality was protected by anonymizing all personal identifiers in the research data.

RESULT

Based on a study conducted in Trunamanggala Village, 60 breastfeeding mothers met the criteria and agreed to participate. The research findings were analyzed using univariate and bivariate methods, as presented in the following table.

Overview of Respondent Characteristics

Table 1. Frequency Distribution of Respondents' Characteristics (N = 60)

Characteristic	Category	n	%
Occupation	Housewife	55	91.7
	Government employee/National Army/National Police	4	6.7
	Self-employed	1	1.7
Education	Elementary school	3	5.0
	Junior high school	21	35.0
	Senior high school	28	46.7
	Undergraduate/postgraduate	8	13.3
Age (years)	20–25	28	46.7
	26–35	32	53.3
Family planning method	Injection	29	48.3
	Intrauterine device (IUD)	21	35.0
	Implant	4	6.7
	Not yet using/not using	6	10.0

Based on Table 1, most breastfeeding mothers in Trunamanggala Village are homemakers, comprising 55 respondents (91.7%). Regarding education, most breastfeeding mothers have a secondary or high school education, with 28 respondents (46.7%). In terms of age, most breastfeeding mothers are between 26 and 35 years old, with 32 respondents (53.3%). Lastly, in the family planning variable, most breastfeeding mothers use injectable birth control, with 29 respondents (48.3%).

Cross-tabulation of Age and Exclusive Breastfeeding

The frequency distributions of age, exclusive breastfeeding, and the return of menstruation are shown in the following table, based on the cross-tabulation results.

Table 2. Cross-Tabulation of Age, Breastfeeding, and Menstruation (N = 60)

Variable	Category	20–25 years, n (%)	26–35 years, n (%)	Total, n
Breastfeeding	< 6 months	2 (7.0)	2 (6.0)	4
	≥ 6 months	26 (93.0)	30 (94.0)	56
	Total	28 (100.0)	32 (100.0)	60
Menstruation	< 6 months	7 (25.0)	14 (44.0)	21
	≥ 6 months	21 (75.0)	18 (56.0)	39
	Total	28 (100.0)	32 (100.0)	60

Based on Table 2, most breastfeeding mother respondents who exclusively breastfed for ≥ 6 months were aged 26-35 years, namely 30 people (94%). Meanwhile, most breastfeeding mother respondents who experienced menstruation for ≥ 6 months were aged 20-25 years, namely 21 people (75%).

Cross-tabulation of Contraceptive Use with Breastfeeding and Menstruation

The results of the cross-tabulation of frequency distributions between the use of birth control and exclusive breastfeeding and the return of menstruation are shown in the following table.

Table 3. Cross-Tabulation of Contraceptive Use with Breastfeeding and Menstruation

Variable	Category	Injection, n (%)	IUD, n (%)	Implant, n (%)	Not yet using/Not using, n (%)	Total, n
Breastfeeding	< 6 months	1 (3.0)	3 (13.0)	0 (0.0)	0 (0.0)	4
	≥ 6 months	28 (97.0)	18 (87.0)	4 (100.0)	6 (100.0)	56
	Total	29 (100.0)	21 (100.0)	4 (100.0)	6 (100.0)	60
Menstruation	< 6 months	10 (35.0)	8 (38.0)	2 (50.0)	1 (17.0)	21
	≥ 6 months	19 (65.0)	13 (62.0)	2 (50.0)	5 (83.0)	39
	Total	29 (100.0)	21 (100.0)	4 (100.0)	6 (100.0)	60

Table 3 shows that most breastfeeding mothers in Trunamanggala Village who used injectable contraceptives practiced exclusive breastfeeding for ≥ 6 months (28 respondents, or 97%). Meanwhile, most breastfeeding mothers using injectable contraceptives experienced the return of menstruation at ≥ 6 months (19 respondents, or 65%).

