



The effectiveness of *Musa balbisiana* Colla toward the enhancement of prolactin hormone level and postpartum mother breast milk production

Laeli Musfiroh^{1*}, Bedjo Santoso², Runjati³

¹⁻³ Department of Midwifery, Ministry of Health Polytechnic of Semarang, Indonesia

Abstract

Most of the breastfeeding mothers have problems with unsmooth breast milk production. The heart of the banana is a plant that has an effect of galactagogue that increases the production of breast milk. The purpose of this study was to determine the impact of giving banana heart to increased levels of prolactin hormone and milk production in postpartum mothers. This is pre-post with control group design. The population was postpartum mothers on days 1-4 were breastfeeding, a sample of 36 respondents. Data analysis used the parametric paired t-test, Wilcoxon, independent t-test, Mann Whitney. In the intervention group, there was a significant increase in prolactin hormone levels (79.31 ± 51.46 , p-value 0.000) while the control group decreased (-12.09 ± 72.42 , p-value 0.488). Breast milk production based on infant body weight in the intervention group had a significant increase (3058.61 ± 58.40502 , p-value 0.040) compared to the control group there was a decrease (-76.3584 ± 54.22032 , p-value 0.000). Milk breast production in the intervention group experienced a significant increase (51.8750 ± 6.36356 , p-value 0.000) compared to the control group there was a decrease (38.9117 ± 7.58910 p-values 0.000).

Banana heart extract is effective against increase prolactin hormone levels in postpartum mothers, $p < 0.05$, which means that there is an effect of consumption of banana heart on prolactin hormone levels and milk breast production.

Keywords: postpartum, banana heart, prolactin hormone, breast milk production

1. Introduction

Breastfeeding mothers must pay attention to several things to improve the quality and volume of breast milk, among others by consuming vegetables and fruits [13, 14]. Several studies suggest that a small amount of breast milk can be overcome by consuming traditional plants such as chayote, long bean and banana heart [8, 15, 16].

Traditional plants are believed to be able to give t galactagogue namely substances that can increase and facilitate the production of breast milk [7, 17]. The consumption of several traditional galactagogue such as the heart of a banana significantly correlated with the volume of breast milk [17].

Heart of banana (*Musa balbisiana* Colla) is a part of a banana plant that has proven effective against increasing breast milk production [7]. The banana heart also contains carbohydrates, proteins, lots of minerals, especially phosphorus, calcium, Fe, vitamins A, B1 and C [2]. Heart bananas include galactagogue compounds, which have the potential to stimulate hormones oxytocin and prolactin such as alkaloids, polyphenols, steroids, flavonoids, and other substances are most effective in the production of breast milk [2]. Polyphenols and steroids affect prolactin reflexes to stimulate alveoli that are active in the formation of breast milk [18]. Flavonoid high is galactagogue which helps produce milk [13]. The average intensity of breast milk frequency before consuming the heart of banana stone was 5.7 times, and after drinking the heart of banana stone, it is increased 9.75 to 19.1 times.

Based on the description, the researcher was interested in

researching the effectiveness of the banana heart on increasing breast milk levels of prolactin hormone and breast milk production in postpartum mothers.

2. Materials and methods

Type of research was analytic with experimental methods that examined the effect of banana heart giving on the increase in prolactin hormone levels and breast milk production in mothers of Post-Partum in Cilacap Hospital in 2018. The design is included in a *quasi-design experimental*, with *Pre and Post-test with control group design*. In this design, the researcher divided the respondents into two groups, namely 1 control group and 1 treatment group. Then the two groups were examined prolactin hormone levels and breast milk production first before the study (*pre-test*). Later in the experimental group were given supplements of stone heart banana extract (*Musa balbisiana* Colla) 2 x 250 mg for 4 days. In the control group, only care was given to ordinary postpartum mothers in the form of nutrition education for breastfeeding mothers without supplementation of banana heart extract for 4 days. Then the researchers examined prolactin hormone levels and ASI production again on day 5 (*post-test*).

