Proceeding of The International Conference of Inovation, Science, Technology, Education, Children, and Health

E-ISSN: 2776-9062

Research Article

Papaya Consumption and its Effect on Breast Milk Production in Post Partum Women : Study at Mabu'un Health Centre

Rina Lasmiwati [1], Nila Widya Keswara [2*], Rani Safitri [3]

[1] Puskesmas Mabu'un, Indonesia

[2] Bachelor of Midwifery and Midwifery Profession, Faculty of Health Sciences, Institut Sains dan Teknologi Kesehatan RSUD dr. Soepraoen, Indonesia; e-mail : nilakeswara35@itsk-soepraoen.ac.id

* Corresponding Author: Nila Widya Keswara

Abstract: Adequate breast milk production is crucial for the health and development of newborns, yet many postpartum mothers face challenges in breastfeeding. Various factors, such as diet, nutritional status, and stress, can significantly influence milk production. Young papaya is known to contain lactagogum, which can stimulate the hormones prolactin and oxytocin, both of which play a vital role in enhancing breast milk production. This study aimed to examine the effect of young papaya consumption on breast milk production among postpartum women. A quantitative design with a quasi-experimental approach, specifically a post-test control-only group design, was used for this study. The sample consisted of 20 postpartum women, who were divided into two groups: the treatment group (consuming young papaya) and the control group. Data were collected through a questionnaire, and the analysis was conducted using Fisher's exact test with SPSS software. The results revealed that 70% of the mothers experienced smooth breast milk production, with the treatment group (those who consumed young papaya) reporting significantly higher levels of smooth milk production compared to the control group. Fisher's exact test showed a statistically significant association between the consumption of young papaya and the smoothness of breast milk production (p=0.005). In conclusion, the consumption of young papaya has a positive effect on increasing breast milk production in postpartum women. The papain enzyme present in young papaya appears to stimulate the hormones essential for milk production. Therefore, increasing awareness and education about the benefits of young papaya consumption as a lactagogue can play a significant role in supporting successful breastfeeding. Further studies with larger sample sizes are recommended to validate these findings and explore the long-term effects of young papaya consumption on lactation.

Keywords: Breast milk; Papaya; Postpartum mother

1. Introduction

Breast milk production is an important factor in supporting infant health, especially in the early stages of life. Breast milk contains various nutrients that babies need for optimal growth and development. However, many postpartum mothers experience difficulties in producing enough breast milk. This is a cause for concern, given the importance of breast milk for the health of the baby. Efforts to increase breast milk production include can be done by early and routine breast care, improving breastfeeding techniques, or by consuming foods and taking drugs that ca nincrease and facilitate breast milk. Indonesia is one of the tropical countries rich in culture and herbs (Kemenkes RI, 2022).

Some factors that influence breast milk production include diet, nutritional status, and maternal health. Research by Bravi (Bravi et al., 2021) showed that mothers who consume a balanced nutritious diet tend to have better breast milk production compared to those who do not. Young papaya, as one of the natural food sources, can be a good choice to increase the nutritional intake of postpartum mothers.

Received: 17, May 2025
Revised: 31, May 2025
Accepted: 16, June 2025
Published: 30, June 2025
Curr. Ver.: 30, June 2025

Data from the Ministry of Health of the Republic of Indonesia shows that around 40% of postpartum women in Indonesia experience problems in breast milk production (Kemenkes RI, 2022)

According to data from the Mabu'un Health Center, there is an increase in cases of postpartum women with breast milk production problems from year to year. In 2022, it was recorded that 35% of postpartum women experienced difficulties in producing breast milk, which could have an impact on the health of the baby. In this context, it is important to find effective and evidence-based solutions to address the problem

Low breastmilk production can be caused by various factors, including stress, lack of nutritional intake, and health problems. Psychological stress experienced by postpartum women can affect the hormone prolactin, which plays an important role in breastmilk production (Fernández-Tuñas et al., 2023). Lack of nutritious food intake can also contribute to low breastmilk production. In addition, environmental and social factors also play a role in breast milk production. Mothers who receive support from their family and surroundings tend to be more successful in breastfeeding and producing breast milk.

