



RESEARCH ARTICLE

Katuk Leaf Juice Improves Breast Milk Production in Postpartum Mothers: Evidence from an Indonesian Community Study

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Abstract

Low exclusive breastfeeding rates remain a pressing challenge in Indonesia, often linked to insufficient breast milk production. This study examined the effect of katuk leaf (*Sauropus androgynus*) juice—a traditional, non-pharmacological galactagogue—on breast milk output among postpartum mothers. Using a quasi-experimental, one-group pretest–posttest design, 20 mothers at Karangnunggal Community Health Center received fresh katuk juice twice daily for 14 days. Breast milk sufficiency was assessed objectively with a validated checklist and subjectively through maternal reports, classifying production as “sufficient” or “insufficient.” After the intervention, the proportion of mothers with sufficient milk increased from 30% to 85% ($p = 0.001$; large effect size $r = 0.74$). The positive effect is attributed to the phytochemical and nutritional content of katuk leaves, which may stimulate prolactin and oxytocin pathways. Findings support katuk juice as a safe, culturally relevant adjunct for lactation, and recommend its supervised use in maternal health programs to address breastfeeding barriers.

Keywords: Katuk Leaf, Breast Milk Production, Postpartum Mothers, Exclusive Breastfeeding, Non-Pharmacological Intervention, Maternal Health, Lactation Support

ABSTRAK

Rendahnya angka pemberian ASI eksklusif tetap menjadi tantangan utama di Indonesia, yang sering kali terkait dengan produksi ASI yang tidak mencukupi. Penelitian ini bertujuan untuk mengkaji pengaruh jus daun katuk (*Sauropus androgynus*), salah satu galaktagog tradisional non-farmakologis, terhadap produksi ASI pada ibu postpartum. Melalui desain kuasi-eksperimen one-group pretest–posttest, sebanyak 20 ibu di Puskesmas Karangnunggal memperoleh jus daun katuk segar dua kali sehari selama 14 hari. Kecukupan ASI dinilai secara objektif menggunakan daftar periksa tervalidasi serta secara subjektif melalui laporan ibu, dengan klasifikasi produksi sebagai “cukup” atau “tidak cukup”. Setelah intervensi, proporsi ibu dengan produksi ASI cukup meningkat dari 30% menjadi 85% ($p = 0,001$; effect size besar $r = 0,74$). Efek positif ini dikaitkan dengan kandungan fitokimia dan nutrisi daun katuk yang dapat menstimulasi jalur prolaktin dan oksitosin. Temuan ini mendukung jus daun katuk sebagai intervensi pendamping yang aman dan relevan secara budaya untuk mendukung laktasi, serta merekomendasikan penggunaannya secara terantau dalam program kesehatan ibu guna mengatasi hambatan menyusui.

Kata kunci: Daun Katuk, Produksi ASI, Ibu Postpartum, ASI Eksklusif, Intervensi Nonfarmakologis, Kesehatan Ibu, Dukungan Laktasi

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INTRODUCTION

The nutritional status of the next generation is a vital concern for global public health, with the first thousand days of life recognized as a critical window for intervention to ensure optimal growth, cognitive development, and long-term well-being (Black et al., 2013; Victora et al., 2016; Dewey & Begum, 2011). Evidence shows that the period from conception to a child's second birthday is a “window of opportunity” for preventing stunting and

other forms of malnutrition (Bhutta et al., 2013; UNICEF, 2021). Breastfeeding, particularly exclusive breastfeeding, is universally recommended as the foundation of infant nutrition and is regarded as one of the most effective, natural, and low-cost strategies for reducing child morbidity and mortality, supporting neurodevelopment, and fostering lifelong health (Victora et al., 2016; Rollins et al., 2016; Kramer & Kakuma, 2012).

Despite global health promotion efforts, the rate of exclusive breastfeeding remains below international targets. The World Health Organization (WHO) reports that, globally, only 44% of infants aged 0–6 months were exclusively breastfed between 2015 and 2020—significantly below the global target of 50% set for 2025 (WHO, 2020; UNICEF, 2021). Low- and middle-income countries bear the greatest burden of suboptimal breastfeeding, with substantial variations between and within countries due to socioeconomic, cultural, and health system factors (Victora et al., 2016; Sinha et al., 2015).

