Jurnal Info Kesehatan
Vol. 21, No. 4, December 2023, pp. 721-729
P-ISSN 0216-504X, E-ISSN 2620-536X
DOI: *10.31965/infokes.Vol21.Iss4.1129*
Journal homepage:*https://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[1a*], Sitti Aisa[2b], Aswita[2c], Muliati Dolofu[2d], Nur Rahman[3e], Bringiwatty Batbual[4f]

[1] Department of Midwifery, Poltekkes Kemenkes Palu, Palu, Central Sulawesi, Indonesia
[2] Department of Midwifery, Poltekkes Kemenkes Kendari, Kendari, Southeast Sulawesi, Indonesia
[3] Department of Nutrition, Poltekkes Kemenkes Malang, Malang, East Java, Indonesia
[4] Department of Midwifery, Poltekkes Kemenkes Kupang, Kupang, East Nusa Tenggara, Indonesia

[a] Email address: nurmiaty1908@gmail.com
[b] Email address: sittiaisakeb@gmail.com
[c] Email address: aswita_wita71@yahoo.com
[d] Email address: dolofumuliati@yahoo.com
[e] Email address: rahmancahaya@yahoo.com
[f] Email address: wattybatbual155@gmail.com

Received: 9 March 2023 Revised: 28 December 2023 Accepted: 28 December 2023

Abstract

For a long time, banana flowers have been believed to increase breast milk production. Thus, many people consume them as vegetables for breastfeeding mothers. This research examines 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 three 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 for 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 postpartum day following the intervention. The checkup of prolactin level was through Chemiluminescent Microparticle Immunoassay (CMIA). This research utilized a T-test exam to analyze the data. The average difference in prolactin levels in pre-and-post intervention in group 1 was -61,75 ng/mL. Although decreasing prolactin levels occurred, there was no significant interval between pretest and post-test. 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 that the combination of banana flower and oxytocin massage evolved the prolactin level in nursing mothers. Research related to enforcing the recommendation of breastfeeding mothers to consume traditional galactagogues.

Keywords: Prolactin, Banana Flower, Oxytocin Massage.

Corresponding Author:

Nurmiaty
Department of Midwifery, Poltekkes Kemenkes Palu, Palu, Central Sulawesi, Indonesia
Email: nurmiaty1908@gmail.com

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 continue 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%. Southeast Sulawesi's 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 delays 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 fulfilment of their baby's 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 may indirectly 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 (Aisya, 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 consuming CA for one month after birth increases breast milk production (Damanik et al., 2001; Damanik et al., 2004). One of the plants that are known to be able to improve breast milk production is a banana flower. Since long ago, banana flowers have been 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 effectively increases breast milk production (Wahyuningsih et al., 2017; Riani, 2017).

Some efforts have been made to deal with breastfeeding problems, such as educating mothers about breast milk and breastfeeding through lactation classes (Nurmiaty et al., 2016). The feedback shows that the mothers who joined the class could maintain exclusive breastfeeding until their babies aged 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 familiar with processing and quickly getting them.

A shoulder massage is one solution to coping 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 prolactin level; the higher the prolactin level, the higher breast milk production.

Breast milk production is also influenced by food intake. High protein and fat foods also increase breast milk production. Besides that, psychological factors play an important role. Mothers who feel psychologically comfortable and happy will produce good breast milk. Banana flowers contain galactagogue, which can stimulate oxytocin hormone and prolactin. A small 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 kcal, 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, phosphorus, protein, minerals, calcium, vitamin B1, vitamin C, high fibre, Fe, and Iodine. Ordinary people, especially mothers, are familiar with banana flowers as a vegetable and perceive that their 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 the experiences of folks who have utilized banana flowers as part of their diet and some research, the water of boiled banana buds can boost breast milk production. 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. This research sample was 30 people separated into three groups, each comprising 10 people. Group 1 was intervened by oxytocin massage, group 2 was treated with banana flower consumption, and a combination of oxytocin massage and banana flower consumption approached Group 3. The banana flowers used were the banana flowers of Pisang Batu (*Musa balbisiana Colla*), which were processed to be ready-to-consume vegetables. The vegetable, then, was given to breastfeeding mothers.

