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Breastfeeding Adequacy Across DASS-21 Stress Severity Levels: A Cross-Sectional Study in Primary Midwifery Care

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ABSTRAK

Introduction *Psychological stress may hinder breastfeeding, but little is known about how breastfeeding adequacy varies across graded stress levels in primary midwifery care. This study explored the association between DASS-21 stress severity and indicator-based milk adequacy among mothers of infants aged 0–6 months.*

Methods *This exploratory cross-sectional study was conducted at a single independent midwifery practice in Lamongan, Indonesia, in January 2026. Of 21 registered breastfeeding mothers, 18 eligible mothers were included through purposive sampling (n = 18). Stress was measured with the DASS-21 stress subscale. Milk adequacy was assessed with a seven-item yes/no checklist of maternal and infant indicators that does not measure milk volume; adequacy was defined as at least five indicators. Data were analyzed using the two-sided Fisher Freeman Halton exact test.* ***Results*** *Seven mothers had normal stress, six mild, four moderate, and one severe stress; 12 of 18 (66.7%) met the adequacy criterion. Inadequate milk adequacy was observed in 0/7 mothers with normal stress, 2/6 (33.3%) with mild, 3/4 (75.0%) with moderate, and 1/1 with severe stress (p = 0.017). The association was unadjusted and imprecise.*

Discussion and Conclusion *Higher stress categories were associated with a greater proportion of checklist-defined inadequacy in this small single-site sample. The findings do not establish causality; they support larger longitudinal studies using validated adequacy measures and suggest that maternal psychological wellbeing deserves attention in lactation support.*

Keywords *: breast milk production, breastfeeding mothers, DASS-21, lactation, maternal stress*

INTRODUCTION

Breast milk provides complete nutrition and immunological protection for infants, and exclusive breastfeeding during the first six months of life reduces infant morbidity and mortality with lifelong benefits for both children and mothers [1]. The World Health Organization emphasizes that mothers need intensive breastfeeding support during the newborn period, when most breastfeeding difficulties begin [2]. According to the 2023 Indonesian Health Survey, 68.6% of infants aged 0-5 months in Indonesia were exclusively breastfed a level that remains beneath the 80% national target [3]. Suboptimal breastfeeding is linked to poorer infant growth and stunting at the population level [4], [5].

Reports of perceived or actual deficiency in milk are a common occurrence. The rationale behind introducing formula supplementation and the premature discontinuation of breastfeeding encompasses a multifaceted array of considerations. Roughly fifty percent of mothers who discontinue breastfeeding attribute this decision to the perception of inadequate milk supply [6]. Because mothers often judge their milk supply based on how their breasts feel and the baby's behavior. Consequently, such behavioral interpretations may diverge from empirically measured milk yields [6]. In Lamongan, insufficient milk, inadequate lactation management, and limited social support. It has been reported that these are the reasons why some mothers choose to use both breastfeeding and formula feeding [7].

The postpartum phase demands that mothers navigate the dual challenges of physical recuperation and disrupted sleep patterns. New caregiving responsibilities and disruption, as well as a decrease in family support and breastfeeding, are present. Knowledge and economic pressures also add to the stress [8]. Maternal psychological distress has been linked to delayed secretory activation and a shortened duration. Although the relationship is likely to be bidirectional due to exclusive breastfeeding, it is not clear if it is exclusive breastfeeding difficulties can also increase distress [9]. Stress has been reported to reduce the frequency of oxytocin releases during the early stages of breastfeeding [10]. Importantly, an elevated stress score obtained via a screening instrument does not constitute a formal diagnosis of postpartum depression. The presence of depression indicates psychological stress that may warrant additional evaluation.

Several Indonesian studies have reported associations between maternal stress and breast milk outcomes [11], [12], [13], [14], whereas a study using the Perceived Stress Scale found no significant association [15]. These inconsistencies may reflect differences in stress instruments, dichotomized stress categories, outcome definitions, and infant age ranges. Few studies have examined how well breastfeeding is done. Distributed across the graded severity categories of a standardized instrument such as the DASS-21, especially in independent midwifery practices where midwives are the main caregivers first point of contact for postpartum mothers. A small single-site study cannot establish causality, a biological dose–response effect, or broad generalizability; its achievable contribution is to describe the pattern across graded stress categories and to generate hypotheses for larger studies. This exploratory study therefore aimed to examine the association between DASS-21 stress severity and indicator-based milk adequacy among breastfeeding mothers of infants aged 0-6 months in primary midwifery care.