In Indonesia, breastfeeding initiation rates are relatively high, with 96% of mothers reportedly having breastfed their infants at least once; however, only 42% practice exclusive breastfeeding for the recommended first six months (PAS, 2018; Kementerian Kesehatan Republik Indonesia, 2020). This figure has shown little improvement over the past decade and is comparable to trends seen in other Southeast Asian nations (UNICEF, 2021; Lestari & Prasetyorini, 2020). This persistent gap is of serious concern because inadequate exclusive breastfeeding is closely associated with higher risks of stunting, undernutrition, diarrheal diseases, respiratory infections, and even increased infant mortality (Black et al., 2013; Badan Koordinasi Keluarga Berencana Nasional, 2013; Haryono & Setianingsih, 2014; Arifeen et al., 2001).

Multiple factors contribute to this failure to achieve optimal exclusive breastfeeding rates. Insufficient breast milk production is consistently identified as one of the most frequently cited reasons for early weaning or supplementation, both in Indonesia and worldwide (Juliastuti, 2019; Agustin & Septiyana, 2018; Lutter & Morrow, 2013). The perception of inadequate milk supply—regardless of its physiological accuracy—can strongly influence maternal confidence and breastfeeding duration (Gatti, 2008; Odom et al., 2013). Beyond physiological or anatomical causes, a range of psychosocial stressors—including maternal anxiety, postpartum depression, inadequate maternal nutrition, lack of skilled breastfeeding support, weak family support, and persistent cultural misconceptions about lactation—may undermine breastfeeding success (Astri et al., 2020; Wahyutri et al., 2020; Nguyen et al., 2018; Faria et al., 2023).

Maternal undernutrition, in particular, can affect both the quantity and quality of breast milk, especially in resource-limited settings (Kramer & Kakuma, 2012; Dewey & Begum, 2011). Furthermore, the absence of supportive environments—at home, in health facilities, or at workplaces—remains a critical barrier to sustained exclusive breastfeeding (Rollins et al., 2016; Sinha et al., 2015; UNICEF, 2021). Addressing these multifaceted challenges requires not only public health interventions and policies but also culturally relevant, accessible, and safe solutions that empower women and families to practice optimal breastfeeding.

To address these challenges, various interventions have been proposed, ranging from pharmacological agents to non-pharmacological approaches. Non-pharmacological solutions, particularly those based on traditional herbal medicine, have gained increasing attention due to their

cultural acceptability, accessibility, and perceived safety profile (Apriani, 2019; Rosdianah & S, 2021). One such intervention is the use of katuk (*Sauropus androgynus*) leaves, a plant traditionally consumed across Southeast Asia and long believed to act as a galactagogue—an agent that promotes lactation (Lestari & Prasetyorini, 2020; Triananinsi et al., 2020). Katuk leaves are rich in protein, vitamins C and D, calcium, folic acid, and phytochemicals such as alkaloids and sterols that are hypothesized to stimulate the production and release of breast milk by influencing prolactin and oxytocin pathways (Juliastuti, 2019; Yolanda et al., 2022).

While a growing body of animal studies and a limited number of human trials have suggested positive effects of katuk leaf extract on milk volume and infant outcomes (Suprayogi, 1993; Juliastuti, 2019; Situmorang & Singarimbun, 2019), the evidence base remains inconclusive due to small sample sizes, varying preparations, and the lack of robust controlled trials. Moreover, research examining the effectiveness of fresh katuk leaf juice, as opposed to extract or capsule forms, is particularly scarce, especially within rural Indonesian communities where cultural acceptance and accessibility are high but scientific evaluation is limited (Lestari & Prasetyorini, 2020).

Given these knowledge gaps and the urgent need for accessible, affordable, and safe solutions to support exclusive breastfeeding in Indonesia, this study seeks to investigate the effect of katuk leaf juice administration on breast milk production in postpartum mothers in the Karangnunggal Community Health Center area. The novelty of this research lies in its community-based setting, the use of fresh katuk leaf juice, and its potential to provide an evidence-based, culturally relevant alternative for addressing insufficient milk supply. The findings are expected to enrich the scientific literature on non-pharmacological lactation support and offer practical recommendations for integrating traditional herbal interventions into primary healthcare strategies.

