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DOI: [10.31965/infokes.Vol21Iss4.1129](https://doi.org/10.31965/infokes.Vol21Iss4.1129)Journal homepage: <http://jurnal.poltekkeskupang.ac.id/index.php/infokes>**RESEARCH****Open Access****The Impact of Oxytocin Massage and Banana Flower Consumption (*Musa balbisiana colla*) on the Prolactin Level in Breastfeeding Mothers****Nurmiaty<sup>1a\*</sup>, Sitti Aisa<sup>2b</sup>, Aswita<sup>2c</sup>, Muliati Dolofu<sup>2d</sup>, Nur Rahman<sup>3e</sup>, Bringiwatty Batbual<sup>4f</sup>**<sup>1</sup> Department of Midwifery, Poltekkes Kemenkes Palu, Palu, Central Sulawesi, Indonesia<sup>2</sup> Department of Midwifery, Poltekkes Kemenkes Kendari, Kendari, Southeast Sulawesi, Indonesia<sup>3</sup> Department of Nutrition, Poltekkes Kemenkes Malang, Malang, East Java, Indonesia<sup>4</sup> Department of Midwifery, Poltekkes Kemenkes Kupang, Kupang, East Nusa Tenggara, Indonesia<sup>a</sup> Email address: [nurmiaty1908@gmail.com](mailto:nurmiaty1908@gmail.com)<sup>b</sup> Email address: [sittiaisakeb@gmail.com](mailto:sittiaisakeb@gmail.com)<sup>c</sup> Email address: [aswita\\_wita71@yahoo.com](mailto:aswita_wita71@yahoo.com)<sup>d</sup> Email address: [dolofumuliati@yahoo.com](mailto:dolofumuliati@yahoo.com)<sup>e</sup> Email address: [rahmancahaya@yahoo.com](mailto:rahmancahaya@yahoo.com)<sup>f</sup> Email address: [wattybatbual155@gmail.com](mailto:wattybatbual155@gmail.com)

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**Abstract**

Since a long time ago, banana flowers have been believed they increase the production of breast milk. Thus, many people consume them as vegetables for breastfeeding mothers. This research aims to examine the impact of oxytocin massage and banana flower consumption on prolactin levels in breastfeeding mothers. The method used a true experiment control group design in which samples were divided into 3 groups; group 1 was treated with oxytocin massage, group 2 was treated with banana flower consumption, and group 3 was given intervention with oxytocin massage and banana flower consumption. The massage was conducted every day with durations of 5-10 minutes. The banana flower vegetable was served as much as 150 grams daily. The first blood sampling was done pre-intervention on the third day of postpartum. The second blood sampling was done after intervention on the tenth day of postpartum. The checkup of prolactin level was through a method of Chemiluminescent Microparticle Immunoassay (CMIA). To analyze the data, this research utilized a T-test exam. The result is the average difference in prolactin levels in pre-and-post intervention in group 1 was -61,75 ng/mL. Although decreasing prolactin levels occurred, yet there was no significant interval between pretest and posttest. The difference in prolactin levels in pre-and-post intervention in group 2 was 103,61 ng/mL. The prolactin level increased but not significantly. In group 3, the difference levels were about 110,22 ng/mL. In this group, a significant prolactin level increase had occurred. The conclusion is the combination treatment of banana flower and oxytocin massage evolved the level of prolactin level in nursing mothers. Research related to strengthening the recommendation of traditional galactagogues consumption to breastfeeding mothers.

**Keywords:** Prolactin, Banana Flower, Oxytocin Massage.**\*Corresponding Author:**

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## 1. INTRODUCTION

Breastfeeding has been becoming one of the ways that can be done to ensure infants obtain adequate nutrients in age 0-6 first month. It also could deter stunting. According to that, every mother must breastfeed their infants exclusively in the 0-6 months and it must be continued until the next 2 years. However, breastfeeding in society still shows a low percentage and is far from what is expected. The Indonesian target adequacy of exclusive breastfeeding (0-6) in 2018 is 68,74%. In Southeast Sulawesi, the target adequacy of exclusive breastfeeding is 47,53% (Kementerian Kesehatan Republik Indonesia, 2020). The achievement of target adequacy of exclusive breastfeeding should get more concern.

