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The Effectiveness of Nanoparticle Supplementation from Papaya Leaves (*Carica Papaya L*) to Increase Weights of Babies

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Abstract:- one of the problems with exclusive breastfeeding is inadequate breast milk production. Therefore, the solution is with papaya leaves as lactogogue. Lactogogue can increase the secretion and production of breast milk. The management of papaya leaves at the nanoparticle level can increase drug absorption by the body. This research aims to determine the effect of nanoparticle supplementation from papaya leaves to increase the weight of babies. This increasing weight becomes an indicator of breast milk production. This true experimental research used a randomized pretest-posttest design with the control group. The researchers used 36 postpartum mothers as respondents. The respondents were grouped into intervention and control groups. The intervention group received a nanoparticle capsule from papaya leaves with 458mg/day for seven days. During this administration, the intervention group also received standard postpartum care. The control group received placebo and standard postpartum care. The researchers measured babies' weight before and after the treatment for eight days with a digital weigher. Then, the researchers tested the data statistically with paired T-test. The findings showed a score of p < 0.001. It indicated differences in babies' weights from intervention and control groups. Thus, consuming nanoparticle capsules from papaya leaves, dose 458 mg/day for seven days, could increase the weight of the babies.

Keywords: *Nanoparticles, Papaya leaves, Breast milk production, Papaya leave capsule*

I. INTRODUCTION

Breast milk is the best meal for babies. Normal mothers produce breast milk for 550-1000 ml per day. Breast milk is the easiest nutrient for newborn babies to digest. The milk also has an adequate amount for babies [1]. *World Health Organization* suggests exclusive breast milk provision until the sixth month. Experts explain the benefits of breast milk. However, the benefits are higher and excellent if the babies only receive breast milk without any supplementary meals for the first six months.

The government has put efforts for mothers to increase their breast milk production. One of them is providing communication, information, education, and vitamin A administration for postpartum mothers after giving birth [2]. However, this effort should be maximized with additional therapy to increase breast milk production.

Papaya leaves are plants that contain lactogogue. The qualitative phytochemical analysis results on *Carica papaya L* leaves found Alkaloids, saponins, flavonoids, tannins, and glycosides. Papaya leaves contain minerals, such as Ca, Mg, Na, K, Fe, and Mn [3]. Papaya leaves can increase breast milk production. The administrations of papaya leaves may take form into veggie soup, juice, sweet powder, and extract capsule.

Recently, herbal medicine with nanotechnology has been used because it has excellent potential to be a therapy. For example, Curcuma, mangosteen skin, and Phaleria macrocarpa fruit processed with nanoparticle formulation could be used for cancer therapy. Nano particles of curcuma, based on chitosan Na-Tripolyphosphate, can be use as antiacne [4][5]. Nanoparticles have much superiority. Thus, it is interesting to determine the effectiveness of nanoparticle supplementation from papaya leaves as an obstetric effort to increase the weight of babies.

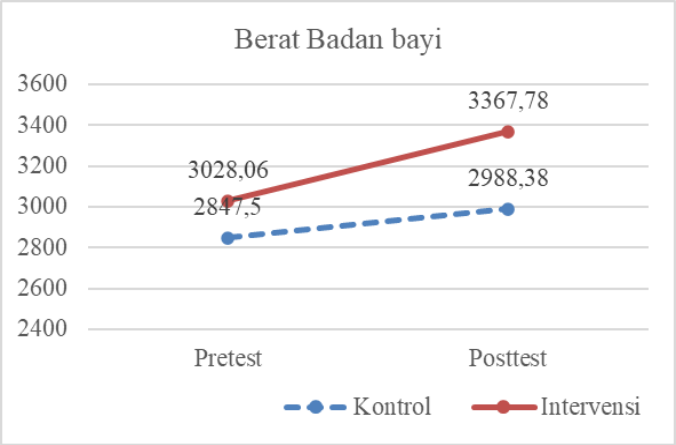
II. RESEARCH METHOD

This true experimental research used *pretest-posttest control group design.* The researchers started the research in April 2021 and ended it in May 2021. The population consisted of all pregnant women with an estimated giving birth time from March until May 2021. The researchers took the population in region II of Demak Public Health Center. The sampling technique was consecutive sampling.

The intervention group received nanoparticle capsules from papaya leaves with 458 mg/day for seven days. The intervention group also received standard postpartum care. The control group received a placebo capsule and standard postpartum care for seven days. In the beginning, the researchers provided a pretest by measuring the initial weights of babies with a digital weigher. On the eighth day, the researchers measured the final weights of babies.

The researchers analyzed the data with univariate and bivariate analyses. The bivariate analysis was with *Independent T-test.* This research obtained ethical clearance from the Bioethical Commission of Medical and Health Research of Universitas Islam Sultan with 89/III/2021/Komisi Bioetik, dated March 31, 2021.