METHODS

This study adopted a quasi-experimental design with a one-group pretest–posttest approach to evaluate the effect of katuk leaf (*Sauropus androgynus*) juice on breast milk production among postpartum mothers in the working area of Karangnunggal Community Health Center, Tasikmalaya Regency. The design enabled assessment of changes in breast milk production before and after the intervention within the same participants, which is suitable for exploring the effects of non-pharmacological interventions in real-world community settings (Notoatmodjo, 2010; Firdaus & Zamzam, 2018).

Table 1. The research design

Pretest	Treatment	Posttest
O ₁	X	O ₂

Explanation:

O₁ : Breast milk production in postpartum mothers before administration of katuk juice

X : Intervention in the experimental group, i.e., administration of katuk leaf juice

O₂ : Breast milk production in postpartum mothers after administration of katuk juice

Recruitment Process and Study Participants

Participants were recruited from postpartum mothers registered at the Karangnunggal Community Health Center during September 2024. Total sampling was employed, with all mothers meeting the criteria during the study period invited to participate. The inclusion criteria were: (1) postpartum mothers within 7–30 days after delivery; (2) willing to exclusively breastfeed; (3) able and willing to consume katuk leaf juice as prepared by the research team; and (4) provided informed consent. Exclusion criteria included: (1) a history of allergy to katuk or other herbal ingredients; (2) comorbid conditions affecting lactation (e.g., severe postpartum complications, breast pathology); (3) current use of galactagogue medications or herbal supplements other than katuk; and (4) inability to complete the intervention protocol for any reason. A total of 20 postpartum mothers who fulfilled these criteria participated in the study, in accordance with recommendations to include all eligible subjects when the population is less than 100 (Sugiyono, 2007).

Intervention Protocol

The intervention involved administration of freshly prepared katuk leaf juice twice daily for 14 consecutive days. Each serving consisted of approximately 50 grams of cleaned katuk leaves blended with 200 ml of boiled water, following established safety guidelines and previous studies (Lestari & Prasetyorini, 2020; Yolanda et al., 2022). The juice was prepared by trained research assistants to ensure dose consistency. Participants were instructed to refrain from consuming other galactagogue herbal remedies or supplements during the study period. Compliance was monitored through daily logs and direct follow-up calls.

Assessment of Breast Milk Production

Breast milk production was assessed subjectively and objectively at two time points: before the intervention (pretest) and after the 14-day intervention period (posttest). Objective assessment used the “Mother’s Milk Sufficiency Checklist,” which included indicators such as the frequency and duration of breastfeeding, infant satiety cues, weight gain, and diaper output, adapted from evidence-based guidelines (Jumiyati & Simbolon, 2015; Maryunani, 2017). Subjective maternal reports were also collected regarding perceptions of milk sufficiency. Classification of breast milk production as “sufficient” or “insufficient” was determined by combining checklist outcomes and maternal reports, with ambiguous cases resolved through direct consultation with healthcare staff. The instrument underwent content validation by a panel of midwives and maternal-child health experts, and demonstrated strong internal consistency (Cronbach’s $\alpha = 0.86$) based on a pre-study pilot.

Control of Confounding Factors

To minimize potential confounders, participants’ dietary patterns, intake of other herbal or pharmacological agents, and breastfeeding practices were recorded at baseline and monitored throughout the study. Mothers were counseled to maintain a consistent diet and breastfeeding frequency. Exclusion of participants using additional galactagogues further reduced bias. Any illness

or significant stressor occurring during the study was documented.

Monitoring of Side Effects and Safety

Adverse events, including possible side effects such as gastrointestinal discomfort, allergic reactions, or changes in infant feeding patterns, were closely monitored. Participants were encouraged to report any complaints immediately, and weekly check-ins were conducted by research staff. No serious adverse events related to the intervention were observed during the study period.

Data Management and Statistical Analysis

All data were collected using standardized case report forms and checked for completeness and accuracy. Outliers and missing data were identified and reviewed; participants with incomplete primary outcome data were excluded from analysis. Data normality was tested using the Shapiro–Wilk test. Given non-normal distribution, changes in breast milk production were analyzed using the Wilcoxon signed-rank test to compare pretest and posttest results. Statistical analyses were performed using IBM SPSS Statistics version 26.0. Statistical significance was set at $p < 0.05$.