METHODS

This exploratory analytic cross-sectional study was conducted at the Independent Midwifery Practice (TPMB) Kristini Juariningsih, S.Keb, Kalitengah, Lamongan Regency, East Java, Indonesia, a primary midwifery facility providing postpartum care, breast care education, and breastfeeding counselling. Exposure (stress category) and The results regarding milk sufficiency were checked at the same time, and the study results are presented following the STROBE recommendations for cross sectional studies.

The source population included all 21 breastfeeding mothers who were registered at the practice. Data were gathered on one day, January 27, 2026, and all 21 registered individuals were included. On that day, the researcher talked to the mothers and checked if they were eligible. Eligibility was determined by the researcher using maternal and child health (KIA) records and a brief interview. The inclusion criteria were: (1) mothers who had given birth and were caring for their newborns. Aged 0–6 months, confirmed from the KIA book; currently breastfeeding; willing. To take part; and (4) capable of communicating effectively. The exclusion criteria were: (1) serious maternal health complications; (2) maternal or infant conditions that impede breastfeeding and; (3) incomplete questionnaires. Three mothers did not meet one or more of the inclusion criteria. Exclusion criteria were applied, resulting in the

elimination of non-qualifying subjects; consequently, a cohort of 18 participants was retained through purposive selection sampling. No prior calculation was done to determine the sample size; the study is therefore described as an exploratory near-census of eligible mothers at one practice, with limited statistical power for a 4×2 comparison with sparse cells. Exact infant age was used only to confirm eligibility and was not retained as a variable in the analytic dataset.

Stress, underlined maternal stress, and suffocation were measured using the stress subscale of the Depression Anxiety Stress Scales (DASS-21), with seven items in the range of 0 to 3 for me, and covering experiences over the past week [16], using the Indonesian version, whose construct validity and reliability have been measured in Indonesian adults [17]. The subscale total is multiplied by two and delimited in terms of the publication cutoffs for the corresponding measures: normal (0–14), mild (15–18), moderate (19–25), severe (26–33), or extremely severe (34) [16]. The most severe and the most severe categories accounted for by these groups for a common group are combined for an ultimate “severe (26)” class, as scores of those categories are defined, so it would not be possible to differentiate the scores for these subjects, because they are simply classified as category scores. The questionnaire was checked for completeness in a sample of 18, and there were no item codes; it is not possible to calculate internal consistency in this sample since it could not be accurately said that category codes would suffice.

The outcome was indicator-based milk adequacy, assessed with a seven-item yes/no checklist compiled by the researchers from commonly used maternal and infant signs of breastfeeding adequacy: (1) milk is expressed when the breast is pressed; (2) the breast feels full or firm before feeding; (3) milk drips or flows while the infant suckles; (4) the infant feeds at least eight times in 24 hours; (5) the infant urinates at least six times in 24 hours; (6) the infant appears satisfied and calm after feeding; and (7) the infant shows no excessive weight loss. The checklist was self-completed by mothers in the same session as the DASS-21, which preceded it on the questionnaire form; all items, including infant weight, were based on maternal report. Mothers fulfilling at least five of seven indicators were classified as adequate and those fulfilling four or fewer as inadequate; this cut-point was set a priori as a majority of indicators because no validated threshold exists. The checklist has not been validated, indicating maternal sensations and infant feeding and output (although not an individual's total milk volume or supply). Frequency criteria apply to feedings and wet diapers after the first

postpartum week and vary with infant age, so the outcome is interpreted as checklist-defined adequacy rather than objective milk supply.

The data were analyzed using IBM SPSS Statistics version 26. Categorical variables are shown as frequencies and percentages; in the cross-tabulation, percentages are used and calculated within each stress category. Because over 20% of the cells were expected. The link between stress levels and whether enough milk was provided was checked. Using the two-sided Fisher-Freeman-Halton exact test for a 4 by 2 table, statistical analysis. Significance was set at $p < 0.05$. No multivariable adjustment was attempted because of the small sample size. Small sample size, and all estimates are not adjusted and are just initial, exploratory findings.

