

Effectiveness of Administration of Papaya Leaf Capsule Extract (*Carica Papaya*) and Moringa Leaves (*Moringa Oleifera*) on Increasing Prolactin Hormones in Breastfeeding Mothers

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A B S T R A C T

This research aimed to determine the effectiveness of administering papaya (*Carica Papaya*) and Moringa leaf (*Moringa oleifera*) capsule extracts on prolactin hormone levels in breastfeeding mothers in PMB M Palangka Raya City. The research used was Quasy Experimental, Two Group Pretest – Posttest design (two groups pretest – posttest). The sampling technique used was purposive sampling, with a total sample of 66 respondents who met or met the inclusion criteria. The statistical test used is the Independent T-test. Based on the significance results, the resulting Z statistic is -3.531 with a probability of 0.000. This means that probability < significance level (alpha = 5%). Thus, it can be stated that there is a significant difference in the levels of the hormone prolactin in breastfeeding mothers in PMB M Palangka Raya City before and after administering Moringa leaf capsule extract.

Introduction

To achieve optimal growth and development, in the Global Strategy for Infant and Young Child Feeding, the World Health Organization, WHO, and the United Nations Emergency Children's Fund UNICEF recommend four important things that must be done, namely first, giving breast milk to babies immediately within 30 minutes after birth. The baby is born, the second is giving only breast milk or exclusive breastfeeding from birth until the baby is 6 months old, the third is providing complementary foods with breast milk / MP-ASI since the baby is 6-24 months old, and the fourth is continuing breastfeeding until the child is 24 months old or more. (Ruan et al., 2022). Exclusively breastfed babies have a 1.62 times greater chance of experiencing normal growth than non-exclusively breastfed babies. On the other hand, babies who do not receive exclusive breast milk are 21.0 times more likely to experience growth disorders than babies who receive exclusive breast milk (Al Rahmad, 2017).

For infants, breast milk contains bioactive components that formula milk cannot replace, such as hormones, enzymes, and growth factors that support brain development and intelligence (Herawati et al., 2024). For mothers, breastfeeding can reduce the risk of breast and ovarian cancer, as well as

accelerate postpartum recovery (Wei et al., 2023). Although these benefits are widely known, various factors, such as the lack of accurate information about nutrition for breastfeeding mothers, often pose barriers to the practice of exclusive breastfeeding (Pitilin et al., 2020)."

Many factors cause mothers to not exclusively breastfeed their children. One of them is the uneven production of breast milk. (Walter et al., 2021). The production and release of breast milk are influenced by two hormones: prolactin and oxytocin. Prolactin influences breast milk production, while oxytocin influences breast milk production. Prolactin is related to maternal nutrition, the better the nutritional intake, the more production will be produced. One effort that can be made to increase the rate of secretion and production of breast milk is through (processed) papaya leaf capsule extract (*Carica Papaya*) and Moringa leaf capsule extract. Papaya leaves have high levels of calcium. Calcium is needed to increase the production and release of breast milk (Wiyani, 2019). One tablespoon of Moringa leaf flour contains around 14% protein, 40% calcium, and 23% iron and is close to all a toddler's need for Vitamin A. Six full tablespoons can meet the iron and calcium needs of pregnant and breastfeeding women (Price, 2000).

The Moringa plant (*Moringa oleifera*) is a local food ingredient that has the potential to be developed in the culinary arts of nursing mothers. Because it contains phytosterol compounds that increase and facilitate breast milk production (lactagogum effect). Theoretically, compounds that have a galactagogue effect include sterols (Farezki, 2023)