The research was done from May to September 2019. The research location was in the working area of Nambo dan Poasia Health Center in Kendari. It comprised two stages. Stage 1 was collecting samples of pregnant mothers whose ages of pregnancy were 35-40 weeks while filling a consent form 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 before and after the intervention undertaken by the staff of Prodia Laboratory. It 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 grams; (9) Blood sampling and breast milk volume of mothers after given intervention in postpartum day 10. Blood sampling was conducted from 08.00 – 10.00 am; (10) Samples were taken by staff to whom

Kendari Prodia Laboratory has assigned, and the samples were straightly sent to Jakarta Prodia Laboratory for observation. The prolactin level measurements utilize a Chemiluminescent Microparticle Immunoassay (CMIA) method. Data analysis is done through univariable analysis, namely, mean, median, and deviation standard and bivariable analysis using a T-test exam.

The Research Ethics Commission of Health Polytechnic of Kendari, Ministry of Health, No. 1065/KEPK-PTKMKS/X/2019, has ethically permitted this research.

3. RESULTS AND DISCUSSION

Table 1. Characteristic of Respondents.

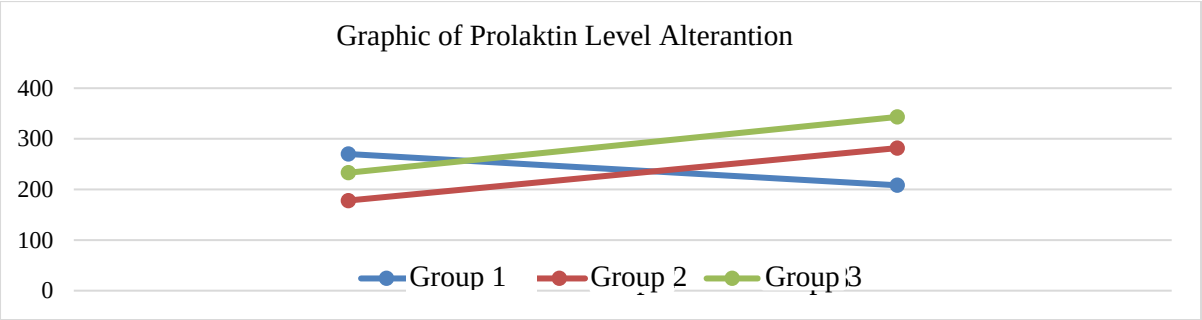
Characteristic	**Group 1**		**Group 2**		**Group 3**		**p-value**
	n	**%**	**n**	**%**	**n**	**%**	
Age of mother							
<20	2	20.0	0	0.0	1	10.0	0.506
20-35	7	70.0	9	90.0	9	90.0	
>35	1	10.0	1	10.0	0	0.0	
Parity							
1	5	50.0	1	10.0	4	40.0	0.483
2	2	20.0	4	40.0	2	20.0	
3	2	20.0	2	20.0	3	30.0	
4	1	10.0	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 respondents in each group were, on 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**	**$\bar{X}$ ± 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 prolactin levels 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 shows the result of pre- and pro-prolactin levels in the graphic below. Group 1 was the highest of all groups at the beginning of the prolactin measurement. In the second measurement, an improvement in prolactin levels was observed 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. The data was normally distributed if the score was significant (p-value) > 0,05.