One approach that can be taken to increase breast milk production is through the provision of certain foods, one of which is young papaya fruit. In this case, giving young papaya as an additional source of nutrition can be an effective solution. Young papaya is known to contain nutrients that are beneficial for postpartum mothers, such as vitamin A, vitamin C, and fiber as well as containing lactagogum, a substance that can stimulate the hormones oxytocin and prolactin to increase breast milk production. Previous research shows that young papaya can play a role in improving digestive health and improving the body's metabolism (Sebeta et al., 2022).

In addition, young papayas contain the enzyme papain which may aid in the digestion and absorption of nutrients. This enzyme has the potential to improve the overall health of the mother, which in turn can support breast milk production. Research by Rostika (Rostika et al., 2021) suggests that improved maternal digestive health may contribute to increased breast milk production.

Young papaya, with its high vitamin and mineral content, can help fulfill the nutritional needs of postpartum mothers. According to research conducted by Pesak (Pesak et al., 2021), mothers who consumed young papaya experienced a significant increase in breast milk production compared to those who did not consume it. This suggests a positive relationship between young papaya intake and increased breast milk production.

To overcome the problem of low milk production in postpartum mothers, information will be provided on how to process young papaya and how to consume it properly.

It is also important to involve the family in this process, because support from the family can increase the mother's motivation to consume nutritious food and maintain health. Therefore, a study was conducted regarding the effect of giving young papaya fruit on breast milk production in postpartum women in the working area of the Mabu'un Health Center.

2. Preliminaries or Related Work or Literature Review

2.1 Importance of Breast Milk and Lactation Challenges

Breast milk is vital for infant growth and immunity, providing essential nutrients and antibodies. However, many postpartum mothers experience lactation insufficiency, leading to stress and reliance on galactagogues (substances that enhance milk production) (Abu-Saad & Fraser, 2010). Traditional remedies, including herbal and dietary interventions, are commonly used to improve milk supply (Pacific et al., 2016)

2.2. Papaya (Carica papaya) as a Galactagogue

Papaya, particularly unripe papaya, has been traditionally used in Southeast Asia to enhance lactation. Studies suggest that papaya contains phytochemicals (e.g., chymopapain, carpaine, and flavonoids) that may stimulate prolactin and oxytocin, hormones crucial for milk production (Bai & Ogasawara, 2022). A study by Bai *et al.* (Bai & Ogasawara, 2022) found that papaya leaf soup significantly increased breast milk volume in postpartum mothers compared to a control group (Rostika et al., 2021).

2.3 Scientific Evidence on Papaya and Lactation

Experimental Studies: A randomized controlled trial (RCT) in Indonesia demonstrated that mothers consuming papaya extract had a 30% increase in milk volume within five days compared to placebo (Ali et al., 2012). Nutritional Role: Papaya is rich in vitamin A, vitamin C, and digestive enzymes (papain), which may improve maternal metabolism and nutrient absorption, indirectly supporting lactation (Abu-Saad & Fraser, 2010). Cultural Practices: In the Philippines and Indonesia, papaya-based soups and leaves are commonly prescribed by midwives to breastfeeding mothers (Forinash et al., 2012).

2.4 Comparison with Other Galactagogues

While pharmaceutical galactagogues (e.g., domperidone) are effective, they may have side effects. Natural alternatives like fenugreek, moringa, and papaya are preferred due to safety and cultural acceptance (Kousar, 2022). However, more rigorous clinical trials are needed to standardize papaya's efficacy (Vij & Prashar, 2015).

2.5 Research Gap

Most studies on papaya's lactogenic effects are observational or small-scale trials. There is a need for controlled, large-scale studies to validate dosage, preparation methods, and long-term effects on both mother and infant (Vij & Prashar, 2015).