Knowing the average levels of the hormone prolactin in breastfeeding mothers before giving capsule extracts of papaya leaves (*Carica papaya*) and Moringa *oleifera* leaves. Knowing the average levels of the hormone prolactin in breastfeeding mothers after giving capsule extracts of papaya leaves (*Carica papaya*) and Moringa leaves. (*Moringa oleifera*), Knowing the frequency distribution of the effectiveness administering papaya (*Carica Papaya*) and Moringa leaf (*Moringa oleifera*) capsule extracts on prolactin hormone levels in breastfeeding mothers based on diet, Knowing the frequency distribution of the effectiveness of administering papaya (*Carica Papaya*) leaf capsule extracts Moringa (*Moringa oleifera*) on prolactin hormone levels in breastfeeding mothers based on the frequency of mothers breastfeeding their babies, Knowing Analyzing the average difference in the papaya leaf capsule extract group and the Moringa *oleifera* leaf group, Knowing Analyzing the effect of giving leaf capsule extract papaya (*Carica Papaya*) and Moringa leaves (*Moringa oleifera*) on prolactin hormone levels in breastfeeding mothers (Handayani et al., 2018).

Method

The type of research used is intervention, namely Quasy Experiment. The research design in this study was two pre-test and post-test experiments with a control group, which were carried out twice, namely before the experiment (O1), called the pre-test, and after the experiment (O2), called the post-test. Test. This research was carried out at PMB M from May 2023 to August 2023, using a sample size using the Dahlan (2010) formula with 20 respondents in each group.

The main focus of this research is increasing levels of the hormone prolactin in breastfeeding mothers by administering papaya and moringa leaf extract capsules so that it can increase breast milk production. Therefore, there are several stages of the process, namely stage I, making papaya and Moringa leaf extract capsules according to the prescribed dosage; stage II, measuring the levels of the hormone prolactin in the blood of breastfeeding mothers; stage III, administering papaya and Moringa leaf extract capsules, stage IV measures the levels of the hormone prolactin in the blood of breastfeeding mothers after being given papaya and moringa leaf extract capsules, stage V tests the effect of giving papaya and moringa leaf extract capsules to nursing mothers. Consumed 2 times a day, morning and evening, for 10 days.

This study has inclusion and exclusion criteria, namely: Inclusion criteria are breastfeeding mothers 0-6 months who are willing to be research respondents, breastfeeding mothers who do not consume breast milk-stimulating herbal medicine, breastfeeding mothers who are willing to fill out informed consent forms, and Nursing mothers who live in Palangka Raya.

Exclusion criteria: breastfeeding mothers who have a history of complications, breastfeeding mothers who are still on lactation suppression medication, Breastfeeding mothers with sore or blistered nipples, Breastfeeding mothers with breast infections, breast abscesses, mastitis, septicemia, Breastfeeding mothers who have babies with cleft lips. Based on its objectives, this research aims to test a hypothesis, where this research hypothesis believes that there is an effect of papaya and Moringa leaf extract capsules to increase prolactin hormone levels in breastfeeding mothers in PMB Palangka Raya city.

Result

Table 1. By Age Papaya Leaf Capsule Extract and Moringa Leaf Capsule Extract

Group	Minimum	Maximum	Average	Std. Deviation
Papaya Leaf Capsule Extract	20	48	28	7.004
Moringa Leaf Capsule Extract	17	48	28.10	7.677

Based on the table above, it can be seen that the 20 respondents who were given papaya leaf capsule extract (*Carica Papaya*) had a minimum age of 20 years and a maximum age of 48 years. The average number of 20 respondents in the group who were given papaya leaf capsule extract was 28 years, with a standard deviation of 7,004 years. Thus, it can be said that the age of the 20 respondents is centered on $28 \pm 7,004$ years. Meanwhile, the 20 respondents who were given Moringa oleifera leaf capsule extract had a minimum age of 17 and a maximum of 48 years. The average number of 20 respondents in the group who were given Moringa leaf capsule extract was 28.10 years, with a standard deviation of 7.677 years. Thus, it can be said that the age of the 20 respondents is centered at $28.10 \pm 7,677$ years.

