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Research article

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### Papaya leaf extract (*carica papaya*) on breast milk and prolactin hormone in mothers

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#### ABSTRACT

##### Background

Breastfeeding is the main food for babies, proper breastfeeding is done in an exclusive way, namely giving without food or complementary drinks from newborns to 6 months of age. Plant extracts currently really need to be used as a companion to increase the volume of breast milk for working mothers to continue breastfeeding exclusively who require daily intake such as papaya leaf extract which contains calcium and laktogogum, vitamins that increase breast milk and prolactin hormone.

##### Objective

To determine the effectiveness of giving papaya leaf extract on breast milk volume and prolactin hormone levels in mothers who give exclusive breastfeeding.

##### Method

This research design uses Quasy Experiment with pre test - post test with control group design. The research sample consisted of 32 mothers divided into 2 groups, namely 16 interventions and 16 controls. The intervention was given 800 mg/day of papaya leaf extract, the control group was given a placebo, the intervention was carried out for 7 days. Data analysis saw changes and differences in breast milk volume and prolactin hormone levels using the Wilcoxon and Mann Whitney test.

##### Results

Giving papaya leaf extract increased prolactin hormone levels in the mother by 117.66mg/dl with a p-value of 0.005 and could increase the volume of breast milk by 229.667ml with a p-value of 0.000 for 7 days.

##### Conclusion

Giving papaya leaf extract (*Carica Papaya*) increased breast milk volume and prolactin hormone levels in nursing mothers.

**Keywords:** Papaya Leaf (*Carica Papaya*), Breast Milk, Prolactin

#### INTRODUCTION

The main food for infants is breast milk, which is an emulsion of fat in a solution of protein, lactose

and organic salts secreted by the mother's breast glands.(1) Correct breastfeeding in an exclusive way, namely breastfeeding without complementary foods or drinks starting from newborns to the age of up to 6

months, new babies may be given complementary foods or abbreviated as MP-ASI, breastfeeding can also be done until the baby is aged two years.(2)

The benefits of breastfeeding are not only for babies but also for mothers, namely natural contraception, reducing the risk of breast cancer, and helping mothers to establish affection then the benefits for babies provide a good life for development and growth, protect against bacterial, viral, fungal and infectious diseases. parasites, increase the baby's intelligence and make the baby loved by the mother, this has an impact until the baby is an adult, such as reducing the risk of hypertension, cholesterol, and overweight. (3)

Data from the *World Health Organization* (WHO) (4) in 2019 showed that breastfeeding worldwide only reached 40, 93%, while the coverage according to world data was 50%. Only a few mothers can exclusively breastfeed in the first 6 months, this is said by the *American Academy of Pediatrics* and the World Health Organization there are 10-15% of mothers can not produce breast milk, this can cause the baby to lack breast milk and cause hypothermia, deficiency nutrition to developmental failure. (5)

Mother's occupation has an effect on exclusive breastfeeding. Because mothers have a lot of work at home and at work, this is what triggers the occurrence of fatigue and fatigue so that the mother can experience a decrease in production, then if the mother experiences stress and fatigue there will be blockade of the letdown reflex due to the release of epinephrine.(6) Data from the Central Statistics Agency (BPS) states that the population of women working at the age of 15 years and over in Central Java is Semarang City with a total of 5.696 female workers In this case 80% of working mothers fail to exclusively breastfeed, babies are given formula milk at the age of 2-4 months and stop breastfeeding at the age of 6-18 months, on the grounds that they cannot breastfeed in full due to long hours of work so that the baby's lack of sucking causes reduced milk production. (7)

The impact of under-produced breast milk makes mothers think that their babies will not get enough breast milk so mothers often take steps to stop breastfeeding and replace them with formula milk (8), this is a factor that triggers high morbidity rates in infants, namely formula feeding (9) Lack of awareness to give exclusive breastfeeding causes babies to be susceptible to disease, there are 40% of babies exposed to diarrheal diseases due to infection, this can increase after babies get food because previously babies were not

given exclusive breastfeeding. National data in 2018 of exclusive breastfeeding in Indonesia 68, 74% this has exceeded the target of the Strategic Plan (Renstra 50%) in the data, Central Java is included in 6 provinces in Indonesia that have not reached the target in 2018. Primary Data for Exclusive Breastfeeding Recapitulation Semarang City Health Office There are 3 health centers with the lowest exclusive breastfeeding coverage, namely Kedung Munduh Health Center 36, 96%, Mijen Health Center 47, 97% and Ngaliyan Health Center 51, 47%. (10)

Existing solutions sought by the government have been carried out such as the National Movement to Increase the Use of GNPP-ASI. Breastfeeding is very important for babies, this is in accordance with government regulation number 33 of 2012 which states that breastfeeding is given by babies from birth up to 6 months without adding and/or replacing other foods or drinks. Breast milk is the main and most perfect food for babies because breast milk has the content and composition according to the baby's needs and optimizes development. (11)

In the Sustainable Development Goals (SDGs) or the 2030 Sustainable Development Goals, breastfeeding is one of the first steps for a human being to have a healthy and prosperous life, but not everyone knows this. Exclusive breastfeeding is a promotive and preventive effort in an effort to improve public health status. Exclusive breastfeeding program needs to be the main agenda that must be supported because it can save health costs significantly.