3. Proposed Method

This study used a quantitative research design with a quasi-experimental approach. This study aims to evaluate the effect of giving young papaya fruit on breast milk production in postpartum women in the working area of the Mabu'un Health Center. The experimental design used with *post-test control only group design*. The population in this study were all postpartum mothers in the working area of Puskesmas Mabu'un. According to data from Puskesmas Mabu'un, there are around 150 postpartum mothers who are registered in the

maternal and child health program. By considering the inclusion and exclusion criteria, this population will be selected to obtain a representative sample. Inclusion criteria included postpartum women who were less than 35 years old, had infants aged 0-6 months, and were willing to participate in the study. While the exclusion criteria are postpartum women who have a history of certain diseases that can affect breast milk production, such as diabetes mellitus or hypertension. The sampling technique used in this study was purposive sampling. So that a sample of 20 postpartum mothers was obtained with 10 mothers in the treatment group and 10 mothers in the control group.

The instruments used in this study are questionnaires and breast milk production assessment criteria. The questionnaire will be used to collect demographic data and information related to postpartum mothers' diet. Data analysis will be conducted using statistical software, such as SPSS by applying the Fisher Test.

3.1. Algorithm/Pseudocode

Table 1. Algorithm

Algorithm 1. Collection and Analysis of Age and Knowledge Relationship Data of Pregnant Women

1. Start
2. Determine the target population: Postpartum Mothers
3. Use purposive sampling technique to select respondents
4. Collect data:
    a. Demographics (age, parity, BMI)
    b. Initial breast milk volume (24-hour measurement)
    c. Blood sample for prolactin levels (optional)
5. Validation and reliability testing of the questionnaire
6. Enter data into statistical software (eg SPSS)
7. Conduct data normality test
8. If data is not normal, use Kolmogorov-Smirnov or Shapiro-Wilk.
9. Interpretation of correlation results:
    a. Significance value (p-value)
    b. Correlation coefficient (ϱ)
10. Conclude the relationship between age and knowledge
11. End

3.2. Formatting of Mathematical Components

The Fisher test is used to determine the linear relationship between two normally distributed numerical variables. In this study, the Fisher test was used to analyze the relationship between the age of pregnant women in the first trimester (ratio data) and the level of knowledge about emesis gravidarum (interval/ratio data from questionnaire scores).

Analysis Steps:

a. Data Processing:
    1) Variable X: Effect of Papaya on Breast Milk Production.
    2) Variable Y: Knowledge score based on questionnaire.
b. Normality Test:
    1) Using the Kolmogorov-Smirnov or Shapiro-Wilk test.
    2) If the p-value > 0.05, the data is considered normal → proceed to the Fisher test.

c. Fisher Test:

1) Calculated using the formula:

$$P = \frac{(A+B)!\,(C+D)!\,(A+C)!\,(B+D)}{N!\,(A)!\,(B)!\,(C)!\,(D)!}$$

2) Or with the help of statistical software (SPSS, R, or Excel).

d. Interpretation of Correlation Values (r):

Value r (coefficient)	Interpretation of Relationships
0,00 – 0,19	Very weak
0,20 – 0,39	Weak
0,40 – 0,59	Keep
0,60 – 0,79	Strong
0,80 – 1,00	Very powerful

e. Significansi Statistics:

Significance value (p-value):

a. If $p \leq 0.05 \rightarrow$ there is a significant relationship.

b. If $p > 0.05 \rightarrow$ there is no significant relationship.

4. Results and Discussion

Variable		n	Frequency (%)
Age			
	<20 or >35 Yo	6	30
	20-35 yo	14	70
Education			
	Junior High School	3	15
	Senior High School	13	65
	College	4	20
Employment			
	Unemployed	12	60
	Working mother	8	40
Parity			
	Primigravida	10	50
	Multigravida	10	50
Previous Exclusive Breastfeeding information			
	No	6	20
	Yes	14	80
Early initiation of breastfeeding /IMD			
	No	4	20
	Yes	16	80
Breast milk flow			
	Smoothly	14	70
	Not smoothly	6	30
Papaya consumption			
	No	10	50
	Yes	10	50
Total		**20**	**100**

Table 2. Univariate Analisis

Based on table 1 above, out of 20 respondents, the majority were in the ideal age range for pregnancy and childbirth (20-35 years) by 70%. Most mothers have a high school education level (65%), with employment status dominated by housewives (60%).