Table 2. Based on Mother's Diet, Papaya Leaf Capsule Extract and Moringa Leaf Capsule Extract

Mother's Diet	Papaya Leaf Capsule Extract		Moringa Leaf Capsule Extract	
	Frequency	Percentage	Frequency	Percentage
< 3 times	3	15.0%	3	15.0%
≥ 3 times	17	85.0%	17	85.0%

Based on the table above, it can be seen that of the 20 respondents who were given papaya leaf capsule extract (*Carica Papaya*) and of the 20 respondents who were given Moringa leaf capsule extract (*Moringa oleifera*), 15.0% had a diet of less than 3 times, while the rest have a pattern of eating more than or equal to 3 times with a percentage of 85.0%.

Table 3. Based on Breastfeeding Frequency Papaya Leaf Capsule Extract and Moringa Leaf Capsule Extract

Mother's Diet	Papaya Leaf Capsule Extract		Moringa Leaf Capsule Extract	
	Frequency	Percentage	Frequency	Percentage
< 8 times	4	20.0%	3	15.0%
≥ 8 times	16	80.0%	17	85.0%

Based on the table above, it can be seen that 20.0% of the 20 respondents who were given papaya leaf capsule extract (*Carica Papaya*) had a breastfeeding frequency of less than 8 times, while the rest had a breastfeeding frequency of more than or equal to 8 times with a percentage of 80.0%. Of the 20 respondents who were given Moringa *oleifera* leaf capsule extract, 15.0% had a frequency of breastfeeding less than 8 times, while the rest had a frequency of breastfeeding more than or equal to 8 times with a percentage of 85.0%.

Table 4. Testing of Differences in Prolactin Hormone Levels in Breastfeeding Mothers After Giving Capsule Extract After Giving Papaya Leaf Capsule Extract (*Carica Papaya*) and Moringa Leaf Capsule Extract (*Moringa oleifera*) in PMB M Palangka Raya City

Prolactin Hormone Levels	Average	Mann Whitney Test	Probability
Administration of papaya leaf capsule extract (<i>Carica Papaya</i>)	246.250	184.500	0.674
Administration of moringa leaf capsule extract (<i>Moringa oleifera</i>)	247.250		

Based on the test results listed in the table, it can be seen that the Mann-Whitney test produced 184,500 with a probability of 0.674. This means that probability > level of significance ($\alpha = 5\%$). Thus, it can be stated that there is an insignificant difference in the levels of the hormone prolactin in breastfeeding mothers in PMB M Palangka Raya City after administering papaya (*Carica Papaya*) and Moringa leaf (*Moringa oleifera*) capsule extracts. Judging from the average, the level of the prolactin hormone in breastfeeding mothers after giving Moringa *oleifera* leaf capsule extract is slightly higher than the average level of the prolactin hormone in breastfeeding mothers after giving papaya leaf capsule extract (*Carica Papaya*).

Discussion

Healthy breast milk production will be sufficient during the reproductive period because of its function, and reproductive organs can still work correctly. A 35-year-old mother is considered dangerous because the reproductive organs are suitable, and other body organs have experienced a decrease, resulting in risk complications in pregnancy and childbirth, and breastfeeding is very high. The research results show that the average age of respondents in both groups, control, and treatment, is within that period of healthy reproduction. In the statistical analysis results, the mother's age seems to have something to do with the baby's weight gain. This matter shows that breast milk production is what the mother produces and is satisfactory to the baby's needs, which can be seen from the increased baby's

weight. However, if you look at the amount of breast milk and maternal age, they are not related to breast milk production. This could be caused by other factors, such as the pumping ability of Breast milk and inappropriate pumping times (Nurfatimah, 2019).