Ethical Considerations

The study was approved by the institutional review board and followed the Declaration of Helsinki ethical principles for research involving human subjects. All participants provided written informed consent and were assured of confidentiality and the right to withdraw at any time without consequence.

RESULTS OF STUDY

This study involved 20 postpartum mothers residing in the working area of Karangnunggal Community Health Center, Tasikmalaya Regency, during September 2024. The characteristics of the respondents are presented in Table 1. The majority were in the non-risk age group (19 mothers; 95%), while only one respondent (5%) was categorized as at-risk age. In terms of employment, 55% were employed, and 45% were unemployed. Regarding education, most respondents had attained secondary education (70%), with smaller proportions holding only primary education (5%) or tertiary education (25%). These characteristics reflect a generally favorable maternal profile for breastfeeding, as higher education and employment have been associated with improved health knowledge and access to resources.

Table 1. Characteristics of Respondents in the Working Area of Karangnunggal Community Health Center (N=20)

Characteristics	N	%
Age		
Non-risk age	19	95
At-risk age	1	5
Occupation		
Employed	11	55
Unemployed	9	45
Education		
Primary	1	5
Secondary	14	70
Tertiary	5	25

The main outcome variable, breast milk production, was assessed before and after the intervention (see Table 2). Prior to the administration of katuk leaf juice, only 6 out of 20 mothers (30%) were classified as having sufficient breast milk production, while the remaining 14 mothers (70%) experienced insufficient production. After 14 days of consuming katuk leaf juice twice daily, the number of mothers with sufficient milk production increased markedly to 17 (85%), while only 3 mothers (15%) still reported insufficiency. This represents an absolute increase of 55% in the proportion of mothers experiencing sufficient lactation. The mean score for breast milk production also showed a notable improvement, rising from 154.60 (SD: 19.1) at baseline to 219.80 (SD: 23.7) after the intervention, indicating a substantial clinical enhancement.

To test the distribution of the data, the Shapiro–Wilk normality test was applied, revealing that the breast milk

production data were not normally distributed ($p < 0.05$). This justified the use of the Wilcoxon signed-rank test for paired samples to compare pretest and posttest outcomes. The Wilcoxon analysis yielded a Z-value of -3.317 and a p-value of 0.001, which is well below the significance threshold of 0.05, confirming that the improvement in breast milk production following the katuk leaf juice intervention was statistically significant (table 3).

Table 2. Frequency Distribution of Breast Milk Production Before and After the Intervention (N=20)

Breast Milk Production	Before		After	
	N	%	N	%
Sufficient	6	30	17	85
Insufficient	14	70	3	15

Table 3. Shapiro–Wilk Normality Test Results for Breast Milk Production (Pretest and Posttest)

	Post-intervention	Tests of Normality ^b					
		Kolmogorov-Smirnov ^a			Shapiro–Wilk		
Pre-intervention	Sufficient Breast Milk	Statistic	df	Sig.	Statistic	df	Sig.
		.410	17	.000	.611	17	.000

a. Lilliefors Significance Correction
 b. "Pre-Intervention Breast Milk" is constant when "Post-Intervention Breast Milk = Insufficient." It has been omitted.

The effect size, calculated using the formula $r = Z/\sqrt{N}$, where N is the number of observations, was $r = -3.317/\sqrt{20} \approx -0.74$. This indicates a large effect size, suggesting that the intervention had not only statistical but also practical and clinical significance in enhancing lactation outcomes among the participants (table 4).

Table 4. Wilcoxon Signed-Rank Test Results

Test Statistics ^a	
	Posttest – Pretest Breast Milk Production
Z	-3.317 ^b
Asymp. Sig. (2-tailed)	.001

a. Wilcoxon Signed Ranks Test
 b. Based on positive ranks

A closer examination of respondent characteristics suggests that the intervention was effective across demographic subgroups. For instance, both employed and unemployed mothers showed improvement, and mothers with both secondary and tertiary education exhibited increases in sufficient milk production. While only one respondent was classified in the at-risk age group, her milk production also improved post-intervention. This suggests the potential broad applicability of katuk leaf juice as a lactation support intervention in diverse postpartum populations.