Correlation Between Age, Breastfeeding, and Return of Menstruation

Table 4. Spearman Rank Correlations Between Age, Breastfeeding, and Return of Menstruation

Variable	Correlation coefficient (rs)	p	N
Age – Return of menstruation	-0.196	0.133	60
Breastfeeding – Return of menstruation	0.364	0.004	60

The Spearman rank correlation analysis showed that age was not significantly correlated with the return of menstruation ($r_s = -0.196$, $p = 0.133$). In contrast, breastfeeding duration was significantly and positively correlated with the return of menstruation ($r_s = 0.364$, $p = 0.004$). These findings indicate that greater breastfeeding duration was associated with a higher value of the measured menstruation-return variable, whereas age showed no statistically significant correlation with the return of menstruation.

DISCUSSION

The present study identified a clear association between exclusive breastfeeding and delayed postpartum resumption of menstruation among lactating mothers in Trunamanggala Village. Most participants practiced exclusive breastfeeding for at least 6 months, with 56 of 60 mothers reporting breastfeeding durations consistent with the recommended period. A substantial proportion of participants also experienced menstrual resumption at 6 months postpartum or later, and the statistical analysis showed a positive association between the duration of exclusive breastfeeding and the timing of menstrual return. The observed Spearman correlation coefficient indicated a modest rather than a strong association, suggesting that breastfeeding contributes meaningfully to

postpartum reproductive suppression while remaining only one of several determinants of menstrual recovery, consistent with the established neuroendocrine basis of lactational amenorrhea (Calik-Ksepka et al., 2022). Maternal age was not significantly associated with menstrual resumption in the present study. However, recent population-based evidence indicates that maternal age, breastfeeding persistence, menstrual history, and reproductive characteristics may jointly contribute to variation in postpartum menstrual recovery (Samejima et al., 2024).

The high prevalence of exclusive breastfeeding observed in this population is broadly consistent with evidence indicating that maternal knowledge, social support, healthcare system practices, and broader structural conditions shape successful breastfeeding. Evidence synthesized across breastfeeding interventions indicates that coordinated health-service support, counseling, community-based interventions, and supportive social environments can substantially improve breastfeeding initiation, exclusivity, and continuation (Tomori et al., 2022). Exclusive breastfeeding during the first six months provides important nutritional and immunological benefits for infants, while sustained breastfeeding has also been associated with favorable health outcomes for mothers and offspring across the life course (Liu et al., 2025). The high proportion of mothers achieving at least six months of exclusive breastfeeding in the present study reflects favorable breastfeeding practices within the study setting. However, the cross-sectional design does not permit identification of the specific social, educational, or health-service factors responsible for this pattern.

Maternal age appeared to have a limited influence on exclusive breastfeeding and postpartum menstrual resumption within the study population. Participants were restricted to mothers aged 20–35 years, resulting in relatively limited age variability for detecting age-related differences. Recent systematic evidence identifies maternal age as one of several demographic predictors of exclusive breastfeeding. However, its contribution operates alongside maternal education, socioeconomic status, breastfeeding knowledge, social support, parity, and healthcare exposure (Kalhor et al., 2025). Evidence from another systematic review similarly suggests that continuing breastfeeding to 6 months is strongly influenced by employment, breastfeeding knowledge, parity, perceived milk insufficiency, feeding attitudes, self-efficacy, and breastfeeding intention, rather than chronological age alone (Wu et al., 2022). The absence of a statistically significant relationship between age and menstrual return in the present analysis may consequently reflect the restricted age distribution rather than the complete absence of age-related reproductive effects. A larger sample encompassing younger mothers and women older than 35 years would provide greater variability for assessing the independent contribution of maternal age to postpartum reproductive recovery.

The timing of postpartum menstrual resumption observed in this study supports the established physiological relationship between breastfeeding and suppression of ovarian activity. Thirty-nine mothers experienced menstrual return at six months postpartum or later, compared with 21 mothers whose menstruation returned before six months. Evidence synthesized by the American Academy of Pediatrics indicates that exclusive or predominant breastfeeding is associated with a greater probability of continued amenorrhea during the first six postpartum months compared with partial or no breastfeeding (Meek & Noble, 2022). Recent observational evidence also demonstrates substantial interindividual variation in menstrual resumption, with breastfeeding persistence, maternal age, previous menstrual characteristics, contraceptive history, and family-related factors contributing to delayed postpartum menstruation (Samejima et al., 2024). Postpartum menstrual recovery should therefore be understood as a multifactorial reproductive process rather than an outcome determined exclusively by breastfeeding duration.