Table 1: Research Design

| Pre-test | Treatment of | Post-test |
|----------|--------------|-----------|
| O1 | X1 | O2 |
| O3 | X2 | O4 |

Remarks

- O1: Measuring prolactin levels and breast milk production in groups control (*pre-test*)
- O2: Measuring prolactin hormone levels and breast milk production in the control group (*post-test*)
- O3: Measuring prolactin hormone levels and milk production before intervention in the treatment group (*pre-test*)
- O4: Measuring hormone prolactin levels and output of breast milk after intervention in the treatment group (*post-test*)
- X₁: Intervention care during childbirth in the form of nutrition education of breastfeeding mothers in the control group
- X₂: Intervention for the provision of banana heart supplements (*Musa balbisiana* Colla) in the treatment group

3. Results & Discussion

Characteristics of respondents in this study included maternal age, resting patterns, maternal psychology, and parity in the intervention group and the control group.

The average age of respondents is in healthy reproductive age, with an average age of 29 years in the intervention group and 27 years in the control group. Researchers set this age limit because in general age 20-35 years is a healthy reproductive age group and does not have a high risk or complications that can endanger the puerperium. The average rest pattern in the intervention group was 5 hours, as well as the control group. Factors that can affect breast milk production include maternal rest. If the condition of the mother is too tired /, lack of rest then will also decrease the milk production. Average parity in this study is known that 33.3% of mothers are primiparous parity groups in the treatment group, while the remaining 66.7% of mothers with multiparous. Respondents in the control group amounted to 22.2% were mothers with primiparous parity, while the remaining 77.8% were mothers with multiparous. Parity homogeneity test results obtained p -value 0.154 ($p > 0.05$).

The average psychological condition in the normal/unconcerned intervention group was 83.3%, mild anxiety was 16.7% while in the standard / not anxious control group 88.9%, mild anxiety was 11.1%. The psychological preparation of the mother determines the success of breastfeeding, the mental state of the mother who is depressed, sad, and tense will reduce the volume of breast milk.

The homogeneity test results of all these variables showed that p -value > 0.05 , which means that the variables of age, parity, psychological, and maternal resting patterns did not affect the relationship between giving intervention or treatment provided to prolactin hormone levels and breast milk production in respondents either treatment group and control group.

The results of *paired t-test* showed the mean levels of hormone Prolactin before being given a banana heart, in the intervention group was 270.06 ng/ml and after being given a banana heart to 349.37 ng/ml. Further analysis results obtained p -value of 0,000 ($p < 0,05$) means that there is a difference in the hormone prolactin before and after the treatment in the intervention group, and it can be concluded that the heart of banana is effective in increasing levels of the hormone prolactin. In the control group, it was found that the level of prolactin hormone before treatment was 307.95 ng/ml

and after being treated, it was 295.85 ng/ml. The results of further analysis obtained p -value 0.488 ($p > 0.05$) means that there are no differences in prolactin levels before and after treatment in the control group.

Independent t-test showed the difference in mean prolactin hormone levels before and after a given treatment group intervention was 79.31 ng/ml and the control group was -12.09 ng/ml. Further analysis results obtained p -value of 0,000 ($p < 0, 05$) means that there are differences in the hormone prolactin before and after being treated in the intervention group and the control group. It can be concluded that banana heart is more effective in increasing prolactin hormone levels than nutritional education in postpartum mothers.

The intervention group experienced an increase in the levels of the hormone prolactin and the control group decreased. Traditional plants are believed to be able to provide the effect of galactagogue which is a substance that can increase and facilitate the production of milk breast. The heart of banana stone contains galactagogue compounds, which have the potential to stimulate hormones oxytocin and prolactin such as alkaloids, polyphenols, steroids, flavonoids and other substances most effective in improving and facilitating the production of breast milk^[2]. The presence of polyphenols and steroids affects prolactin reflexes to stimulate alveoli which are active in the formation of ASI^[18]. High flavonoids are galactagogue which helps produce breast milk. This is in line with the results of Dian's (2017) study that the average prolactin level in the experimental group was 35,337 nanograms and in the control group was -38,381 nanograms. The highest level of prolactin occurs at the beginning of lactation, and there is a decrease with the development of lactation^[28].