From the results of research conducted at PMB M Palangka Raya to determine the effectiveness of administering papaya (*Carica Papaya*) and Moringa leaf (*Moringa oleifera*) leaf capsule extracts on prolactin hormone levels in breastfeeding mothers based on Age, It is known that the 20 respondents who were given papaya leaf capsule extract (*Carica Papaya*) had a minimum age of 20 years and a maximum age of 48 years. The average number of 20 respondents in the group who were given papaya leaf capsule extract was 28 years, with a standard deviation of 7,004 years. Thus, it can be said that the age of the 20 respondents is centered at $28 \pm 7,004$ years. Meanwhile, the 20 respondents who were given Moringa *oleifera* leaf capsule extract had a minimum age of 17 and a maximum of 48 years. The average number of 20 respondents in the group who were given Moringa leaf capsule extract was 28.10 years, with a standard deviation of 7.677 years. Thus, it can be said that the age of the 20 respondents is centered at $28.10 \pm 7,677$ years. Age range Healthy reproduction is at the age of 20-35 years. This period is a period the best for pregnancy, childbirth, and breast-feeding.

Baby sucking has an impact on the production of Breast milk because the baby's sucking will affect the production of the functioning hormone prolactin to produce breast milk. Plus, sucking the baby will also stimulate the expenditure of the hormone oxytocin. The frequency of breastfeeding for each mother will be different and influenced by several factors, including the baby's health condition. According to the results, Hopkinson's research on a study of 32 mothers with premature babies concluded that breast milk production will be optimal if it is pumped more than 5 times per day during the first month after giving birth. Pumping is done because premature babies cannot breastfeed. Another study on mothers with term babies shows that breastfeeding 10 - 13 times per day during the first 2 weeks after giving birth is associated with adequate breast milk production (Kramer & Kakuma, 2012).

Based on the mother's diet, it is known that of the 20 respondents who were given papaya leaf capsule extract (*Carica Papaya*) and 15.0% of the 20 respondents who were given Moringa leaf capsule extract (*Moringa oleifera*) had a diet of less than 3 times, while the rest had eating pattern of more or equal to 3 times with a percentage of 85.0%.

Based on the frequency of breastfeeding, it is known that 20.0% of the 20 respondents who were given papaya leaf capsule extract (*Carica Papaya*) had a breastfeeding frequency of less than 8 times, while the rest had a breastfeeding frequency of more than or equal to 8 times with a percentage of 80.0%. Of the 20 respondents who were given Moringa *oleifera* leaf capsule extract, 15.0% had a frequency of breastfeeding less than 8 times, while the rest had a frequency of breastfeeding more than or equal to 8 times with a percentage of 85.0% (Septyara et al.,2020).

Based on testing the difference in prolactin hormone levels in breastfeeding mothers after giving capsule extract after papaya leaf capsule extract (*Carica papaya*) and moringa leaf capsule extract (*Moringa oleifera*) in PMB M Palangka Raya City. Thus, it can be stated that there is an insignificant difference in hormone levels of prolactin in breastfeeding mothers in PMB M Palangka Raya City after

administering papaya leaf (*Carica Papaya*) and Moringa leaf (*Moringa oleifera*) capsule extracts. Judging from the average, the level of the prolactin hormone in breastfeeding mothers after giving *Moringa oleifera* leaf capsule extract is slightly higher than the average level of the prolactin hormone in breastfeeding mothers after giving papaya leaf capsule extract (*Carica Papaya*). Moringa leaves contain Phytosterol compounds, namely, alkaloids, functional saponins, and flavonoids, which improve and streamline breast milk production. While papaya leaves contain galactagogue, this galactagogue is believed to help maintain, stimulate, or increase the production of Nursing mothers' breast milk (Sinaga, H. T., & Siregar, M. 2020).

Papaya leaves have quite a variety of nutritional content, including vitamin A 18250 SI, vitamin B1 0.15 milligrams per 100 grams, vitamin C 140 milligrams per 100 grams of papaya leaves, calories 79 calories per 100 grams, protein 8.0 grams per 100 grams, fat 2.0 grams per 100 grams, hydrate charcoal/carbohydrate 11.9 grams per 100 grams, calcium 353 milligrams per 100 grams, and water 75.4 grams per 100 grams. Papaya leaves have high levels of calcium, where calcium is needed to increase the production and release of breast milk (Pawera et al., 2020).