The significant positive correlation between exclusive breastfeeding and delayed menstrual resumption represents the central finding of this study. A Spearman's rho coefficient of 0.364 ($p=0.004$) indicates that longer exclusive breastfeeding was associated with later menstrual return.

However, the magnitude of the coefficient should be interpreted as modest rather than strong. Contemporary clinical evidence indicates that exclusive or near-exclusive breastfeeding can prolong postpartum amenorrhea, particularly when breastfeeding remains sufficiently frequent during both daytime and nighttime periods (Meek & Noble, 2022). This association is biologically plausible because sustained suckling maintains lactation-associated neuroendocrine signals that suppress ovarian activity and delay restoration of normal reproductive cycling (Calik-Ksepka et al., 2022). The present findings extend this evidence to a community-based population in Sumedang Regency while demonstrating that the observed association remains moderate. The cross-sectional observational design precludes causal inference, making it more appropriate to describe exclusive breastfeeding as associated with delayed menstrual resumption rather than directly causing it.

The neuroendocrine regulation of lactation and reproductive function strongly supports the biological plausibility of this association. Infant suckling generates neural input to hypothalamic pathways, promoting prolactin secretion and creating a physiological state of hyperprolactinemia that suppresses ovarian activity during lactation. Elevated prolactin levels influence hypothalamic reproductive signaling, including kisspeptin-mediated regulation of gonadotropin-releasing hormone pulsatility, thereby reducing luteinizing hormone activity and delaying the restoration of ovulatory ovarian cycles (Calik-Ksepka et al., 2022). Contemporary neuroendocrine evidence further establishes kisspeptin and neurokinin B neurons as major regulators of pulsatile GnRH secretion and of the hypothalamic–pituitary–gonadal axis that controls menstrual cyclicity and ovulation (Koysombat et al., 2025). Persistent suckling can maintain endocrine conditions that favor lactational amenorrhea, whereas reduced breastfeeding stimulation permits progressive recovery of hypothalamic–pituitary–ovarian function and eventual resumption of menstruation.

Breastfeeding intensity may be more physiologically informative than the categorical classification of exclusive breastfeeding alone. Lactational reproductive suppression depends on the intensity of the suckling stimulus, feeding intervals, breastfeeding frequency, nighttime feeding, and changes in maternal energy balance during lactation. Experimental and neuroendocrine evidence indicate that suckling-related signals suppress kisspeptin-mediated GnRH and luteinizing hormone pulsatility. At the same time, the substantial energetic demands of milk production may further contribute to reproductive suppression during lactation (Uenoyama et al., 2023). Clinical guidance similarly emphasizes feeding frequency, including intervals not exceeding approximately four hours during the day and six hours at night, as an important condition underlying the contraceptive effectiveness of lactational amenorrhea during the first six postpartum months (Meek & Noble, 2022). Mothers classified as exclusively breastfeeding may therefore experience substantially different levels of neuroendocrine stimulation depending on their actual feeding patterns. The absence of detailed information on feeding frequency, feeding duration, nighttime breastfeeding, and prolactin concentrations in the present study limits identification of the specific breastfeeding behaviors most strongly associated with delayed menstrual resumption.

Contraceptive use represents an important potential confounder when interpreting postpartum menstrual patterns in this population. Nearly half of the participants used injectable contraception, while other participants used intrauterine devices, implants, or no contraception. Hormonal contraceptive methods can alter menstrual bleeding independently of lactational physiology, making the presence or absence of menstrual bleeding an imperfect surrogate for recovery of ovarian function. Clinical guidance on depot medroxyprogesterone acetate indicates that menstrual changes, including irregular bleeding and progressively increasing rates of amenorrhea with prolonged use, are expected consequences of this progestin-only contraceptive method (American College of Obstetricians and Gynecologists' Committee on Clinical Consensus–Gynecology, 2022). Pharmacological evidence further demonstrates that DMPA suppresses gonadotropin secretion,

inhibits follicular maturation and ovulation, and modifies the endometrium, providing a direct biological explanation for altered bleeding patterns among DMPA users (Shaheen et al., 2024). Menstrual resumption in the current study cannot be attributed solely to breastfeeding, particularly among mothers using hormonal contraception. Future analyses should distinguish contraceptive methods explicitly and use stratification or multivariable adjustment to estimate the independent association between exclusive breastfeeding and postpartum menstrual recovery.

