



THE EFFECTIVENESS OF MORINGA LEAVES AND YELLOW SWEET POTATO NOODLES FOR THE UTERINE INVOLUTION AND BREAST MILK PRODUCTION

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ABSTRACT

Background: Breast swelling or engorgement breast is the blocking up of breast milk because of the narrowing of the lactiferous duct or glands that are not emptied completely and the percentage incidence of it to postpartum women is 72%-85%. Breast swelling that is not handled properly can cause complications such as obstructions that lead to breast infection that can hinder the realization of exclusive breastfeeding in the future and without adequate treatment, the engorgement with moderate severity can become the obstructions of ducts and breast infections/mastitis. The purpose of this study is to determine the effect of the moringa leaves and yellow sweet potato noodles for the uterine involution and breast milk production of postpartum women.

Methods: This research was conducted in the Tembarak Public Health Center, Temanggung Regency using a quantitative approach with Quasi Experiment method. The design was post test only with control group. The population in this study was postpartum women who gave birth in September and October 2016. The sampling technique used was total sampling.

Results: The results of this study showed that there were effects from the consumption of moringa leaves noodles for breast milk production of postpartum women, showed by the p value of 0.034 and there was no effect from the consumption of yellow sweet potato noodles for the uterine involution, showed by the p value of 0.767.

Conclusion: The suggestions for professional organizations were to cooperate with the relevant authorities (Health Offices) in disseminating the results of this evidence-based research to help increasing breast milk production by using local food, and also to cooperate in cross-programs and cross-sectors in order to incorporate the use of local food based on the evidence as a procedure in providing health education for postpartum women

Keyword : uterine involution; breast milk production

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Received: July 3, 2021; Revised: August 1, 2021; Accepted: September 26, 2021

Background. The postpartum period (puerperium) begins after the birth of the placenta and ends when the uterus returns to its former condition before pregnancy. The postpartum period (puerperium) begins from 2 hours after the birth of the placenta until 6 weeks (42 days) after that (Pitriani. R, Andriyani 2014).

Several physiological changes will occur during this period, one of them is the uterine involution, which is the process of the uterus returning to its pre-pregnancy state after giving birth. The process of uterine involution that does not run normally can result in postpartum

hemorrhage (Sukma, Hidayati, and Nurhasiyah Jamil 2017).

One of the disturbances during the postpartum period is the disruption of the process of restoring the physical condition of the postpartum women, namely the process of uterine involution. Impaired uterine involution process disorders include uterine subinvolution which can cause bleeding, in addition to uterine hyperinvolution (Pitriani. R, Andriyani 2014). It is estimated that 60% of maternal deaths due to pregnancy occur after delivery and 50% of postpartum deaths occur within the first 24 hours (Marmi 2017). The causes are 90% atony, 7% the tearing of the

birth canal, the rest is due to retained placenta and blood clotting disorders (Kemenkes 2015).

According to (Kemenkes 2015), The 3 main factors for maternal mortality are hemorrhage (28%), eclampsia (24%), and infection (11%). The maternal mortality ratio (MMR) in Indonesia according to the Indonesia Demographic and Health Survey (IDHS) 2012 was 395 cases per 100,000 live births. The MMR in Central Java Province in 2015 based on reports from districts/cities was 112 per 100,000 live births.

Meanwhile, the MMR in Temanggung Regency in 2015 was 75.36 per 100,000 live births. Based on a report from the Temanggung Regency Health Office, in 2015 there were 7 cases of maternal death, 2 of them or 42.9% were caused by hemorrhage while 5 cases or 57.1% were caused by pregnancy with comorbidities.

The means passed down by the ancestors for postpartum women is to drink maternity herbs for 40 days, but they are usually prohibited from eating food of animal origin with the assumption that breast milk will smell rancid and hinder the healing process of wounds in the uterus (Suwanti 2014). It will have an impact on breast milk production and exclusive breastfeeding coverage.

The coverage of exclusive breastfeeding in Temanggung Regency in 2015 was 68%, while the coverage of exclusive breastfeeding in Tembarak District in 2015 was 53.23%. These are very far from the target set by the Temanggung Regency Health Office (Dinas Kesehatan Kabupaten Temanggung 2015).