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 post-test 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 Group 2, the average pretest prolactin level was 178,06 ng/mL, while the post-test was 281,67 ng/mL. There was a difference of 103,61 ng/mL, meaning that the prolactin level increased. However, the analysis shows no difference in prolactin levels before and after the intervention of banana flower consumption, which is seen from a p-value of 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 post-test. 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 a difference in prolactin levels before and after the intervention of banana flower vegetable consumption and oxytocin massage with a p-value of

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 and involved 30 postpartum mothers. The sample was divided into three 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 that oxytocin treatment did not influence the prolactin hormone level. It differs from the result of (Delima, Arni, and Rosya, 2016), who saw that oxytocin influenced 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 used an approach of giving banana flower-based boiled water. The results showed a significant impact of consuming *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*) significantly increases 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. Breast milk production also increases while consuming stone banana flowers. This is undoubtedly 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 ± 51.46, p-value 0.000). While in the control group, there was a decrease (-12.09±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±6.36356, p-value 0.000). Banana flower extract is effective against increasing levels of the hormone prolactin. A significant effect of banana flower consumption is on increasing prolactin levels and milk production.

Many studies have been carried out on using herbal plants as galactagogues. Several herbal plants with proven potential as galactogues 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 in the laboratory, the active substances in banana blossoms blended, boiled, or extracted with ethanol are alkaloids, flavonoids, and terpenoids. These active substances are also found in Rosella flower seeds and young papaya. The research results of Okasha, Abubakar, and 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 and milk secretion. Medicine 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 in the pituitary, which causes the amount of prolactin to increase. Domperidone is another dopamine antagonist that blocks D2 receptors in 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. Regularly consuming the banana flower vegetable can produce prolactin hormone and breast milk.

Research on rats showed that aqueous 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 increased 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 they are polar compounds in the aqueous extract. 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 using traditional galactagogues among nursing mothers (Buntuchai et al., 2017).

Banana flowers are a traditional processed food, and they are known almost throughout the country. Banana flowers are also processed into food that can be consumed daily. Banana flower vegetables can be 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 stimulates the production of the hormones oxytocin and prolactin. Meanwhile, food ingredients like banana flowers 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 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 was103,61, and group 3 was 110,22. Group 3 experienced increased prolactin levels and a significant change between pretest and post-test. 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, nursing mothers must innovate a new extract of banana flowers for easier consumption. Research related to active substances in galactagogues is also needed to strengthen the recommendation of nursing mothers to consume traditional galactagogues.

ACKNOWLEDGMENTS

We express our sincere gratitude to the Ministry of Health for generously providing grants that facilitated the completion of this research. Our heartfelt thanks also extend to all mothers and infants who actively participated as respondents in this study.

REFERENCES

Aisya, M. W., Zakaria, F., & Daud, W. (2020). The Effects of Banana Blossom (Musa Acuminate Colla) Consumption on Increased Breast Milk Production in the Work Area of Talaga Jaya. *Journal La Lifesci, 1*(4), 1-7.

Buntuchai, G., Pavadhgul, P., Kittipichai, W., & Satheannoppakao, W. (2017). Traditional galactagogue foods and their connection to human milk volume in Thai breastfeeding mothers. *Journal of Human Lactation, 33*(3), 552-559.

Damanik, R., Damanik, N., Daulay, Z., Saragih, S., Premier, R., Wattanapenpaiboon, N., & Wahlqvist, M. L. (2001). Consumption of bangun-bangun leaves (Coleus amboinicus Lour) to increase breast milk production among Bataknese women in North Sumatera Island, Indonesia. *Asia Pacific Journal of Clinical Nutrition*, *10*(4), S67.

Damanik, R., Wahlqvist, M. L., & Wattanapenpaiboon, N. (2004). The use of a putative lactagogue plant on breast milk production in Simalungun, North Sumatra, Indonesia. *Asia Pacific Journal of Clinical Nutrition*, *13*.

Delima, M., Arni, G. Z., & Rosya, E. (2016). Pengaruh pijat oksitosin terhadap peningkatan produksi ASI ibu menyusui di Puskesmas Plus Mandiangin. *Jurnal Ipteks Terapan*, *9*(4), 283–293.

Holter, A. (2012). Galactogogues : Effectiveness and Safety. *Saskatchewan Drug Information Services College of Pharmacy and Nutrition*, 29(2), 29–32.

Kementerian Kesehatan Republik Indonesia. (2020). *Profil Kesehatan Indonesia Tahun 2019*. Kementerian Kesehatan Republik Indonesia.