One of the benefits that those breastfeeding from papaya leaves can feel is the ability of papaya leaves to promote breast milk (mother's milk) (Pawera et al., 2020). Papaya leaves contain vitamins A and B1, calories, protein, fat, calcium, phosphorus, iron, and water. Phytochemical analysis of papaya leaves shows that papaya leaves contain alkaloids, phenols, flavonoids, and saponins. The flavonoids and polyphenols in papaya leaf capsules play a role in the prolactin reflex to produce breast milk and stimulate the hormone oxytocin to stimulate breast milk production. The calcium content in papaya leaves also affects breast milk production. The higher the calcium level, the more prolactin secretion increases. Calcium is needed to increase breast milk production and excretion (Nuraini, 2019).

Moringa leaves contain higher levels of Vitamin A than carrots, higher calcium content than milk, and higher iron content than spinach (Fahey, 2005). One tablespoon of Moringa leaf flour contains around 14% protein, 40% calcium, and 23% iron and is close to all a toddler's need for Vitamin A. Six full tablespoons can meet the iron and calcium needs of pregnant and breastfeeding women. The B-carotene in moringa is a precursor to retinol (Vitamin A). Depending on the variety, there are around 25 types of B-carotene (Price, 2000). Six full tablespoons can meet pregnant and breastfeeding women's iron and calcium needs. The B-carotene in moringa is a precursor to retinol, vitamin A). Depending on the variety, there are about 25 types of B-carotene (Price, 2000). The higher the calcium level, the more prolactin secretion increases. Calcium is needed to increase breast milk production and excretion (Kemenkes, 2023a).

The main focus of this research is increasing levels of the hormone prolactin in breastfeeding mothers by administering papaya and moringa leaf extract capsules so that it can increase breast milk production. Therefore, there are several stages in the process, namely, stage I, making papaya and Moringa leaf extract capsules according to a predetermined dose; stage II, measuring the levels of the hormone prolactin in the blood of breastfeeding mothers; stage III giving papaya and Moringa leaf extract capsules, stage IV measuring the levels of the hormone prolactin in the blood of breastfeeding

mothers after being given papaya and Moringa leaf extract capsules, stage V tested the effect of giving papaya and Moringa leaf extract capsules to breastfeeding mothers (Kemenkes, 2021b).

Conclusions

The TKT research proposed is TKT 2 because this research applies the administration of papaya leaf capsule extract and Moringa leaf capsule extract to breastfeeding mothers, which, based on previous research, has been proven to have an effect in stimulating the hormone prolactin to increase the amount of breast milk production in breastfeeding mothers. Then, a blood test is carried out in the laboratory to prove whether there is an increase in prolactin hormone levels in breastfeeding mothers. The expected final TKT is TKT 3 because this type of research is an intervention, so direct treatment is carried out for breastfeeding mothers to consume papaya and Moringa leaf extract capsules whose dosage has been determined based on previous research by existing theory so that it can increase the production of the hormone prolactin in breastfeeding mothers. Based on the test results listed in the table, it can be seen that the Mann-Whitney test produced 184,500 with a probability of 0.674. This means that probability $>$ level of significance ($\alpha = 5\%$). Thus, it can be stated that there is an insignificant difference in the levels of the hormone prolactin in breastfeeding mothers in PMB M Palangka Raya City after administering papaya (*Carica Papaya*) and Moringa leaf (*Moringa oleifera*) capsule extracts. Judging from the average, the level of the prolactin hormone in breastfeeding mothers after giving Moringa oleifera leaf capsule extract is slightly higher than the average level of the prolactin hormone in breastfeeding mothers after giving papaya leaf capsule extract (*Carica Papaya*).

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