One food ingredient that is widely available around us and has a high nutritional content is sweet potato (Persagi 2009). Sweet potatoes have many features. In addition to being cheap and easy to cultivate, sweet potatoes and their leaves are also easy to be processed into a variety of cooking menus. Not only that, this type of tuber has various health benefits and is also prospective as a future food source and is safe for consumption by almost all people, from infants aged more than 6 months to the elderly. According to an article published by the North Carolina Sweet Potato Commission,

of the 58 types of vegetables studied, it was found that sweet potatoes were the best food on the list (Setyawan 2015).

In addition to sweet potatoes, moringa leaves have been known to have various benefits, especially for health. Ancient people had used this Moringa leaf to cure several types of diseases. The most common disease treated with the use of moringa leaves is fever. Moreover, Moringa leaves are also commonly used for vegetable.

Moringa leaves (*Moringa oleifera*) have so many benefits for health, especially in treating various diseases. These are due to the high nutritional content of various types of vitamins and minerals in these moringa leaves. For example, the vitamin C in moringa leaves can be up to seven times the vitamin C in oranges. No wonder they have benefits as an antioxidant. Then, the vitamin A in moringa leaves is four times higher than the vitamin A in carrots, which is 11,300 IU. Furthermore, (Krisnadi, 2013) said that: judging from its content, moringa deserves the title "Miracle Tree" or "Trees of Life" and "Super Nutrients". Not without reason, the super nutritional content of moringa has been verified by various scientific institutions and universities in various parts of the world. The information is then used for humanitarian movements to cope with malnutrition in poor African countries. Millions of people have been saved by consuming moringa.

Based on the description above, the author is interested in researching "The Effectiveness of Moringa Leaves Noodles and Yellow Sweet Potato Noodles for the Uterine Involution and the Increasing of Breast Milk Production of Postpartum Women".

Methods. This research is a quantitative research with a True Experimental research design. The design used is a two group comparison posttest design. The population of this study were all postpartum women in the Working Area of the Tembarak Public Health Center, Temanggung Regency in September-October, with the total number of 44 postpartum women.

The sampling technique used was probability sampling, namely consecutive sampling. Samples were taken based on inclusion criteria, namely postpartum women with physiological delivery, they were in postpartum day 1 and willing to be respondents and willing to sign informed consent, they were cooperative, had healthy babies, and were exclusively breastfeeding their babies.

The exclusion criteria were mothers who were diagnosed with chronic disease, and had a history of postpartum hemorrhage. A total of 40 postpartum women were involved, at the time of the study there were 4 respondents who dropped out as research subjects with the reasons of not giving exclusive breastfeeding/having been giving solid food to their babies were 3 respondents and 1 respondent dropped out because they could not cooperate during the study

Result and Discussion.

Result

1. Respondent Characteristics

Table 1. Distribution of case characteristics in the control and intervention group

Variable	Control	Intervention	Test (lev)
	Mean ±	Mean ± D	
Age	26.67±	27.13±	1.2
Parity	1.53±0.7	1.93±0.8	0.57
Anxiety	19.67±6.067	16.27±7.015	0.360

From table 1, it can be seen that the characteristics of the respondents in the control group and the intervention group were homogeneous (Levene's test > 0.05). The mothers' age in the control group had an average of 26.67 years, while in the intervention group the average age was 27.13 years. After statistical testing with Levene's test, it turned out that there was no significant difference between the two groups (p value > 0.05).

The mean parity in the control group was 1.53 and in the intervention group was 1.93. After being tested statistically with Levene's test, it turned out that there was no significant difference between the two groups (p value > 0.05).

The average anxiety in the control group was 19.67 and in the intervention group was 16.27. After being tested statistically with

Levene's test, it turned out that there was no significant difference between the two groups (p value > 0.05).

2. Univariate Analysis

Table 2. The Uterine Involution by Group

Group	n	The Uterine Involution
Control	18	10.25± 3.27
Intervention	18	9.91± 3.49

The table above shows that TUI in the control group will end its involution period for an average of a minimum of 6.98 days and a maximum of 13.52 days, while in the intervention group the involution period will end for an average of a minimum of 6.42 days and a maximum of 13.4 days.