A low milk supply can cause growth delay that is caused by under-standard body weight and length and vulnerability to infection. Faltering growth can be experienced by all children from 2-6 months old. A result of research in a developing country found that the main factor of nutrient deficiency and retardation in 1-15-month-old babies was the insufficiency of milk supply and poor complementary foods (Shrimpton, et al., 2001). The reasons for the low milk supply are a failure of mothers to breastfeed their infants just after giving birth and the perception of mothers who think that breast milk is insufficient for the fulfillment of their babies nutrient needs "breast milk lack syndrome". As a result, mothers or other family members supply complementary foods before their babies reach 6 months old.

The mother's food indirectly may influence milk production in terms of quality and quantity. Breastfeeding mothers do not have to consume excessive food but enough proportion to maintain their nutrient needs. If breastfeeding mothers cut down on the amount of food they eat or ignore hunger, it will reduce milk production (Aisyah, Zakaria & Daud, 2020). Bataknese lactating women in Simalungun District, North Sumatra, Indonesia, have a tradition of consuming Torbangun leaves (*Coleus amboinicus* Lour; CA) after birth. They believe that the consumption of CA for one month after birth increases their breast milk production (Damanik et al., 2001; Damanik et al., 2004). One of plants that are known to be able to improve breast milk production is banana flower. Since a long time ago, banana flowers are believed to increase breast milk production in nursing mothers. Therefore, many people consume it as a vegetable for breastfeeding mothers. Some research reveals that the water of boiled banana flowers is effective to increase breast milk production (Wahyuningsih et al., 2017; Riani, 2017).

To deal with breastfeeding problems, some effort has been done, such as educating mothers about breast milk and breastfeeding through lactation classes (Nurmiaty et al., 2016). The feedback shows that the mothers who join the class were able to maintain exclusive breastfeeding until their babies age 6 months. The impact on the rise of body weight and length was very significant. Nevertheless, the effort of education is thought not enough, thus innovative action is needed to solve those problems such as through massage treatment and giving mothers local foods which are part of their local wisdom. With those local foods, people are not only familiar to process them, but also easy to get them.

A shoulder massage is one of the solutions to cope with abnormalities in breast milk production. The massage along both sides of the spine will stimulate the medulla oblongata to send a message to the hypothalamus in the posterior to release oxytocin hormone and produce breast milk. The benefit of oxytocin massage is to ease swollen breasts (engorgement), reduce blockage of breast milk (plugged/milk duct), and help maintain milk production while mothers and babies are ill. Oxytocin massage is a treatment that aims to induce hormone prolactin and oxytocin during post-pregnancy. Furthermore, the oxytocin hormone can calm mothers, so that breast milk can go out smoothly (Mardiyaningsih, Setyowati, & Sabri, 2011). The production of breast milk is affected by the level of prolactin, the higher level of the prolactin, the higher breast milk production.

Breast milk production is also influenced by food intake. High protein and fat food are also able to increase breast milk production. Besides that, a psychological factor is playing an important role. Mothers who feel psychologically comfortable and happy will produce good breast milk. Banana flowers are known to contain galactagogue that has a potential in stimulating oxytocin hormone and prolactin. A little amount of breast milk is solved by consuming sweat leaves, long beans, chayotes, and banana flowers or well-known banana hearts. The contents of a banana flower such as calories, protein, fat, carbohydrate, vitamin A, vitamin B1, vitamin C, and minerals like phosphor, calcium, and Fe can bolster breast milk production. The nutrient content per 100 grams of fresh banana flower according to the Nutrition Directorate of the Indonesian Health Department contains; fat 31 kkal, protein 1,2 g, fat 0,3 g, carbohydrate 7,1 g, calcium 3,0 mg, phosphor 50 mg, Fe 0,1 mg, vitamin A 170 mg, vitamin B1 0,05 mg, vitamin C 10 mg, water 90,2 g, and BDD 255% (Kementerian Kesehatan Republik Indonesia, 2020).

Banana flowers contain flavonoids, phosphors, protein, minerals, calcium, vitamin B1, vitamin C, high fiber, Fe, and Iodine. Ordinary people especially mothers are familiar with banana flowers to be a vegetable and perceive that its benefit can expedite breast milk. Therefore, we want to know more deeply about what active substances in banana flowers could increase milk production. Based on folk's experience who have utilized banana flowers as part of their diet and some research the water of boiled banana buds can boost the production of breast milk. This research aims to examine the impact of oxytocin massage and banana-flower-contained food consumption on the level of prolactin.

