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GALAKTAGOGUM IN LOCAL VEGETABLES: HABITS REVEALED BY SCIENCE

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ABSTRACT

Breast milk has an ideal nutritional content for babies according to the needs to grow and develop optimally. Indonesia has a very rich diversity of foodstuffs, one of the habits of the Indonesian people is to regularly consume certain vegetables during breastfeeding. However, some vegetables are not yet popular for breastfeeding mothers to consume even though they contain many benefits such as banana heart, young papaya and spinach. The purpose of this literature review is to provide an evidence-based study on the potential of local vegetables that are commonly consumed during breastfeeding in Indonesia but the content of galaktogogum is not widely known, namely: papaya, spinach, and banana heart. This article is a literature review that discusses the potential of local plants as a source of galactogues. Article search involves 2 databases, namely PUBMED and Google Scholar. The keywords used are: ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND PAPAYA". ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND banana flower". ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND Spinach". ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND Spinach. Banana hearts, young papayas, and spinach are vegetables that are able to increase breast milk production through galactogue compounds and their derivatives. The saponins contained in the heart of bananas and young papaya can increase the activity of the hormone oxytocin in the myoepithelial cells surrounding the alveolus and ductus. Meanwhile, the phytoestrogen content in spinach can cause biological effects similar to estrogen that are able to increase breast milk production.

Keywords: banana flowers; galactagogum; papaya; spinach

INTRODUCTION

Galactagogues are compounds found in pharmaceutical preparations, foods, or supplements that have been shown to increase, induce, or maintain breast milk (breast milk) production. Most galactagogues work by increasing prolactin through mechanisms such as direct stimulation of the adenohypophysis or inhibition of the prolactin-inhibiting hormone.10 Prolactin is a peptide hormone that is synthesized and secreted by the anterior pituitary. This hormone functions to stimulate the production of breast milk in the mammary glands.(Khairani, 2021) Breast milk has an ideal nutritional content for babies according to the needs to grow and develop optimally. The optimal breastfeeding is from birth to 23 months of age to minimize the risk of infants/toddlers experiencing pain and death. Many problems arise during the breastfeeding process, one of which is the lack of milk production. Factors that cause reduced breast milk production include psychological factors and physical factors of the mother.(Rahimah, 2022)(Ningrum, 2021)

One of the efforts to overcome the problem of breast milk production is the use of galaktogogum so that it continues to be consumed by breastfeeding mothers. Galactogogum mediates an increase in the hormone prolactin which plays an important role in breast milk production. The most commonly used synthetic galactogogums are chlorpromazine, sulpiride, metoclopramide and domperidone. However, long-term use is related to the occurrence of unwanted side effects, one of which is the extra pyramidal effect on both mothers and babies. Therefore, the consumption of galactagogum from natural compounds continues to be developed to meet the needs of

galactogogome that are more acceptable with minimal side effects(Ozalkaya, 2018)(Bazzano, 2016)(Bekoe, 2018).

Indonesia has a very rich diversity of foodstuffs, one of the habits of most Indonesian people is to consume certain vegetables during breastfeeding, these vegetables are believed to be able to increase breast milk production such as banana hearts, young papaya, moringa, and spinach. Advancing science has proven that most of these foods contain galactogues. However, there are still many people who do not know the benefits of these vegetables, so they only focus on one type or rely on pharmaceutical preparations or drugs. High nutrition education is directly related to fruits, vegetables and the consumption of healthy foods. Therefore, evidence-based scientific monitoring to educate health workers and the public is still very necessary. Based on this, the purpose of this review literature is to provide a scientific evidence-based explanation of the content of galactogumes in these local vegetables in increasing breast milk production (Buntuchai, 2017)(Arshad, 2020). This article will provide an evidence-based study of the potential of local vegetables that are commonly consumed during breastfeeding in Indonesia but are not widely known about the content of galaktogogum, namely: papaya, spinach, and banana flowers.

METHOD

This article is a literature review that discusses the potential of local plants as a source of galactogues. Article search involves 2 databases, namely PUBMED and Google Scholar. The keywords used are: ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND PAPAYA". ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND banana flower". ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND Spinach". ("Milk, Human"[Mesh]) AND "Galactogogues"[Mesh] AND Spinach. The inclusion criteria are primary research articles with experimental quasy designs or randomized controlled trials, observational, cross sectional and laboratory studies. The exclusion criteria are articles resulting from community service, short communication, expert opinion or letter to editor. The researcher will take articles published in the past 10 years, namely January 2014 – August 2024.