Kementerian Kesehatan Republik Indonesia, (2020). *Tabel Komposisi Pangan Indonesia*. Jakarta: Kementerian Kesehatan Republik Indonesia.

Kharisma, Y., Ariyoga, A., & Sastramihardja, H. S. (2011). Efek ekstrak air buah pepaya (Carica papaya L.) muda terhadap gambaran histologi kelenjar mamma mencit laktasi. *Majalah Kedokteran Bandung*, *43*(4), 160-165.

Mahmood, A., Ngah, N., & Omar, M. N. (2011). Phytochemicals constituent and antioxidant activities in Musa x Paradisiaca flower. *European journal of scientific research*, *66*(2), 311-318.

Mahmood, A., Omar, M. N., & Ngah, N. (2012). Galactagogue effects of Musa x paradisiaca flower extract on lactating rats. *Asian Pacific Journal of Tropical Medicine*, *5*(11), 882-886.

Mardiyaningsih, E., Setyowati, S., & Sabri, L. (2011). Efektifitas kombinasi teknik marmet dan pijat oksitosin terhadap produksi ASI ibu post seksio di Rumah Sakit Wilayah Jawa Tengah. *Soedirman Journal of Nursing*, *6*, 31-38.

Mortel, M., & Mehta, S. D. (2013). Systematic review of the efficacy of herbal galactogogues. *Journal of Human Lactation*, *29*(2), 154-162.

Musfiroh L., Santoso B., & Runjati. (2018). The effectiveness of Musa balbisiana Colla toward the enhancement of prolactin hormone level and postpartum mother breast milk production. *International Journal of Multidisciplinary Education and Research*, 3(5), 31-34

Nurmiaty, N., Arsin, A. A., Sirajuddin, S., & Syafar, M. (2016). The effect of education lactation on breastfeeding behavior infant 0-6 months in Kendari Indonesia. *Public Health of Indonesia*, *2*(2), 100-111.

Okasha, M. A. M., Abubakar, M. S., & Bako, I. G. (2008). Study of the effect of aqueous Hibiscus sabdariffa Linn seed extract on serum prolactin level of lactating female albino rats. *European Journal of Scientific Research*, *22*(4), 575-583.

Riani, R. (2017). Pengaruh Konsumsi Rebusan Jantung Pisang Terhadap Ekskresi Asi Pada Ibu Menyusui Di Desa Ranah Wilayah Kerja Puskesmas Kampar Tahun 2016. *Jurnal Ners*, *1*(1), 117–124.

Shrimpton, R., Victora, C. G., de Onis, M., Lima, R. C., Blossner, M., & Clugston, G. (2001). Worldwide timing of growth faltering: implications for nutritional interventions. *Pediatrics*, *107*(5), e75-e75.

Soka, S., & Wiludjaja, J., & Marcella (2011). The Expression of Prolactin and Oxytocin Genes in Lactating BALB/C Mice Supplemented with Mature Sauropus androgynus Leaf Extracts. In *International Conference on Food Engineering and Biotechnology (IPCBEE)*, 9, 291–295.

Sriwahyuni, E., & Marpaung, I. S. (2022). Pengaruh Konsumsi Jantung Pisang Terhadap Peningkatan Produksi Asi Ibu Nifas Di Klinik Alisah Treisya Kecamatan Medan Area Tahun 2022. *Jurnal Penelitian Kebidanan & Kespro*, *5*(1), 82-87.

Wahyuningsih, D., Hidayat, S. T., Khafidhoh, N., Suwondo, A., Fatmasari, D., & Susiloretni, K. A. (2017). Effect of Musa balbisiana colla Extract on Breast Milk Production in breastfeeding mothers. *Belitung Nursing Journal*, *3*(3), 174-182.

Zuppa, A. A., Sindico, P., Orchi, C., Carducci, C., Cardiello, V., Catenazzi, P., & Romagnoli, C. (2010). Safety and efficacy of galactogogues: substances that induce, maintain and increase breast milk production. *Journal of Pharmacy & Pharmaceutical Sciences*, *13*(2), 162-174.