RESULTS

Characteristics of Respondents

Of the 21 registered breastfeeding mothers, three did not meet the eligibility criteria and 18 were included and analyzed; no participant had missing data for the analyzed variables. Their **characteristics** are presented in Table 1.

Table 1. Characteristics of Respondents (n = 18)

Characteristic	Category	f	%
Maternal age	< 20 years	2	11.1
	20–30 years	12	66.7
	> 30 years	4	22.2
Education	Junior high school	4	22.2
	Senior high school	10	55.6
	Higher education	4	22.2
Occupation	Housewife	12	66.7
	Private employee	6	33.3
Parity	Primipara	11	61.1
	Multipara	7	38.9
Mode of delivery	Caesarean section	10	55.6
	Vaginal delivery	8	44.4

Note: maternal age groups as recorded (<20, 20–30, >30 years). Infant age, months postpartum, and feeding exclusivity were not recorded in the analytic dataset.

Most mothers were aged 20–30 years, had completed senior high school, and were housewives. Primiparous mothers and caesarean deliveries each accounted for more than half of the participants.

Distribution of Stress Categories and Milk Adequacy

The distribution of DASS-21 stress categories and indicator-based milk adequacy is shown in Table 2.

Table 2. Distribution of DASS-21 Stress Categories and Indicator-Based Milk Adequacy (n = 18)

Variable	Category	f	%
DASS-21 stress category	Normal (0–14)	7	38.9
	Mild (15–18)	6	33.3
	Moderate (19–25)	4	22.2
	Severe (≥26)[a]	1	5.6
Indicator-based milk adequacy	Adequate (≥5 of 7 indicators)	12	66.7
	Inadequate (≤4 of 7 indicators)	6	33.3
Total		18	100.0

Note: [a] severe (26–33) and extremely severe (≥34) categories combined.

Eleven of the 18 mothers (61.1%) scored above the normal range on the DASS-21 stress subscale, mostly in the mild and moderate categories, and only one mother was classified as severe. Twelve mothers (66.7%) met the checklist criterion for adequacy.

Milk Adequacy by Stress Category

The distribution of milk adequacy within each stress category is presented in Table 3.

Table 3. Indicator-Based Milk Adequacy by DASS-21 Stress Category (n = 18)

DASS-21 stress category	Adequate		Inadequate		Total		p-value*
	n	%	n	%	n	%	
Normal (0–14)	7	100.0	0	0.0	7	100.0	0.017
Mild (15–18)	4	66.7	2	33.3	6	100.0	
Moderate (19–25)	1	25.0	3	75.0	4	100.0	
Severe (≥26)	0	0.0	1	100.0	1	100.0	
Total	**12**	**66.7**	**6**	**33.3**	**18**	**100.0**	

Note: % = row percentage within each stress category; severe includes extremely severe (≥34). *Two-sided Fisher–Freeman–Halton exact test (exact p = 0.0168); unadjusted.

Inadequate milk adequacy was observed in none of the 7 mothers with normal stress (0%), in 2 of 6 mothers with mild stress (33.3%), in 3 of 4 mothers with moderate stress (75.0%), and in the single mother with severe stress (1/1). Overall, 6 of the 11 mothers with any degree of stress (54.5%) were classified as inadequate, compared with 0 of 7 mothers in the normal category. The Fisher Freeman Halton exact test indicated an association between stress category and milk adequacy (p = 0.017). This association is unadjusted, and the very

small numbers in the moderate (n = 4) and severe (n = 1) categories make the category-specific proportions highly imprecise.

DISCUSSION

This study looked at the link between the level of stress measured by the DASS-21 and milk production sufficient for breastfeeding mothers who are feeding their babies between 0 and 6 months old, based on certain signs or indicators, in a primary midwifery setting. The percentage of mothers who did not meet the adequacy criterion was higher in the higher stress categories, ranging from 0/7 among them. Mothers with normal stress are rated 2/6, showing mild stress, 3/4 indicating moderate stress, and 1/1 for the most severe stress. with severe stress ($p = 0.017$). Given the small sample, sparse cells, and absence of. This finding is seen as a possible link rather than clear proof of a causal or dose-response effect.