The findings have important implications for maternal and reproductive health counseling because breastfeeding-related amenorrhea may contribute to postpartum birth spacing when specific clinical conditions are satisfied. The Lactational Amenorrhea Method is recognized as a temporary postpartum contraceptive approach when a mother remains amenorrheic, the infant is younger than six months, and breastfeeding is exclusive or nearly exclusive with frequent feeding. Exclusive breastfeeding alone should not be interpreted as reliable contraception once these conditions are no longer fulfilled. Health professionals should therefore communicate the reproductive benefits of breastfeeding without creating the impression that breastfeeding universally prevents pregnancy. Counseling delivered by nurses, midwives, and community health workers should integrate breastfeeding support with individualized postpartum family planning information, particularly when menstruation has resumed, breastfeeding frequency has declined, complementary feeding has begun, or the infant has reached 6 months of age (Hoyt-Austin et al., 2023). The cited study specifically emphasizes gaps in maternal understanding of the contraceptive effects of breastfeeding and recommends that clinicians provide clearer counseling regarding LAM as a postpartum contraceptive option.

Several methodological limitations require consideration when interpreting the present findings. The relatively small sample of 60 mothers from a single village limits statistical power and reduces the generalizability of the results to populations with different socioeconomic, cultural, nutritional, or healthcare characteristics. Total sampling improved coverage of the accessible study population but did not eliminate the possibility of selection bias related to participant availability and willingness to participate. Reliance on retrospective self-reports of breastfeeding duration and menstrual resumption introduces potential recall and classification biases, particularly when breastfeeding practices are reconstructed retrospectively (Nanishi et al., 2023). The cross-sectional design also prevents temporal and causal inference. At the same time, the analysis did not adequately control for parity, maternal nutritional status, body mass index, breastfeeding frequency, nighttime feeding, complementary feeding practices, postpartum complications, stress, sleep, infant feeding behavior, or exposure to hormonal contraception. Future studies would benefit from prospective longitudinal follow-up beginning soon after childbirth, repeated assessment of breastfeeding intensity and menstrual status, more precise measurement of contraceptive use, and multivariable modeling capable of separating the independent contribution of breastfeeding from other determinants of postpartum reproductive recovery. Different maternal recall approaches can produce markedly different estimates of exclusive breastfeeding, supporting caution when retrospectively measured breastfeeding exposure is used in epidemiological analyses.

CONCLUSION

This study demonstrated a significant positive association between exclusive breastfeeding and delayed postpartum menstrual resumption among lactating mothers in Trunamanggala Village, indicating that longer exclusive breastfeeding was associated with a longer duration of postpartum amenorrhea. The observed relationship was modest in magnitude, suggesting that breastfeeding is an important determinant of menstrual recovery but does not operate independently of other

physiological and reproductive factors. Maternal age was not significantly associated with the timing of menstrual resumption within the age range studied. The findings support the biological role of sustained breastfeeding in suppressing ovarian activity and highlight its potential contribution to postpartum birth spacing when the established criteria for lactational amenorrhea are fulfilled. Interpretation should remain cautious because the cross-sectional design, limited sample size, single-site setting, reliance on maternal recall, and potential influence of hormonal contraceptive use restrict causal inference and generalizability. Prospective multicenter studies incorporating breastfeeding intensity, hormonal profiles, nutritional status, contraceptive exposure, and other relevant confounders are warranted to clarify the independent effect of breastfeeding on postpartum reproductive recovery.

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CONFLICT OF INTEREST

The authors declare that they have no financial or personal relationships with any individuals or organizations that could influence or bias the content and findings of this article. They have no competing or conflicting interests to disclose.

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