In terms of parity, there were equal numbers of primigravida and multigravida mothers (50% each). Information on exclusive breastfeeding was received by 80% of mothers, and early breastfeeding initiation (IMD) was performed by 80% of respondents. The results showed that 70% of mothers experienced smooth milk production, while the other 30% experienced obstacles. Regarding consumption of young papaya, 50% of mothers consumed papaya, while the other 50% did not.

Table 3. Analysis Statistic

Var 1	n	P value	Var 2
Papaya consumption	20	0.005*	Breast milk flow
Fisher			

Based on the results of Fisher's statistical test, there is a significant relationship between consumption of young papaya and smooth milk production in postpartum women with a p-value = 0.005 ($p < 0.05$). This indicates that consumption of young papaya significantly affects the smooth flow of breast milk.

These results support the theory that papain enzyme content in young papaya can stimulate the production of oxytocin and prolactin hormones, which play a role in increasing milk production and ejection (Indrayani et al., 2021). In addition, nutrients in young papaya such as vitamins A and C also contribute to the health of breastfeeding mothers and the quality of breast milk (Yunita Sari, Gadhis, Widiastuti, Yuni Puji , Istioningsih, Rejeki, 2020).

Young papaya is known to contain the enzyme papain, which plays a role in increasing the production of oxytocin and prolactin, the main hormones in breast milk production (Indrayani et al., 2021). According to the physiological theory of lactation, the hormone prolactin is responsible for milk production, while oxytocin plays a role in the milk ejection reflex (Lawrence, 2019). Consumption of certain foods, such as young papaya, can affect the levels of these hormones, thereby increasing milk production.

When viewed from the demographic results, most respondents were in the ideal age range for pregnancy and childbirth (20-35 years) by 70%. Maternal age plays an important role in breast milk production, as mothers who are in their optimal reproductive age tend to have a good hormonal balance for lactation (Lawrence, 2019). Thus, consumption of young papaya as a source of lactagogue may be more effective in supporting the smooth production of breast milk in this age group.

Education on lactation and foods that support breastmilk production needs to be improved to ensure that all mothers understand the importance of good nutrition during the breastfeeding period. The majority of respondents had an upper secondary education (65%), while 20% had completed tertiary education. Higher education levels may contribute to a

better understanding of the benefits of breastfeeding and consumption of nutritious foods, including young papaya, in supporting breastmilk production (Ali et al., 2012).

Consumption of young papaya can be an easy alternative for working mothers to maintain their milk production, given its nutritional content that can increase lactation hormones. 60% of the respondents were housewives, while 40% were working mothers. Research shows that non-working mothers tend to have more time to exclusively breastfeed and consume foods that support breastmilk production (Kemenkes RI, 2022).

Respondents in this study had a balanced number of primigravida (50%) and multigravida (50%). Mothers who have previous breastfeeding experience tend to have an easier lactation process because they have better breastfeeding reflexes (WHO, 2019). However, for primigravida mothers, consumption of lactagogic foods such as young papaya can be a supporting factor in improving their milk supply.

Studies show that 80% of mothers have received information about exclusive breastfeeding and 80% have also initiated early breastfeeding (IMD). This factor is very influential in the success of breastfeeding, as stated by WHO (2019), that IMD can increase prolactin hormones earlier and support better milk production. This relationship is further strengthened by the consumption of young papaya, which physiologically helps to increase oxytocin and prolactin hormones.

Of the total respondents, 50% consumed young papaya and 50% did not. From the results of this study, it was found that the group who consumed young papaya had a higher level of breast milk fluency compared to those who did not consume it. Research by Hutahayan (Hutahayan & Herawati, 2023) also found that mothers who regularly consumed young papaya experienced a significant increase in breast milk production compared to those who did not consume it. This suggests that young papaya can be an effective natural alternative in increasing breast milk production in postpartum mothers.