This connection matches what earlier Indonesian research found, which showed that mothers who had more stress were more likely to have lower-quality breast milk [11], [12]. They found that stress and other psychological factors are linked to milk production [13], [14]. Stress has also been linked to less exclusive breastfeeding by mothers who have babies between 0 and 6 months old [18]. At the international level, a review of existing research found that a mother's mental health struggles are linked to a slower start of large milk production, shorter periods of exclusive breastfeeding, and earlier stopping of breastfeeding [9]. Moreover, the common belief that there isn't enough milk, which is the most often given reason for starting formula early, is actually affected by both the mother's and the baby's factors, not just the amount of milk [6]. This might explain why the mother's mental state shows up in the way adequacy is measured through indicators.

Nevertheless, the evidence is not entirely consistent. Fatimah et al.found no meaningful connection between the scores from the Perceived Stress Scale and the amount of milk produced. Among 40 mothers whose babies are between 0 and 24 months old, most of them said they had family support [15]. Differences in the tools used to measure stress, how outcomes are defined, the age ranges of infants considered, and available support may account for this discrepancy. Social support may also explain why. In this study, two-thirds of the mothers who experienced mild stress still met the criteria for adequacy. Family support plays a key role in affecting a mother's mental health during this time [8]. By contrast, three out of

the four mothers who experienced moderate stress did not.This meets the criterion, which aligns with reports that anxiety in postpartum mothers is accompanied by lower milk production [19]. These observations suggest that the relationship between stress and breastfeeding can depend on how severe the stress is and the support available.

The stress levels seen in this study are something that needs to be carefully considered. Out of the 18 mothers, 11 (which is about 61.1%) had scores above the normal range on the DASS-21 stress scale, and most of them were in the mild or moderate stress categories. These scores show symptoms like trouble relaxing, being easily annoyed, and feeling tense and nervous in the last week [16], which are common during the early postpartum period when a person is adjusting to new challenges like not sleeping well, recovering physically, not having enough family support, and dealing with financial stress [8]. The DASS-21 is a tool used to screen for psychological stress, so the scores show how much stress someone might be feeling, not necessarily a formal medical condition like postpartum depression. Even though the Indonesian version has some limitations, it still works well in terms of measuring what it's meant to measure and giving consistent results [17], which means it can help identify mothers who might need more check-ups and support.

Before suggesting biological reasons, it's important to look at other possible explanations. Since exposure and outcome were measured at the same time, it's possible that the cause and effect could be reversed: breastfeeding problems might raise a mother's stress levels, and the link between stress and breastfeeding is thought to work both ways [9]. Mothers who feel more stressed might also think or say negative things about breastfeeding signs, because how they feel about not having enough milk is something they personally believe [6]. In addition, factors like parity, the way the baby was delivered, the baby's age, how often the mother breastfeeds, the level of support from the family, and the mother's nutrition were not taken into account and might have affected the results we saw. If the association is real, there might be several reasons for it. None of these were tested in this study, and the study did not measure cortisol, oxytocin, prolactin, or anything else related to those hormones. Milk volume. Stress may mainly impact how milk comes out rather than how much milk is made. A systematic review reported the number of oxytocin pulses during the early stage. Breastfeeding was connected to milk production and tended to decrease when there was stress [10]. Milk synthesis is driven by prolactin and kept going by efficiently removing the milk continuously. Impaired ejection

might lead to less synthesis over time [10]. Psychological distress has also been linked to delayed secretory activation [9]. Behavioural pathways are equally plausible, as stressed mothers may breastfeed less frequently, doubt their milk supply, or introduce formula earlier [6], [7]. The predominance of primiparous mothers and caesarean deliveries in this sample may also be relevant, since emergency caesarean section has been associated with reduced oxytocin and prolactin release and oxytocin levels have been reported to be lower in primiparous than in multiparous women [10], while post-operative recovery may delay effective breastfeeding [20].