## 2. RESEARCH METHOD

The research uses a true experiment control group design. The sampling technique was purposive sampling. The samples of this research are 30 people which then were separated into 3 groups and each group consists of 10 people. Group 1 was intervened by oxytocin massage, group 2 was treated with banana flower consumption, and group 3 was approached by a combination treatment of oxytocin massage and banana flower consumption. The banana flowers that were used was the banana flowers of Pisang Batu (*Musa balbisiana colla*) which were processed to be a ready-to-consume vegetable. The vegetable, then, was given to breastfeeding mothers.

The research was done from May to September 2019. The research location was in the working are of Nambo dan Poasia Health Center in Kendari. It comprised two stages. Stage 1 was collecting samples which were pregnant mothers whose ages of pregnancy were 35-40 weeks while filling a form of consent to be samples of this research. After that, in stage 2 all those pregnant mothers were visited regularly just after their delivery process and were given intervention. The breast milk was collected from breastfeeding mothers from the third day to the tenth day postpartum. Blood sampling was done prior to and after the intervention that was undertaken by the staff of Prodia Laboratory and would be sent to Jakarta Prodia Laboratory to determine the biomarker level based on the research variable.

The stages of research comprise: (1) Proposing the Research Ethics Commission to get ethical feasibility; (2) Collecting sampling of banana flowers that were going to be observed. The banana flowers used were from Pisang Kepo Batu of Kendari; (3) Formulating vegetable that uses banana buds as the main ingredient to be given to breastfeeding mothers; (4) Screening pregnant mothers in trimester III who became samples of this research through filling out consent forms; (5) Training husbands/families of mothers in how to practice oxytocin massage; (6) Collecting blood sampling and weighing infants before giving intervention to mothers on the third-day postpartum. Blood sampling was done from 08.00 – 10.00 am; (7) Oxytocin massage was done in the morning in 5-10 minutes duration; (8) Serving the banana flower vegetable to be consumed by mothers in the morning as much as 150 gram; (9) Blood sampling

and breast milk volume of mothers after given intervention in postpartum day 10. Blood sampling was carried out from 08.00 – 10.00 am; (10) Samples were taken by staffs who have been assigned by Kendari Prodia Laboratory and the samples were straightly sent to Jakarta Prodia Laboratory to be observed. The prolactin level measurements utilizes a Chemiluminescent Microparticle Immunoassay (CMIA) method. Data analysis is through univariable analysis namely; mean, median, and deviation standard and bivariable analysis using a T-test exam.

This research has been ethically permitted by the Research Ethic Commission of Health Polytechnic of Kendari, Ministry of Health, No. 1065/KEPK-PTKMKS/X/2019.

### 3. RESULTS AND DISCUSSION

**Table 1.** Characteristic of Respondents.

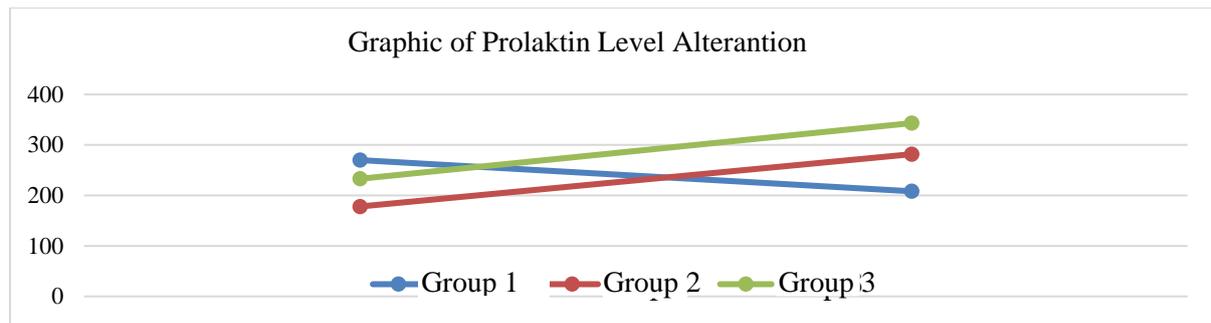
Characteristic	Group 1		Group 2		Group 3		p-value
	n	%	n	%	n	%	
Age of mother							
<20	2	20.0	0	0.0	1	10.0	0.506
20-35	7	70.0	9	90.0	9	90.0	
>35	1	10.0	1	10.0	0	0.0	
Parity							
1	5	50.0	1	10.0	4	40.0	0.483
2	2	20.0	4	40.0	2	20.0	
3	2	20.0	2	20.0	3	30.0	
4	1	10.0	3	30.0	1	10.0	
Mother's education							
Primary - Junior high school	4	40.0	3	30.0	2	20.0	0.621
Senior high school - University	6	60.0	7	70.0	8	80.0	

Table 1 shows that the result exhibits that respondents in each group were average 20-35 years old. For parity, group 1 had 70% parity 1 and 2 and the rest was parity between 3 and 4. In group 2, 50% was parity 1 and 2. In the aspect of education, the majority of respondents had finished senior high school and university.