The paired t-test show mean baby's body weight before being given banana heart extract, in the intervention group was 3188,088 gram and after treatment became 3218.67 gr. Further analysis results obtained p -value of 0.040 ($p < 0.05$) means that there is a significant difference in the weight of the baby before and after being given treatment in the intervention group. It can be concluded that the banana heart is effective in increasing ASI production based on baby's body weight. In the control group, the mean of the baby's body weight before treatment was 3058.55 gram and after treatment became 2982.19 gr. Further analysis results obtained p -value value of 0.000 ($p < 0, 05$) means that there are significant differences in the baby's body weight before and after being given treatment to the control group.

The results of the test *Mann Whitney* showed the mean difference in weight of the baby before and after being given treatment in the intervention group of 30.5861 g and the control group of -76.3584 g. The results of further analysis obtained the value of p -Value 0.000 ($p < 0.05$) means that there is a significant difference in weight of the baby before and after being given the intervention between the intervention group and the control group. It can be concluded that the banana heart is more effective in increasing milk breast production based on infant body weight compared to nutritional education on postpartum mothers.

The *result of the Wilcoxon test* shows the mean volume of milk breast before being given a banana heart extract in the intervention group was 4.6694 ml and after being given

treatment 56.544 ml. Further analysis results obtained the *p-value* of 0.000 ($p < 0.05$) means that there are significant differences in the volume of breast milk before and after being given treatment in the intervention group. It can be concluded that the banana heart is effective in increasing milk production based on the volume of ASI. In the control group the mean volume of breast milk before treatment was 4.4250 ml and after being treated, it was 43.336 ml. Further analysis results obtained *p-value* 0.000 ($p < 0.05$) means that there is a significant difference in the volume of breast milk before and after being given treatment to the control group. It can be concluded that nutritional education effectively increases milk production based on the volume of breast milk in postpartum mothers.

The test Results *t-independent test* shows the difference in the volume of breast milk before and after being given intervention between the intervention group of 51.8750 ml and the control group of 38.9117 ml. Further analysis results obtained *P value* 0,000 ($p < 0.05$) means that there are significant differences in the volume of breast milk before and after the intervention is given between the intervention group and the control group. Then it can be concluded that the banana heart is more effective in increasing milk production based on the volume of breast milk compared to nutritional education in postpartum mothers.

Based on the analysis using statistical tests *t-independent test* after being given banana heart extract (*Musa balbisiana* Colla) showed an average difference in the increase in volume in the intervention group was 51.8750 ml and the control group was 38.9117 ml. Further analysis results obtained *P value* 0.000 ($p < 0.05$) means that it can be concluded that there are significant differences in the volume of breast milk before and after the intervention is given between the intervention group and the control group. From the results of the above research, it can be concluded that the effect of providing banana heart extract in the intervention group shows that there is a higher increase in breast milk volume compared to the control group.

Assessment of breast milk production refers to the volume of breast milk released by the breast. Breast milk that has been produced is stored in the breast milk warehouse, then removed from the chest and then passed to the baby, the amount of breast milk released and drunk by the baby is assumed to be breast milk production [4, 34].

Some factors that influence the smoothness of breastfeeding are maternal nutrition, parity, gestational age at delivery, baby suction, maternal psychological state, maternal rest, contraceptive use and maternal lifestyle. The regularity of the baby sucking more than 10 times with the correct position and supported by nutrients that meet the standards and the consumption of banana heart extract makes breast milk production increase every day, according to the results of this study, there was an increase in milk production of around 4.271 ml.