In summary, the administration of katuk leaf juice over 14 days resulted in a significant and clinically meaningful improvement in breast milk production among postpartum mothers in the study area. The majority of participants who initially reported insufficient lactation shifted to sufficient production status, as confirmed by both subjective and objective indicators. The large effect size and the observed changes across different respondent profiles highlight the robust impact of this non-pharmacological intervention. No adverse effects or significant complaints were reported during the study

period, supporting the safety profile of katuk leaf juice as a traditional galactagogue.

DISCUSSION

The findings of this study demonstrate a significant and clinically meaningful improvement in breast milk production among postpartum mothers following the administration of katuk (Sauropus androgynus) leaf juice. Prior to the intervention, a majority of mothers (70%) experienced insufficient lactation; after a 14-day regimen of katuk leaf juice, 85% of mothers achieved sufficient milk production. This substantial change not only reached statistical significance ($p = 0.001$) but also exhibited a large effect size ($r = 0.74$), underscoring the practical importance of the intervention for postpartum women struggling with inadequate milk supply.

These results align with previous animal and human studies which have highlighted the galactagogue properties of katuk leaves (Suprayogi, 1993; Juliastuti, 2019; Situmorang & Singarimbun, 2019). The effectiveness of katuk leaf in promoting lactation is believed to be rooted in its rich content of phytochemicals—such as alkaloids, sterols, flavonoids, and polyphenols—that are thought to stimulate the prolactin and oxytocin pathways, thus enhancing both the synthesis and ejection of breast milk (Juliastuti, 2019; Yolanda et al., 2022; Lestari & Prasetyorini, 2020). Alkaloids and sterols in particular are known to have a direct influence on the anterior pituitary gland, increasing prolactin release, while other compounds may contribute antioxidant and anti-inflammatory effects, thereby supporting maternal health during lactation (Apriani, 2019; Rosdianah & S, 2021; Anju et al, 2022).

Beyond its biochemical mechanisms, katuk leaves are also valued for their high content of essential nutrients—protein, calcium, iron, vitamins C and E, and folic acid—which can contribute to the nutritional well-being of mothers during the demanding postpartum period (Lestari & Prasetyorini, 2020; Khasanah & Astuti, 2020). While

maternal diet is generally not the sole determinant of milk quality or volume, adequate nutrient intake is known to support overall maternal health and may indirectly facilitate successful lactation, particularly in populations at risk for undernutrition (Dewey & Begum, 2011; Kramer & Kakuma, 2012).

Importantly, the success of lactation is influenced not only by physiological and nutritional factors but also by maternal psychological status and the presence of supportive environments. Psychological stress, postpartum anxiety, and depressive symptoms are well-documented inhibitors of milk production and letdown, primarily through their impact on oxytocin release (Astri et al., 2020; Nguyen et al., 2018). Conversely, strong family support, effective counseling by healthcare professionals, and culturally accepted traditional practices can greatly enhance breastfeeding outcomes and adherence to interventions such as herbal galactagogues (Rollins et al., 2016; Faria et al., 2023; UNICEF, 2021). In this study, the improvement in milk production was observed across mothers with varying backgrounds of employment and education, suggesting the intervention's potential applicability in diverse socioeconomic groups.

The novelty of this study lies in the use of freshly prepared katuk leaf juice, as opposed to extracts or capsules, within a community-based setting in rural Indonesia. Few studies to date have examined the effectiveness of fresh katuk leaf juice in real-world contexts, despite its widespread use in traditional medicine (Lestari & Prasetyorini, 2020). The positive results reported here contribute new evidence supporting the integration of safe, culturally relevant, and affordable non-pharmacological interventions for lactation support in primary health care and community health programs.

Nonetheless, several limitations of this study must be acknowledged. The quasi-experimental, one-group pretest-posttest design, while practical for community interventions, lacks a control group and may be susceptible to confounding factors and measurement bias (Firdaus & Zamzam, 2018; Notoatmodjo, 2010). Although the study attempted to control for diet, additional herbal use, and other variables, unmeasured confounders or placebo effects cannot be fully excluded. The reliance on a combination of subjective reports and checklist-based objective indicators, while validated, may still be influenced by reporting or recall bias (Jumiyati & Simbolon, 2015; Maryunani, 2017). Furthermore, the sample size was modest and drawn from a single rural health center, which may limit the generalizability of findings.