**Table 2.** Variable Analysis with Numeric Data.

Variable	Group	$\bar{X} \pm sd$ (min-max)
Pretest Prolactin	1	269,96 ± 140,33 (95,15- 459,96)
	2	178,06 ± 66,09 (109,04 - 316,64)
	3	229,77 ± 74,96 (133,01 - 373,38)
Posttest Prolactin	1	208,21 ± 154,67 (42,35 - 443,77)
	2	281,68 ± 180,09 (134,38 - 585,83)
	3	346,42 ± 134,78 (174,63 - 647,53)

Table 2 shows that the result of prolactin level measurement before intervention (pretest) obtained the average highest score in group 1 (269,96 ng/mL) followed by groups 3 and 2 whose scores were (229,77 ng/mL) and (178,06 ng/mL) respectively. The levels of prolactin in the post-intervention showed that the average highest score was in group 3 which was 346,42 ng/mL and the lowest score was in group 1 as much as 208,21 ng/mL.



**Graphic 1.** Prolaktin Level Alterantion

Graphic 1 show that the result of pre and pro-prolactin levels is shown in the below graphic. At the beginning of prolactin measurement seen in group 1 was the highest of all groups. In the second measurement, it experienced an improvement in prolactin levels in group 3. The groups that experienced improving prolactin levels were groups 3 and 2.

**Table 3.** Data Normality Test.

Group	Variable	p-value
The Intervention of oxytocin massage	Prolactin Pretest	0.051
	Prolactin Posttest	0.165
The intervention of banana flower vegetable	Prolactin Pretest	0.143
	Prolactin Posttest	0.007
The intervention of banana flower vegetable + oxytocin massage	Prolactin Pretest	0.535
	Prolactin Posttest	0.369

Table 3 shows that the normality data test was done before the multivariable test. The Shapiro Wilk test conducted the normality data test with exam criteria if the score is significant ( $p\text{-value} > 0,05$ ) so the data was normally distributed.

**Table 4.** Analysis of Pair T-test among Groups of Approach.

Group	Variable	n	Mean	SD	p-value	Difference	CI 95%
1	Prolactin Posttest	10	208.2	154.66	0.339	-61.75	-200.18-76.68
	Prolactin Pretest	10	269.96	140.33			
2	Prolactin Posttest	10	281.67	180.09	0.132	103.61	-38.12-245.35
	Prolactin Pretest	10	178.06	66.08			
3	Prolactin Posttest	10	343.20	43.01	0.014	110.22	27.50-192.93
	Prolactin Pretest	10	232.98	24.69			

From Table 4, in group 1, the average pretest prolactin level was 269,96 ng/mL and the posttest was 208,2 ng/mL. There was a 61,75 ng/mL difference. The level of prolactin tends to decline. The analysis shows no difference between before and after the intervention of oxytocin massage, which was proved by p-value 0,339. In addition, in group 2, the average pretest prolactin level was 178,06 ng/mL while the post-test was 281,67 ng/mL. There was 103,61 ng/mL in difference which means that the level of prolactin increased. However, the result of the analysis shows that there was no difference in prolactin levels before and after the intervention of banana flower consumption which is seen from a p-value 0,132. A different result was seen in group 3, where the average pretest prolactin level was 232,98 ng/mL and 343,20 ng/mL of the posttest. The difference occurred as much as 110,22 ng/mL or it could be said that the level of prolactin had improved. The result reveals that there was a difference in prolactin levels before and after the intervention of banana flower vegetable consumption and oxytocin massage with p value 0,014. In this measurement, a slight improvement in prolactin level happened from group 2 to group 3. The average difference values were 103,61 ng/ml and 110,22 ng/ml.