RESULT AND DISCUSSION

Banana Flower (*Musa x paradisiaca)*

Banana hearts are widely consumed by the Indonesian people, but they are not yet popular as a source of galaktogogum such as moringa leaves. Previous research reported that banana flowers (*M. x paradisiaca*) contain alkaloids, saponins, glycosides, tannins, flavonoids, and steroids that can contribute to the lactation process (Mahmood et al., 2011; Joseph et al., 2014). In addition, the content of steroid saponins, whose chemical structure is similar to endogenous estrogen, will help attach to estrogen receptors so that breast milk production will increase (Ghasemi et al., 2015). In studies it is reported that the main phenolic compounds in banana flowers are catechins and isoquercetin. In addition, it contains polyphenols as one of the largest phytochemical groups, and contains a class of flavonoids. Flavonoids are composed of flavones, isoflavones, flavanons, catechins, and anthocyanins. Banana inflorescences are rich in anthocyanins and show a high total presence of phenolic compounds, especially flavonoids, catechins, and isoquercetin in this study. Studies report flavonoids have been shown to protect mothers from oxidative damage, which causes chronic diseases. Consumption of fruits and vegetables is recommended both during pregnancy and breastfeeding (Amornlerdpisan, 2021) (Ahmad, Zakariyya, Abubakar, Sani, & Ahmad, 2019)(Roobha, Saravanakumar, Aravinthan, & Devi, 2011)(Tsopmo, 2018)

Another study reported that banana flower water extract was shown to act as a significant galactagogue on breast milk production and prolactin levels in breastfeeding mothers on the 5th to 12th day postpartum. Even processed biscuits with banana flowers (Musa x paradisiaca) significantly increase breast milk production for up to 6 months. However, the side effects of banana heart are also uncertain. In addition, the secondary metabolite ingredients identified as triterpenes (stigmasterol, and β-sitosterol), sesquiterpenes (karyophyllene), and sesterpenes (ofiobolin) contained in banana flowers have estrogenic effects that are expected to benefit breastfeeding mothers.(Wahyuningsih, 2017)(Nordin, 2020)(Amornlerdpisan, 2021) Banana flowers are also proven to have high antioxidants that are beneficial for wound healing, the content of phenolic compounds and flavonoids has antioxidant potential. Thus, banana flowers play a beneficial role as a health food supplement for breastfeeding mothers, including postpartum mothers and post-cesarean section mothers. In a laboratory-based study conducted in his study that compared petroleum ether, ethanol and water extracts from banana flowers in providing galactogogum effects, it was reported that the average milk production of rats during lactation on the 6th to 15th day of the group showed results ($P < 0.05$). Statistically, the amount of milk production in mice treated with banana flowers extract showed a significant difference compared to the control group and water extract with the comparison of banana flowers extract and control results were 217.27 vs 214.25 and 178.93 g vs 177.31 respectively(Michele, Rosa, Ernesto, Gabrielle, & Marcio, 2015)(Mahmood A, 2017)

Papaya

Papaya fruit is a type of plant that contains lactogum and has the potential to stimulate the hormone oxytocin and prolactin hormone through substances such as alkaloids, saponins, flavonoids, polyphenols and steroids. In the study of young papaya fruit extract on the hostology of rat mammary glands, it was seen that the increase in breast milk production that occurred in the young papaya fruit extract group was caused by the presence of saponins and alkaloids contained in the young papaya fruit extract. (Mareta, 2020)(Kharisma Y, 2011) The saponins contained in papaya can increase the activity of the hormone oxytocin in the myoepithelial cells surrounding the alveolus and ducts. In addition, alkaloid substances act as α-adrenergic receptor agonists in the ducts of the mammary glands whose activity synergizes with the hormone oxytocin in breast milk secretion. The research conducted by reported that there was an increase in breast milk in 3.3% of respondents and the statistical results showed that there was an effectiveness of consuming young papaya decoction to increase breast milk production with (p value 0.000). This result is supported by the results that report that on average most breastfeeding mothers who do not consume young papaya have problems with poor breastfeeding.(Wijayanti K, 2019)(Hutahayan, 2023) (Sartika, 2020)