Participant characteristics may provide additional context for the overall level of milk adequacy. Most mothers were aged 20–30 years and two-thirds were housewives, conditions that may allow more frequent and unrestricted breastfeeding and may partly explain why two-thirds of the sample met the adequacy criterion. Conversely, more than half of the mothers were primiparous, and first-time mothers often lack breastfeeding experience and are more likely to worry about whether their milk is sufficient [8]. More than half also gave birth by caesarean section, which may delay effective breastfeeding because of post-operative pain and limited mobility [20]. Owing to the small sample, these characteristics could not be examined as confounders or effect modifiers, and their roles should be explored in larger studies.

These findings are relevant to the national context, in which only 68.6% of infants aged 0–5 months are exclusively breastfed [3] and perceived insufficient milk is a leading reason for early supplementation [6], [7]. Although the exploratory design does not justify a specific screening programme, midwives may consider exploring maternal stress and available support during routine lactation counselling and offering additional support or referral when needed. Supportive measures evaluated in other Studies cover teaching about how to breastfeed properly and taking care of the breasts [21], [22], relaxation-based psychological treatments [23], psychological and social support integrated with lactation care [24], family support [25], [26], and digital peer support, which improved exclusive breastfeeding in Lamongan [27]. Interventions such as Oxytocin massage and foods that help increase milk supply have also been studied in midwifery [20], [28], [29].

The results also affect how we check if a baby is getting enough breast milk. In routine practice. Indicators include how often the baby is fed, the number of wet diapers, and the infant's overall condition. Satisfaction in counseling is practical but also partly based on personal feelings and can be affected by different factors by maternal perceptions [6].

Midwives may therefore combine these indicators with Objective tracking of a baby's growth using the growth chart in maternal and child health care. Health (KIA) book, especially because of formula supplementation and suboptimal. Breastfeeding has been linked to unusual weight gain and stunting in infants in Lamongan [5], [7]. Combining psychological support with objective growth monitoring may help midwives tell the difference between what they think is not enough milk and what is really not enough milk, and prevent them from making wrong decisions unnecessary formula supplementation.

The strengths of this study include using a standardized and validated stress test. instrument, full information for every person involved, and the context of care provided in the main midwifery services where most postpartum mothers receive services. However, several limitations must be acknowledged. The sample was small and was chosen on purpose from one single practice. This leads to few cells, not accurate estimates, and limited ability to apply the results to other situations category contained only one mother. Both variables were self-reported; the severe and extremely severe DASS-21 categories were grouped together, and the internal consistency could be checked. The milk adequacy checklist has not been validated, and several of its items are missing. The statement is subjective and does not measure the amount of milk. Infant age was not retained for he analysis and the cross-sectional design prevent us from drawing conclusions about the direction of the relationship

Future research should use bigger samples collected from multiple locations with a planned sample size in advance. Calculate the size, keep track of the baby's age and whether they are exclusively fed, and check if the milk is enough. Use validated measures like infant weight gain or test weighing, report all five DASS-21 items and categories with reliability estimates, and use longitudinal designs with multivariable analysis. Adjusting to make the direction and strength of the relationship clearer.

CONCLUSIONS

In this exploratory cross-sectional study of 18 breastfeeding mothers at a single independent midwifery practice, higher DASS-21 stress categories were associated with a greater proportion of checklist-defined inadequate milk adequacy (0/7 normal, 2/6 mild, 3/4 moderate, and 1/1 severe; Fisher Freeman Halton p = 0.017). The association is unadjusted and imprecise, the outcome checklist has not been validated and does not measure milk

volume, and the cross-sectional design cannot establish the direction of the relationship. The findings therefore indicate an association that warrants confirmation rather than evidence of a causal effect. Larger longitudinal studies using validated measures of milk adequacy are needed before stress assessment can be recommended as a component of lactation care, although attention to maternal psychological wellbeing remains a reasonable element of supportive midwifery practice.

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AUTHOR CONTRIBUTIONS

Conceptualization: H.M., I.S.; Methodology: H.M., L.D.; Investigation and Data Collection: A.W., I.N.; Data Curation: A.W., I.N.; Formal Analysis: H.M., L.D.; Writing Original Draft: H.M.; Writing, Review & Editing: I.S., L.D., A.W., I.N.; Supervision: I.S. All authors have read and approved the final version of the manuscript.

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