This research was conducted from September to November 2019 by involving 30 postpartum mothers. The sample was divided into 3 groups namely: group 1 (intervened by oxytocin massage); group 2 (intervened by banana flower vegetable consumption); and group 3 (intervened by the combination of oxytocin massage and banana flower vegetable consumption). The results showed that in group 1 the results of the second measurement of prolactin levels (day 10) were lower than the first measurement. However, there was no difference in prolactin levels before and after the oxytocin massage intervention which was indicated with a p-value of 0.339. Meanwhile, in group 2 and group 3, after the intervention, prolactin levels showed an increase. In group 2, the analysis results showed no difference in prolactin levels before and after the intervention of banana flower-based food indicated by a p-value of 0.132. In group 3, the results of the analysis showed differences in prolactin levels before and after the intervention of giving banana flower-based food and oxytocin massage marked with a p-value of 0.014

This research found out in this research that oxytocin treatment did not influence the prolactin hormone level. It is different from the result of (Delima, Arni & Rosya, 2016) who saw that oxytocin had an influence on breast milk production. The mothers who received oxytocin massage experienced a significant increase in breast milk production. In group 2 and group 3 there was an increase in prolactin levels which is linear with the study of (Wahyuningsih et al., 2017) who did an approach by giving banana flower-based boiled water. The results obtained that there was a significant impact of the consumption of *Musa balbisiana colla* extract on the volume of breast milk production ( $p=0.003$ ) and prolactin levels ( $p=0.001$ ). The effect of banana extract (*Musa balbisiana colla*) is significant in increasing breast milk production and prolactin levels in nursing mothers. The findings of this study can be used as the basis for an alternative menu for postpartum mothers. It is also one of the solutions taken by midwives or health workers to deal with postpartum mothers whose milk production is inadequate and whose prolactin levels are low (Wahyuningsih et al., 2017).

Another study on the effect of banana buds on increasing breast milk production is a study by (Wahyuningsih et al., 2017) that found that mothers who consumed banana flower water experienced an increase in breastfeeding frequency from an average of 5.7 times to 9.75 times. There is also an increase in breast milk production while consuming stone banana flowers. This is certainly related to the increase in the hormone prolactin as an effect of consuming banana flowers.

The results of Musfiroh, et al., (2018) on the effectiveness of banana buds on increasing levels of the hormone prolactin and breast milk production in postpartum mothers showed that there was a significant increase in prolactin hormone levels ( $79.31 \pm 51.46$ , p-value 0.000). While in the control group, there was a decrease ( $-12.09 \pm 72.42$ , p-value 0.488). Breast milk production based on the volume of breast milk in the intervention group experienced a significant increase ( $51.8750 \pm 6.36356$ , p-value 0.000). Banana flower extract is effective against increasing levels of the hormone prolactin. There is a significant effect of banana flower consumption on increasing prolactin levels and milk production.

Many studies have been carried out on the use of herbal plants as galactagogues. Several herbal plants that have proven potential as galactagogues are wild asparagus, Torbagun (*Plectranthus amboinicus*), fenugreek, and milk thistle (Mortel & Mehta, 2013). Several other studies have also found plants that can act as galactagogues are (*Musa paradisiacal*) (Mahmood, Omar & Ngah, 2012), Katuk leaves (*Sauropus androgynus*) (Soka, Wiludjaja, & Marcella, 2011) and young papaya (*Carica papaya* L)(Kharisma, Ariyoga & Sastramihardja, 2011). Katuk leaves contain compounds in the form of sterols, alkaloids, flavonoids and tannins that play a role in increasing breast milk production.

Based on the results of bioactive examinations carried out in the laboratory, the content of active substances in banana blossoms that were blended, boiled, or extracted with ethanol is alkaloids, flavonoids, and terpenoids. These active substances are also found in Rosella flower seeds and young papaya. The research results of [Okasha, Abubakar & Bako, \(2008\)](#) who studied rosella seeds discovered that the suspected bioactive galactagogues in rosella flower seeds are saponins, tannins, alkaloids, flavonoids, and steroids. This is in line with the results obtained in this study. The effect of the galactagogue is to increase serum prolactin and pituitary prolactin. Meanwhile, according to research ([Mahmood, Omar & Ngah, 2012](#)), The bioactive substances suspected as galactagogues in banana buds are saponins and tannins.