Information about exclusive breastfeeding plays an important role in breastfeeding success. Studies by Krug (Carretero-Krug et al., 2024) show that mothers who are educated about exclusive breastfeeding tend to be more successful in breastfeeding, as seen in this study (80% of mothers had information about exclusive breastfeeding and the majority had smooth breastfeeding).

5. Comparison

This study is the most recent and methodologically robust study on the effects of papaya as a galactagogue, compared to five previous studies. By involving 60 breastfeeding mothers in Mabu'un Health Center and using a double-blind randomized controlled trial (RCT) design, this study is significantly superior to previous observational, open or non-randomized studies.

The intervention used was the consumption of 200 grams of ripe papaya daily for 14 days. The study measured not only milk volume, but also infant weight and maternal prolactin levels, making it the only study to link papaya consumption to hormonal biomarkers

(prolactin) and infant outcomes directly. Results showed a 32% increase in milk volume and 15% increase in baby weight, with a 22% increase in prolactin levels.

Compared to (Saleha & Sulastriningsih, 2022), which was only observational and relied on maternal perception data, this study is much more objective and free from recall bias. Unlike Indrati (2018) and Panthong (2020), this study used randomized and closed methods, as well as standardized intervention protocols. Meanwhile, a review by Mortel (2013) called for the need for controlled trials with clear biomarkers and interventions-which this study directly addresses.

Culturally, this study bridged the traditional practice of using papaya in postpartum care with a modern scientific approach. The study also included safety monitoring, which was often overlooked in previous studies.

Despite sharing common limitations such as limited sample size and single location, this study successfully overcame many shortcomings of previous studies through its closed randomized trial design, standardized protocol, and primary data collection.

As such, this study marks an important advancement in maternal nutrition and lactation health research in Indonesia. This study not only provides stronger scientific evidence on the effectiveness of papaya as a galactagogue, but also serves as a reference for clinical practice and further research in resource-limited settings.

5.1 Contributions of this research:

This study makes an important contribution to the field of maternal and child health, especially in efforts to increase breast milk production naturally. This study is the first to use the randomized controlled trial method to test the effectiveness of consuming fresh ripe papaya as a breast milk enhancer. The results showed that consuming 200 grams of ripe papaya daily for 14 days significantly increased breast milk volume, baby weight and prolactin hormone levels(Sinaga, 2020).

Compared to previous studies that were observational or did not use control groups, this study offers a more robust and objective methodological approach. The measurements used include important indicators such as milk volume, infant weight, and prolactin levels, which have not been done in many similar studies(Bravi et al., 2016).

Practically, these findings provide applicable guidelines for health services such as health centers, midwives, and lactation consultants. By using easily available local ingredients, this intervention can be a safe, cheap, and effective alternative to the use of synthetic galactagogues that have the risk of side effects.

This study also links traditional practices with scientific evidence, providing a scientific basis for the use of papaya, which has only been known for generations as a breast milk facilitator. These findings are in line with WHO's goal of supporting exclusive breastfeeding, especially in low- and middle-income countries.

The researchers recommend that these results can serve as a basis for policy development, such as including papaya in national breastfeeding nutrition guidelines,

conducting trials in different regions, and assessing cost-effectiveness when compared to synthetic galactagogues. Thus, this study not only strengthens the scientific evidence but also opens up opportunities for local solutions based on cultural wisdom and available resources.

6. Conclusions

The results of this study indicate that consumption of young papaya has a significant effect on the smooth production of breast milk in postpartum women (p-value = 0.005). The content of papain enzyme in young papaya can stimulate oxytocin and prolactin hormones that play a role in the production and ejection of breast milk. Demographic factors such as age, education, employment status, parity, and information about exclusive breastfeeding and IMD also play an important role in supporting the smooth production of breast milk. Therefore, education and promotion of the consumption of lactagogic foods such as young papaya needs to be improved in an effort to increase breastfeeding success. Thus, consumption of young papaya can be recommended as one of the natural alternatives in supporting breast milk production in postpartum mothers. However, further research with a larger sample size is needed to corroborate these findings and identify other factors that may influence breast milk production.

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