Spinach (*Amaranthus viridis)*

Spinach belongs to the family *Chenopodiaceae* These plants are rich in nutrients such as beets, radishes, and quinoa. In addition, spinach is cheap and easy to process. Spinach is a type of leafy vegetable that is in great demand by the public, spinach contains many nutrients, especially iron (Fe), which is good for consuming by breastfeeding mothers. The recommended iron adequacy rate for breastfeeding mothers per day is 18 mg. Based on the Food Composition List table, every 100 g of raw spinach contains 36 calories of energy, 3.5 g of protein, 0.5 g of fat, 6.5 g of carbohydrates, 267 mg of calcium, 67 mg of phosphorus, 3.9 mg of iron, 6090 SI of vitamin A, 0.08 mg of vitamin B1, 80 mg of vitamin C, and 80.9 g of water.(Al-gumbos N, 2019)(Widyasari, 2022)

Although banana flowers are proven to be galactagogic, only a few breastfeeding women can receive the stinging taste of banana flowers. To overcome this problem, banana flowers must be processed in a simple, delicious, and ready-to-eat form. In addition, given the busy lifestyle of mothers, the production of galactogue herbal tea and drinks is very popular and commonly used by breastfeeding mothers.(Yimyam, 2023) Young papaya contains more papain enzyme than mature papaya. Papain is a proteolytic enzyme that helps break down proteins into smaller protein fragments called peptides and amino acids. Raw papaya is also rich in magnesium, potassium, vitamins A, C, E, and B . Raw papaya has a bland, slightly bitter taste with a hard texture. Papaya fruit has protective, antibacterial, laxative, and lactagogumic effects whose properties have been scientifically proven from papaya fruit. Papaya contains lactagome which can be one of the ways to increase the rate of lactation and milk production and is a strategy to increase the effectiveness of exclusive breastfeeding.(Tacias-Pascacio, 2021)(Mittu, 2023)(Nadiyah D L, 2018) Spinach is one of the sources of minerals and vitamins as well as phytoestrogens that are believed to increase lactation. Some of the nutrients contained in spinach are vitamin B6, protein, thiamin, folic acid, calcium, potassium and vitamins that are easily digested. Phytoestrogens are powerful estrogen receptor activators and can cause biological effects similar to endogenous and synthetic estrogens, by consuming foods rich in phytoestrogens the production of breast milk will increase because the hormone estrogen is activated. (Farlikhatun, 2019)

CONCLUSION

Banana flowers, young papayas, and spinach are vegetables that are able to increase breast milk production through galactogue compounds and their derivatives. The saponins contained in the bananas flowers and young papaya can increase the activity of the hormone oxytocin in the myoepithelial cells surrounding the alveolus and ductus. Meanwhile, the phytoestrogen content in spinach can cause biological effects similar to estrogen that are able to increase breast milk production.

REFERENCES

Khairani, A. F. (2021). The potential of medicinal plants as galactagogue in Indonesia: A review from medical perspective. Biomedical and Pharmacology Journal, 14(3), 1595.

Rahimah, H. (2022). Efforts To Increase Breast Milk Production: Literature Review. Lux Mensana: Journal of Scientific Health, 56-63.

Ningrum, A. N. (2021). A Literature Review: Pengaruh Perbedaan Pelarut Ekstrak Jantung Pisang (Musa paradisiaca) Sebagai Galaktogogum. Avicenna: Journal of Health Research, 4(1).

Bekoe, E. C. (2018). Medicinal Plants Used as Galactagogues, In PharmacognosyMedicinal Plants, Shagufta Perveen and Areej Al-Taweel (Ed.). IntechOpen. London.

Bazzano, A. N. (2016). A review of herbal and pharmaceutical galactagogues for breast-feeding. Ochsner Journal, 16(4), 511-524.

Ozalkaya, E. A. (2018). Effect of a galactagogue herbal tea on breast milk production and prolactin secretion by mothers of preterm babies. Nigerian journal of clinical practice, 21(1), 38-42.

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

Arshad, M. B. (2020). Misconceptions about Fruits Consumption among Nursing Mothers: Fruits Consumption among Nursing Mothers. DIET FACTOR (Journal of Nutritional and Food Sciences), 04-08.