This is consistent with previous research proving that the average intensity of breast milk frequency before consuming the banana stone heart is 5.7 times. After drinking the heart of banana stone, 9.75 times the average production of breast milk is proportional to the needs of the baby, assuming that breast milk has gone smoothly and breastfeeding is carried out every 3-4 hours. By breastfeeding, the average milk production on

the second day of the puerperium is around 120 ml, on the third day at least 180 ml, and on the fourth day around 240 ml. A practical guide to calculating breast milk production a day during the first week after delivery is to multiply the number of days of postpartum by 60. This result will give an estimate of the amount of milk in millimeters / 24 hours. Continuous milk production will be achieved after 10-14 days. At the end of the second week, it is generally produced 120-180 ml of milk every time [4, 11, 31].

Breast milk production produced by the mother in her breast gland is not the same every time. The volume of breast milk will decrease according to time [30]. In the first days of birth, if the power sucks the baby adequately, it will produce breast milk 10-100 ml/day of breast milk. Breast milk production will be optimal 400-450 ml/day on the 10-14 days of the baby's age. Healthy babies will consume 700-800 ml/day. Breast milk production will decrease from 600 ml after the first 6 months, 400-600 ml in the 6 months second of 500 to the baby's age, and will be 300-500 ml in the second year of the child's age [31]. The results of the study stated that the heart of banana was effective in increasing prolactin hormone levels and milk production in postpartum mothers.

4. Conclusions

Heart of banana (*Musa balbisiana* Colla) is effective against increased levels of prolactin hormones and milk production in postpartum mothers. It was proven that the banana heart extract (*Musa balbisiana* cola) given to postpartum mothers was effective against increased prolactin hormone levels in the intervention group compared with the control group. Also, banana heart extract (*Musa balbisiana* cola) given to postpartum mothers was effective against increased milk production based on indicators of increased breast milk volume and infant weight in the intervention group compared to the control group.

5. References

1. Riani R. Pengaruh konsumsi rebusan jantung pisang terhadap ekskresi ASI pada ibu menyusui di Desa Ranah wilayah kerja PUSKESMAS Kampar Tahun 2016. *Jurnal Ners*. 2017; 1(1):117-24.
2. Othman N, Lamin RAC, Othman CN. Exploring behavior on the herbal galactagogue usage among Malay lactating mothers in Malaysia. *Procedia-Social and Behavioral Sciences*. 2014; 153:199-208.
3. Gartner LM, Morton J, Lawrence RA, Naylor AJ, O'Hare D, Schanler RJ, *et al*. Breastfeeding and the use of human milk. *Pediatrics*. 2005; 115(2):496-506.
4. Rahayu D, Santoso B, Yunitasari E. The difference in breastmilk production between acupressure point for lactation and oxytocin massage. *Jurnal Ners*. 2015; 10(1):9-19.
5. Dhey FN, Wulandari S, Afriliana FD. The effect of consumption bananas flower to increase breastmilk of postpartum woman.
6. Widyawati MN, Hadisaputro S, Anies A, Soejoenoes A. Effect of massage and aromatherapy on stress and prolactin level among primiparous puerperal mothers in Semarang, Central Java, Indonesia. *Belitung Nursing Journal*. 2016; 2(4).