Galactagogue is a drug or substance that can initiate, maintain, and increase the speed of milk synthesis. The pharmaceutical theory reveals that what causes galactagogues is dopamine antagonists that can increase prolactin secretion and further increase milk secretion. Medicine that had been long known as a galactagogue is domperidone, metoclopramide ([Holter, 2012](#)), and sulpiride ([Zuppa et al., 2010](#)). Metoclopramide, known as a galactagogue since 1975, is a dopamine antagonist. The mechanism is to block dopamine receptors on the pituitary which causes the amount of prolactin to increase. Domperidone is another dopamine antagonist, that acts by blocking D2 receptors on the pituitary gland ([Holter, 2012](#)). Sulpiride as a galactogogum stimulates the hypothalamus to secrete prolactin release factor. The use of galactogogum drugs has side effects on breastfeeding mothers ([Holter, 2012](#)). The side effects of metoclopramide are mild headaches and intestine disorders. The side effects of domperidone are dry mouth, peeling skin, itching, headaches, and stomach upset. The side effects of sulpiride are fatigue and headaches ([Zuppa et al., 2010](#)). Therefore, the banana flower vegetable can be used as an alternative to change the consumption of galactagogue. The regular consumption of the banana flower vegetable can evoke the production of prolactin hormone and breast milk.

Research on rats showed that aqueous extract and petroleum ether extract of banana flower (*Musa paradisiacal*) could increase milk production in lactating rats by 25% and 18%, respectively. Meanwhile, ethanol extract as a control had no effect. The increase in milk production is thought to be caused by an increase in cell proliferation in the mammary glands due to the consumption of banana flower extract. The components of banana flower compounds that are thought to act as galactagogues are saponins and tannins ([Mahmood, Omar & Ngah, 2012](#)).

Previous research on the phytochemical content in the M. Paradisiaca flower showed that this flower contains alkaloids, saponins, glycosides, tannins, flavonoids, and steroids ([Mahmood, Ngah, & Omar, 2011](#)). The presence of these compounds such as saponins, tannins, alkaloids, and flavonoids in Hibiscus sabdariffa L. is thought to increase serum prolactin levels, a hormone associated with milk secretion ([Okasha, Abubakar & Bako, 2008](#)). Since most of the polar compounds are supposed to be soluble in the polar extraction solvent, it can be concluded that the compounds contained in the aqueous extract are polar compounds. The presence of saponins and tannins in the water extract of the Musa flower ([Mahmood, Ngah, & Omar, 2011](#)) shows that at least one of two substances influences the effect of galactagogue in this research.

The results revealed that consumption of several traditional galactagogues was significantly correlated with breast milk volume, including banana flower, lemon basil, Thai basil, bottle gourd, and pumpkin ( $p < 0.05$ ). Furthermore, there was a significant relationship between the consumption of several types of protein and the volume of milk, including tofu, eggs, chicken, fish, and seafood ( $p < 0.05$ ). Maternal energy and carbohydrate intake were related to breast milk volume ( $p < 0.05$ ), but protein intake was not. Certain types of galactagogue and traditional proteins are associated with breast milk volume. However, research relating to the active ingredients in this galactagogue is needed to secure

recommendations on the use of traditional galactagogues among nursing mothers (Buntuchai et al., 2017).

Banana flower is one of the traditional processed foods, known almost throughout the country. Banana flower is also processed into food that can be consumed daily. Banana flower vegetables can be made fresh, stir-fried, or just plain vegetables. The results showed that the galactagogue content in banana buds has the potential to stimulate the hormones oxytocin and prolactin such as alkaloids, polyphenols, steroids, flavonoids, and other substances that are most effective in increasing and facilitating breast milk production (Sriwahyuni, & Marpaung, 2022).

Oxytocin massage can provide a sense of relaxation to mothers because during the massage it will stimulate the production of the hormones oxytocin and prolactin. Meanwhile, food ingredients in the form of the banana flower contain galactagogue which can increase breast milk production. These two things are very well combined because the study results show that the group given the combination intervention of oxytocin massage and banana flower vegetables had higher prolactin levels. There was a significant increase in prolactin levels and there was a significant difference before and after the intervention.

#### 4. CONCLUSION

The difference in average prolactin levels before and after intervention in group 1 was -61,75, group 2 was 103,61, and group 3 was 110,22. Group 3 experienced an increase in prolactin levels and there was a significant change in prolactin levels between pretest and posttest. It is important to deliver socialization to increase breast milk production through the combined intervention of oxytocin massage and banana flower vegetable mothers and households. Furthermore, it is necessary to innovate a new extract of banana flowers for an easier way of consumption for nursing mothers. Research related to active substances in galactagogues is also needed to strengthen the recommendation of traditional galactagogues consumption to nursing mothers.

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