Table 3. The Baby Weight by Group

Group	n	Weight (gram)	
		Start	End
Control	18	3015.63	3223.44
Intervention	18	3087.5	3390.63

The baby's weight was observed for 10 days, both groups had almost the same initial average weight, with the difference between them was only 71.87 grams. After being observed for 10 days, in the control group there was an average increase in body weight of 207.81 grams and in the intervention group there was an average increase in body weight of 303.13 grams. From the difference in body weight divided by the specific gravity of breast milk of 1.03, the volume of breast milk is obtained. The average volume of breast milk from the intervention group was more than the control group, as shown in table 4 below.

Table 4. The Average Amount of Increase in Breast Milk Volume by Group

Group	n	Breast Milk Volume (ml / 24 hours)
Control	18	206.31 ± 145.21
Intervention	18	297.46 ± 125.41

3. Bivariate Analysis

Table 5. Mann-Whitney Test Analysis Results

Group	n	UFH	p	Breast Milk	p
		Mean Rank		Prod. Mean Rank	
Control	18	17.97	0.76	14.86	0.034
Intervention	18	19.03	2	22.14	

From the table above, it is found that the UFH mean values were different between groups with the respondents given sweet potatoes was 17.97 and those given moringa leaves was 19.03. From the results of statistical tests using the Mann-Whitney test, the p value = 0.762 (> 0.05) with a 95% confidence interval so it could be concluded that H_0 was accepted and H_a was rejected, meaning that there was no significant effect of giving sweet potato and moringa leaves to the decrease in uterine fundus in postpartum women in Tembarak District, Temanggung Regency.

Meanwhile, for breast milk production, the difference between the means showed by the respondents given sweet potato had a mean value of 14.86 and those given moringa leaves was 22.14. From the results of statistical tests using the Mann-Whitney test, p value = 0.034 (< 0.05) with a 95% confidence interval so it could be concluded that H_0 was rejected and H_a was accepted meaning that there was a significant effect of giving sweet potato and Moringa leaves on breast milk production in postpartum women in Tembarak District, Temanggung Regency.

Discussions

1. The Effects of Yellow Sweet Potato and Moringa Leaves on Uterine Involution

Yellow sweet potato (*Ipomea batatas*) is a food that is widely available around us and has a high nutritional content. This type of sweet potato contains a lot of vitamin A. Vitamin A is a yellow alcohol crystal and is soluble in fat or fat solvents. When compared with red sweet potatoes and white sweet potatoes, the content of vitamin A in yellow sweet potatoes is the largest, which is 65.520 $\mu\text{g}/100 \text{ gr}$. (Pusat Studi Pangan dan Gizi UGM, 2016).

Likewise, the amount of vitamin A in moringa leaves is 1305.245 $\mu\text{g}/100 \text{ gr}$ (Pusat Studi Pangan dan Gizi UGM, 2016). According to (Saa et al. 2019), moringa contains four times more beta carotene than carrots. All the compounds contained in the moringa plant are very beneficial for the health of the human body, especially for curing various diseases, and have no side effects that have been encountered so they are safe for consumption by both children and adults.

Vitamin A plays a very important role in the process of cell differentiation. Vitamin A contained in yellow sweet potatoes stimulates

the function of gland cells to secrete mucus and be replaced by new cells (Almatsier 2011). During pregnancy and breastfeeding, it is recommended to increase the intake of vitamin A and with the addition of vitamin E, it can increase the effectiveness of vitamin A and prevent the possibility of hypervitaminosis A (Adriani ,M; Wiratmadji 2012).

Vitamin A helps the process of cell differentiation including uterine muscle cells in involution. In the cell differentiation, there are changes in the shape and function of the cell. The cells most markedly differentiated are specialized epithelial cells, especially goblet cells, which are glandular cells that synthesize and secrete mucus. All body surfaces, outside and inside are lined by epithelial cells. The epithelial tissue that covers the body on the outside is called the epidermis, while the one which covers the inside is called the mucous membrane, which covers the surface of the digestive tract, respiratory tract, urinary bladder and urethra, uterus and vagina, eyelids and so on. Mucus protects epithelial cells from the invasion of microorganisms and other harmful particles. If there is a lack of vitamin A, it will block the function of the gland cells that secrete mucus and the cells will be replaced by scaly and dry epithelial cells. The skin becomes dry and rough and wounds are difficult to heal. Then, in the uterus, it influences the contraction process and it will affect the uterine involution (Almatsier 2011).