7. Buntuchai G, Pavadhgul P, Kittipichai W, Satheannoppakao W. Traditional galagalactagogue foods and their connection to human milk volume in Thai breastfeeding mothers. *Journal of Human Lactation*. 2017;0890334417709432.
8. Wahyuni E, Sumiati S, Nurliani N. pengaruh konsumsi jantung pisang batu terhadap peningkatan produksi ASI di wilayah PUSKESMAS Srikunoro, Kecamatan Pondok Kelapa, Bengkulu Tengah Tahun 2012. *Buletin Penelitian Sistem Kesehatan*. 2013; 15(4okt).
9. Uvnas-Moberg K, Petersson M. Oxytocin, a mediator of anti-stress, well-being, social interaction, growth and healing. *Z Psychosom Med Psychother*. 2005; 51(1):57-80.
10. Sulistiyawati E. The evaluation of health care, public behavior, and environment in a high infant mortality rate.
11. Kent JC, Prime DK, Garbin CP. Principles for maintaining or increasing breast milk production. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*. 2012; 41(1):114-21.
12. Anderson PO. Herbal use during breastfeeding. *Breastfeeding Medicine*. 2017; 12(9):507-9.
13. Wahyuningsih D, Hidayat ST, Khafidhoh N, Suwondo A, Fatmasari D, Susiloretni KA. Effect of *Musa balbisiana* Colla extract on breast milk production in breastfeeding mothers. *Belitung Nursing Journal*. 2017; 3(3):174-82.
14. Turkyılmaz C, Onal E, Hirfanoglu IM, Turan O, Koç E, Ergenekon E, *et al*. The effect of galagalactagogue herbal tea on breast milk production and short-term catch-up of birth weight in the first week of life. *The journal of alternative and complementary medicine*. 2011; 17(2):139-42.
15. Mahmood A, Omar MN, Ngah N. Galagalactagogue effects of *Musa x paradisiaca* flower extract on lactating rats. *Asian Pacific journal of tropical medicine*. 2012; 5(11):882-6.
16. Bagian Gizi Kesehatan Masyarakat F, USU, Medan. Jantung pisang sebagai laktogogum, 2012.
17. Luecha P, Umehara K. Thai medicinal plants for promoting lactation in breastfeeding women. *Handbook of dietary and nutritional aspects of human breast milk: Wageningen Academic Publishers*; 2013, 1954-9.
18. Bachelot A, Binart N. Reproductive role of prolactin. *Reproduction*. 2007; 133(2):361-9.
19. Fransisca Novita Dhey. The effect of consumption bananas flower to increase breast milk of postpartum mothers, 2016.
20. Organization WH, UNICEF. Global strategy for infant and young child feeding: World Health Organization, 2003.
21. Kusuma IC, Setiani O, Pramono N, Widyawati MN, Kumorowulan S. Sweet potato (*Ipomoea Batatas L.*) Leaf; its effect on prolactin and production of breast milk in postpartum mothers. *Belitung Nursing Journal*. 2017; 3(2):95-101.
22. Eli Wahyuni. Pengaruh pemberian jantung pisang batu terhadap peningkatan produksi ASI, 2012.
23. Novitasari A, Purnamasari D, Hapsari E, Ardiyani ND. Inovasi dari jantung pisang (*Musa spp.*). *Jurnal Kesmadaska*. 2013; 4(2).
24. Ballard O, Morrow AL. Human milk composition: nutrients and bioactive factors. *Pediatric Clinics*. 2013; 60(1):49-74.
25. Penelitian B. Riset kesehatan dasar. Jakarta: Kementerian Kesehatan RI, 2013.
26. Hubertin SP. Konsep penerapan ASI eksklusif. Jakarta: EGC, 2004, 11.
27. Sri Purwanti H. Konsep penerapan ASI eksklusif: Buku Saku untuk Bidan. Jakarta: EGC, 2004.
28. Sherwood L. *Human physiology: from cells to systems: Cengage learning*, 2015.
29. Hockenberry MJ, Wilson D. *Wong's nursing care of infants and children-E-Book: Elsevier Health Sciences*, 2014.
30. Astutik RY. *Payudara dan laktasi*. Jakarta: Salemba Medika. 2014.
31. Wiji RN. *ASI dan pedoman ibu menyusui*. Yogyakarta: Nuha Medika, 2013.
32. Kirimunun MP, Noer ER. Hubungan frekuensi kunjungan ANC (Ante Natal Care) dengan riwayat pemberian ASI pada bayi usia 6 Bulan. *Journal of Nutrition College*. 2014; 3(4):730-6.
33. Kurnia N. Tingkat pengetahuan ibu menyusui tentang faktor penyebab puting susu lecet di PUSKESMAS Nanggulan Kolon Progo, 2017.
34. Cox S. *Breastfeeding with confidence: Panduan untuk belajar menyusui dengan percaya diri (Gracinia, J, Penerjemah)*. Jakarta, 2006.