Wahyuningsih, D. H. (2017). Effect of Musa balbisiana colla Extract on Breast Milk Production in breastfeeding mothers. Belitung Nursing Journal, 3(3), 174-182.

Nordin, Z. M. (2020). Effect of consuming lactogenic biscuits formulated with banana (Musa x paradisiaca) flower flour on expressed breast milk (EBM) among lactating working women. Food Research, 4(2), 294 – 300.

Amornlerdpisan, D. C. (2021). Bioactive compounds and antioxidant properties of banana inflorescence in a beverage for maternal breastfeeding. Applied Sciences, 11, 343. doi:10.3390/app11010343.

Yimyam, S. S. (2023). Effectiveness of banana flower beverage on breast milk production among mothers of preterm neonates. Journal of Neonatal Nursing, 29(5), 755-759.

Roobha, J., Saravanakumar, M., Aravinthan, K., & Devi, P. (2011). Antioxidant analysis of anthocyanin extracted from Musa acuminata bract. J. Pharm. Res, 4, 1488–1492.

Ahmad, B., Zakariyya, U., Abubakar, M., Sani, M., & Ahmad, M. (2019). Pharmacological Activities of Banana. In Banana Nutrition—Function and Processing Kinetics; Intech Open: London, UK.

Tsopmo, A. (2018). Phytochemicals in Human Milk and Their Potential Antioxidative Protection. Antioxidants, 7, 32.

Michele, M., Rosa, C., Ernesto, H., Gabrielle, S., & Marcio, A. (2015). Evaluation of antioxidant activity of extracts of banana inflorescences (Musa cavendishii). J. Food , 13, 498–505.

Mahmood A, S. N. (2017). Lactogenic Effects of Tannin and Aglycone Form of Aqueous Extract (AFAE) from Musa x paradisiaca Flower on Lactating Rats. Malays. Appl. Biol, 46(3) : 9 - 14.

Mareta, E. W. (2020). Comparison Of Effectiveness Benefits Of Providing Young Papaya Fruit Extract And Breast Care For Normal Postpartum Mother's Breast Milk Production: Systematic Review. STRADA Jurnal Ilmiah Kesehata, 9(2), 1141-1150.

Kharisma Y, A. A. (2011). Extra Water Effects of Young Papaya (Carica Papaya L.) Fruit Against Histology of Lactating Mice Mamma Glands. MKB, 43 (4): 160-165.

Wijayanti K, S. H. (2019). Saponin Maintaining and Dose Determining in Carica Papaya Leaf Cookies as a Breast Milk Booster (galactogogue). Indian Journal of Public Health Research & Development, 10 (9) 730-734.

Hutahayan, M. &. (2023). Effectiveness Of Young Papaya Book Consumption To Increasing Breast Milk Production In Breastfeeding Mothers. International Journal of Health and Pharmaceutical (IJHP), 3(3), 538-544.

Sartika, S. (2020). Green Papaya Consumption Against Increased Breast Milk Production. Journal of Endurance : Scientific Studies of Health Problems. E-ISSN -2477-6521 , Vol 5(3). (514-521).

Tacias-Pascacio, V. G.-S.-V.-M.-L. (2021). Immobilization of papain: A review. International Journal of Biological Macromolecules, 188, 94-113.

Mittu, B. B. (2023). Papaya. In Fruits and Their Roles in Nutraceuticals and Functional Foods . CRC Press, (pp. 163-185).

Nadiyah D L, K. Y. (2018). Determination of the degree of acute toxicity of water extract ofyoung papaya fruit (caricapapaya l.) in mice using purposed new recommended method. Indonesian Herbal Medicine, 1 (2):15-9.

Al-gumbos N, A.-N. S. (2019). Spinach Expert System: Diseases and Symptoms. Al-Azhar University: International Journal of Academic Information Systems Research (IJAISR) ISSN: 2000-002X , Pages: 16-22 9.

Widyasari, R. H. (2022). Financial Feasibility Analysis of Product Modification Katuk and Spinach Brownies Tartlet as an Alternative Breastfeeding Mother's Snack. . In E3S Web of Conferences. EDP Science, (Vol. 348, p. 00036).

Farlikhatun, L. (2019). Pengaruh Terapi Komplementer Terhadap Produksi ASI pada Ibu Nifas. Jurnal Antara Kebidanan, 2(4), 626-637