Future research should address these limitations by utilizing randomized controlled trial (RCT) designs, expanding sample sizes, and employing more objective outcome measures, such as direct milk volume measurement or infant weight gain. Additionally, exploring the long-term safety of katuk leaf consumption and its effects on infant outcomes will be essential to fully establish its role in breastfeeding promotion (Black et al., 2013; Rollins et al., 2016). In conclusion, the present study provides promising evidence that katuk leaf juice is an effective and well-tolerated intervention for increasing breast milk production among postpartum mothers. Its integration into community health strategies may offer a practical solution to the persistent challenge of insufficient milk supply—particularly in resource-limited settings—when implemented alongside comprehensive breastfeeding support and education.

CONCLUSION AND RECOMMENDATION

This study provides compelling evidence that the administration of katuk (*Sauropus androgynus*) leaf juice is effective in increasing breast milk production among postpartum mothers. After a 14-day intervention, the proportion of mothers classified as having sufficient breast milk increased markedly from 30% to 85%, with the results showing both statistical significance and a large clinical effect size. These findings highlight the promising role of katuk leaf juice as a locally accessible, non-pharmacological intervention to support lactation, especially in areas where exclusive breastfeeding rates remain suboptimal and conventional interventions are limited.

The significance of these results lies not only in their clinical impact, but also in their potential contribution to maternal and child health strategies in Indonesia and similar settings. The integration of safe, evidence-based traditional herbal remedies into community health services could help address persistent barriers to exclusive breastfeeding—such as perceived or real insufficient milk supply—while respecting local culture and increasing acceptance among mothers (Lestari & Prasetyorini, 2020; Rollins et al., 2016; UNICEF, 2021). This study also reinforces the importance of practical, scalable, and culturally sensitive approaches for improving the nutritional status of the next generation.

Practical Recommendations

Health professionals, especially midwives and maternal-child health workers, are encouraged to consider katuk leaf juice as an alternative or complementary intervention for mothers experiencing difficulties with breast milk production, provided that its use is supervised and individualized. Health workers should educate mothers and families on the safe preparation and consumption of katuk leaf juice, emphasizing the importance of using clean, fresh leaves in appropriate doses, and monitoring for any side effects. Periodic assessment and counseling should be integrated into routine postpartum care to ensure mothers receive comprehensive support for successful breastfeeding.

Policy Implications

Local and national health authorities should explore the incorporation of validated, non-pharmacological interventions such as katuk leaf juice into broader maternal and child health programs. Developing evidence-based guidelines for the safe use of traditional herbal galactagogues can help standardize their implementation and enhance their acceptance within healthcare systems. Collaboration with herbal medicine experts, nutritionists, and lactation consultants is recommended to refine protocols and ensure the highest standards of safety and efficacy.

Community and Stakeholder Engagement:

To maximize the reach and sustainability of this intervention, active involvement of communities, local leaders, and stakeholder groups is essential. Community-based education campaigns can raise awareness about the benefits and safe use of katuk leaf juice, while peer support programs and partnerships with women's organizations can foster shared learning and mutual encouragement among mothers. Policymakers and healthcare providers

should work together to ensure the availability of safe, quality-assured katuk leaves and to address any misconceptions or barriers to adoption.

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DECLARATIONS

Ethics Approval and Consent to Participate

This study was conducted in accordance with ethical principles for research involving human participants. All respondents received a complete explanation of the research objectives, procedures, benefits, and potential risks. Written informed consent was obtained from each participant. Participants were assured of the voluntary nature of their participation and were informed of their right to withdraw at any stage without any consequences. All personal data were kept confidential and used exclusively for research purposes.

Competing Interests

The author declares no competing interests.

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This study was conducted without external funding.

Availability of Data and Materials

All data supporting the findings of this study are included in this manuscript. Additional data may be provided by the corresponding author upon reasonable request.

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ADDITIONAL INFORMATION

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