III. RESULTS AND DISCUSSION



Graphic 1 Increased Weights of Babies

Graphic 1 shows the weight averages of intervention and control groups before and after the intervention. The weights of the intervention group are increased after receiving nanoparticle capsules of papaya leaves with a dose of 458 mg/day for seven days. This table shows the differential test of breast milk production adequacy (based on weights of babies) on intervention and control groups.

Table of weight differences between the intervention group and the control group

Variables	N	Mean	Difference	SD	*P*
Pre Weight **Intervention Control**	18 18	3028,05 2847,5	180,55	238,54 210,09	0,022
Post Weight **Intervention Control**	18 18	3367,77 2988,38	379,39	206,15 204,81	<0,001

**Independent Test with T-test*

The statistics test with the T-test obtains a score of $p < 0.001$. It means there is a significant difference between the intervention and control groups. The average increased weight of babies for the intervention group is 3367.78 Kg. On the other hand, the result of the control group is 2988.38 Kg. Thus, there is a difference of 379.39 Kg with an effect size value of 1.8.

The independent T-test statistical test shows that the baby's weight before receiving the intervention is 0.002 ($p < 0.05$). Thus, there is a significant difference in babies' weights in the intervention and control groups before the treatment. Then, after the treatment, the score of p is lesser than 0.001. It means there is a significant difference in babies' weights from the control and intervention groups after receiving nanoparticle capsules of papaya leaves. The weights of babies have an effect size value of 1.8, indicating strong. Previous studies about papaya leave extract administration with an 800 mg/day dose for 14 days found it effective in increasing breast milk production. The first indicator was the baby's weight with an increased rate of 271.88 grams and an effect size value of 0.6, indicating weak [6].

Novela and Putri found that postpartum mothers had increased weights of babies on their first day after receiving papaya leaves sauté. However, before receiving papaya leave sauté, the average baby's weight was 2946.67.gram. Then, after receiving papaya leave sauté, they had an increased weight of 3206.67 grams. It indicated an average increase of 260 grams [30]. The differences due to papaya leave sauté and nanoparticle of papaya leaves was observable from the increased weight. However, in this research, with the nanoparticle of papaya leave administration, the increased rate was higher than papaya leave sauté provision. The difference is 260 grams.

Ikhlasiah and Winarmi support this finding. The researchers administered papaya leave juice for lactating mothers and found an increased rate of babies' weights with a p-value of 0.009 lesser than 0.05. The increased weight rate of the babies was 165 grams [7]. Tina's study supports this finding. The researcher found papaya leave extract with a dose of 800 mg/day effectively increased breast milk production. The applied indicator was the baby's weight with an effect size value of 0.6, the low effect [8].

Previous studies about papaya leave extract administration with an 800 mg/day dose for 14 days found it effective in increasing breast milk production. The first indicator was the baby's weight with an increased rate of 271.88 grams and effect size value of 0.6, indicated weakly. In the current research, the administration of nanoparticle capsules from papaya leave with a dose of 458 mg/day for seven days could increase breast milk production. The applied indicator was the baby's weight with an average of 339.72 grams and an effect size value of 1.8, a strong effect.

The same result was shown by Chyntia (2021). In the researcher's study, the researcher administered ginger rhizome extract with a dose of 250 mg three times a day within 14 days. It was effective in increasing babies' weights. The control group had an increased average of 78.95 grams, while the intervention group had an increased average of 269.47 grams with an effect size of 0.2, the low effect [9]. Ratna Dewi Putri (2021) found that lactating mothers of 0 until five months that received moringa leave extract, 600 mg/day, for four weeks, had their babies' weights increased effectively with an average of 920.32 gram, effect size of 0.6, the low effect [10][11].

The previous studies showed that the administration of Curcuma extract capsule was with a dose of 750mg/day while moringa leaves extract with 600 mg/day. In this research, the administered dose was lower, 458 mg/day. The effect sizes of Curcuma extract and moringa leaves extract were 0.2 and 0.6. However, in this current research, the effect size of papaya leaves is 1.8. Therefore, the nanoparticle capsule has the largest effect size than Curcuma and moringa leave extracts. It is because nanoparticle capsule has extremely small particle sizes so that body can absorb them easily. Nanoparticles could

overcome active substance solubility, improve bioavailability, improve active substance stability, and modify the delivery system of medicine. Thus, the drugs can be brought directly to specific parts and provide a stronger effect [12].

IV. CONCLUSION

The admistration of nanoparticle capsule from papaya leaves (Carica Payaya L) whit a dose of 458 mg/day for seven days effective to increase babies' weights. Arter treatment the control group the average baby weight became 2988,38 grams while the interverntion group the average baby weight became 3367,77 grams. So that there is a difference in the increase in infant weight in the intervention and control grups of 379,39 grams.

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