The situation in the field is that many working mothers still do not do exclusive breastfeeding, seen from the coverage of several regions in Indonesia for 5 years, the target of achieving exclusive breastfeeding is still difficult to achieve, such as in provinces with the lowest coverage is East Java, Central Java, and Aceh optimally due to physical and psychological factors. (12)

The success of breastfeeding mothers which is very important to note is the diet, whether from pregnant women or mothers after giving birth so that the nutrition is guaranteed quality and quantity of breast milk, the mother's food must be nutritious and balanced every day, which means that mothers really need to consume carbohydrates, fats, proteins, vitamins, minerals and fruits suitable for nursing mothers. Breast milk production is the main thing that needs to be seen because breast milk is a source of nutrition for children, if the mother is malnourished, then the milk that comes out will be little, so it can be said that the mother is not successful in providing adequate nutrition to the child. (13)

Foods that have been used by the general public to increase breast milk, such as consuming vegetables and fruits, can increase the volume of breast milk. Little amount of milk can be treated mothers with eating katuk, pumpkin siam, beanslong, and banana heart. (8) besides that, it can be done by taking care of the breasts from an early age, improving breastfeeding techniques and consuming foods that can affect the breast milk. The hormone prolactin is the major hormone that controls and causes the discharge of milk a mother. This hormone regulates the cells in the alveoli that function in producing milk. The release of the hormone prolactin will be inhibited if the mother is in a poor nutritional state. If the mother's nutrition is good, it will stimulate the secretion of the hormone prolactin which will stimulate the adenohypophysis (anterior pituitary) so that breast milk comes out. (14) Papaya leaves can overcome the lack of smooth breast milk and increase breast milk production, many studies have been carried out by trying it in simple forms such as traditional ingredients, used as stir-fried foods, stews, raw vegetables and papaya leaves. Papaya leaf milk. Contains alkaloids, triterpenoids, steroids, flavonoids and saponins which can act as substances that can increase the hormone prolactin. (15) Papaya leaf is an alternative that can increase and facilitate breast milk, because papaya leaves contain high calcium potassium and other vitamins, compared to katuk and bitter melon, where it is known that calcium is needed in the mother's process while breastfeeding, and potassium can also reduce fatigue in the mother, it is known that if there is a lack of potassium and easily tired then it can also inhibit the release of breast milk. (16)

**RESULT**

**Tables 1: Changes in the average serum prolactin hormone**

Groups	Hormon Prolactin				Difference Prolactin (Mean)	P value
	Pre test day 1 (mean)	SD	Post test day 8 (mean)	SD		
Intervention	166.313	67.1894	283.973	48.9367	117.6600	0,001
Control	149.240	78.5772	212.187	75.9886	62.9467	0,001

Based on Table it was found that the average prolactin hormone in the intervention group who was given papaya leaf extract 800 mg/day with a pretest average of 166.313 mg/dl and an average posttest increased to 283.973 mg/dl with a p value of 0.001 this shows that there is a change between the administration of papaya leaf extract in the intervention group. In the control group who were given a placebo without

**METHODS**

This research design uses Quasy Experiment with pre test – post test with control group design. The research sample consisted of 32 mothers divided into 2 groups, namely 16 interventions and 16 controls. The intervention was given 800 mg/day of papaya leaf extract, the control group was given a placebo, the intervention was carried out for 7 days. Data analysis saw changes and differences in the increase in breast milk volume and prolactin hormone levels using the Wilcoxon and Mann Whitney test.

**Research design**

Sampling used a probability sampling technique with a simple random sampling approach, by taking 30 respondents according to the inclusion and exclusion criteria. Then the researcher conducted a lottery. Research analysis using Mann Whitney and Wilcoxon.

**Research Instruments**

This study describes the administration of papaya leaf extract on breast milk volume and levels of the hormone prolactin in nursing mothers. In this study, the intervention was given papaya leaf extract at a dose of 800 mg a day, the control group was given a placebo for 7 days. Examination of the volume of breast milk using an observation sheet measurement tool, examination of the prolactin hormone was carried out by taking blood from the vein, then an examination was carried out using the ELISA method to determine the level of the prolactin hormone.

additional supplementation or extracts, the mean pretest was 149,240mg/dl and the post-test average had an increase of 212.187mg/dl with a p value of 0.001 this indicates that there was a change between the administration of placebo in the control group. The difference in the average change in the intervention group was 117.660mg/dl while the control group was only 62.9467 mg/dl.

**Tables 2: Changes in the mean volume of breast milk in the control and intervention groups**

Goups	Breastfeeding volume				difference breastfeeding (Mean +SD)	P value
	Pretest day 1 (Mean)	SD	Post test day 8 (Mean )	SD		
Intervention	13.67	2.8950	243.33	55.7631	229.6667	0,001
Control	12.73	3.2175	165.27	31.0862	152.5333	0,006

The average volume of breast milk in the pretest intervention group was 13.67 ml and the posttest increased to 243.33 ml with a p value of 0.001 this indicates that there is a relationship between the administration of papaya leaf extract to the increase in breast milk volume. In the control group, the average value of pretest breast milk volume was 12.73 ml and the posttest average change in breast milk volume was

165.27 ml with a p value of 0.006. This shows that there is a relationship between giving a placebo in the control group. The average difference in the volume of breast milk in the intervention group was 229,666ml and the control group was 152,533ml, this indicates that the average change in the intervention group was greater than in the control group.

**Table 3: The average difference in serum prolactin levels in the intervention and control groups**

	Groups	Mean	P Value
pre hormon prolactin	Intervention	166.313	0,481
	Control	149.240	
post hormon prolactin	Intervention	283.973	0,005
	Control	212.187	

Using the mannwhitney test, the p value of the prolactin hormone pretest in the intervention and control groups was 0.481, this indicates that there is no difference in the average prolactin hormone levels between the intervention group and the control group before being given treatment (pretest).

While the p value in the posttest of the prolactin hormone in the intervention group and the control group is 0.005, this indicates that there is a difference in the average prolactin hormone levels between the intervention group and the control group after being given treatment (posttest).

**Table 4: The difference in the mean volume of breast milk between intervention and control**

	Groups	Mean	P value
Pretest volume ASI	Intervention	13,67	0,133
	Control	112.73	
Posttest volume ASI	Intervention	243.33	0 000
	Control	165.27	

Using the man whitney test, the p value of the volume of breast milk in the intervention and control groups was 0.133, this indicates that there is no difference in the average volume of breast milk between the intervention and control groups before being given treatment (pretest).While the p value of the volume of breast milk in the intervention and control groups is 0.000, this shows that there is a significant difference between the intervention and control groups after being given treatment (posttest).

## DISCUSSION

The hormone prolactin functions to produce breast milk so that it fills the alveoli while the hormone oxytocin works to squeeze breast milk from the alveoli so that milk is secreted. One of the efforts that can be done to increase the rate of secretion and production of breast milk is through the use of traditional herbal medicines such as katuk (sauropus androgynus) extract. Katuk leaves (sauropus androgynus) which contain

calcium (2.8%) can increase the mother's prolactin hormone (17). Mothers who are breastfeeding their babies do not get extra, there will be a decline in the production of the hormone prolactin so that when it is needed additional such as papaya leaf extract which contains calcium to help the body in increasing the hormone prolactin to secrete milk. The hormone prolactin functions to produce breast milk so that it fills the alveoli while the hormone oxytocin works to squeeze breast milk from the alveoli so that milk is secreted. One of the efforts that can be done to increase the rate of secretion and production of breast milk is through the use of traditional herbal medicines such as katuk (*sauropus androgynus*) extract. Katuk leaves (*sauropus androgynus*) which contain calcium (2.8%) can increase the mother's prolactin hormone (17). Mothers who are breastfeeding their babies do not get extra, there will be a decline in the production of the hormone prolactin so that when it is needed additional such as papaya leaf extract which contains calcium to help the body in increasing the hormone prolactin to secrete milk(18),(19) Giving papaya leaf extract can effectively increase the prolactin hormone because there is high calcium so that it plays a role in blocking the prolactin

inhibiting factor receptor in prolactin secretion. The higher the calcium level, the higher the prolactin and breast milk secreted. If calcium levels are low, prolactin secretion may also decrease. Calcium can also stimulate alveolar epithelial cells in the mammary gland so that it can increase milk production.(20),(21)

## CONCLUSION

Giving papaya leaf extract can increase prolactin hormone levels in nursing mothers as much as 117.66 mg/dl for 7 days compared to the control group, which is 62.97 mg/dl with a p value of 0.005 which states that there is a relationship between the administration of papaya leaf extract on the increase in prolactin hormone in nursing mothers. Giving papaya leaf extract can increase the volume of breast milk in mothers as much as 229,667ml for 7 days compared to the control group, which is 152.53ml with a p value of 0.000 which states that there is a relationship between giving papaya leaf extract to breast milk of nursing mothers, Researchers suggest to be able to examine other content in papaya leaves

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