Yellow sweet potato is also a source of energy. This type of sweet potato contains 119 kcal/100 g of energy (Persagi 2009). During pregnancy, women need additional energy for the growth of the fetus, placenta, and other additional tissues. The additional energy required is 300 kcal/day. During lactation, a mother needs additional energy to produce breast milk and for the energy stored in the breast milk itself. Under normal circumstances, in the first 6 months of lactation, it is expected that all or at least 80% of the baby's energy needs can be provided from breast milk. In addition, mothers also need to maintain their health after giving birth (Almatsier 2011).

The protein content in sweet potatoes is 8.05%, while in moringa leaves it is 8.20% (Pusat Studi Pangan dan Gizi UGM, 2016). Protein plays an important role in the cell growth and maintenance. Hemoglobin which functions as a carrier of O_2 and CO_2 is also a protein bond. In addition, proteins play a role in the formation of

antibodies that function to fight infection (Almatsier 2011).

The calcium content in sweet potatoes is also high at 30 mg/100 g (Persagi 2009), and according to Pusat Studi Pangan dan Gizi UGM 2016, the calcium in sweet potatoes is 1.25%, while in moringa leaves, it is 3.46%. Calcium plays an important role in regulating blood clotting. When an injury occurs, calcium ions in the blood stimulate the release of the phospholipid thromboplastin from the injured blood platelets. This thromboplastin catalyzes the conversion of prothrombin, a normal part of blood, to thrombin. Thrombin helps convert fibrinogen, another part of the blood, into fibrin, which is a blood clot. Calcium also plays a role in the process of muscle contraction. When the muscle contracts, calcium plays a role in the interaction of proteins in the muscle, namely actin and myosin. If the calcium in the blood is less than normal, the muscles cannot relax after contraction (Almatsier, 2011).

Yellow sweet potato also contains iron at 0.4 mg/100 g, while moringa leaves contain iron at 6 mg/100 g (Persagi, 2009). Iron has functions in energy metabolism and the immune system. White blood cells that destroy bacteria cannot work effectively in a state of iron deficiency (Adriani, M; Wiratmadji 2012).

The vitamin C in yellow sweet potatoes is 21 mg/100 g, and in moringa leaves it is 22 mg/100 g (Persagi, 2009). Vitamin C functions in collagen synthesis, wound healing, and bleeding under the skin (Almatsier, 2011)

The results of this study showed that the consumption of moringa leaves noodles and yellow sweet potato noodles did not have a significant effect on uterine involution based on the UFH reduction score. The statistical testing using the Mann-Whitney test showed that the consumption of moringa leaves noodles and yellow sweet potato noodles did not have a significant effect on uterine involution based on UFH with $p=0.762$.

Similarly, the protein content contained in yellow sweet potatoes and moringa leaves is useful for the uterus. The protein contained in yellow sweet potatoes will help the growth and maintenance of uterine cells. Calcium, which is abundant in them, will help uterine contractions. The iron and vitamin C contained in them will also help to heal uterine wounds and bleeding in the uterus.

The research done by (Suwanti and Kuswati, 2014) asserted that there is a

significant relationship between the consumption of sweet potato leaves with involution ($p=0, 0000$) because sweet potato leaves contain carotenoids, Fe, and also laktogogum substances that can increase breast milk production. Carotenoids or vitamin A will help the process of cell differentiation including uterine muscle cells in involution. Meanwhile, Fe or iron contained in sweet potato leaves will also help heal uterine wounds and bleeding, so that the process of uterine involution will take place well.

It is similar with Ritawati L (2012) in her research on The Success of Exclusive Breastfeeding with Sweet Potato Leaves. In her research, Ritawati said that sweet potato leaves contain oxytocin which can increase breast milk production. Increased breast milk production will encourage mothers to breastfeed more often and with breastfeeding more often there will be positive feedbacks on the increase in the oxytocin hormone which greatly helps uterine contractions, compresses blood vessels, and helps the hemostasis process. This process will aid in the uterine involution. In line with the yellow sweet potato, its high calorie content can help the uterine muscles to contract so that the uterine involution process will be better.

Factors that affect uterine involution are parity (Wiknjosastro 2016), early mobilization (Pitriani. R, Andriyani 2014), Early Initiation of Breastfeeding (Kemenkes 2015), mother's age (Wiknjosastro 2016), postpartum exercise (Sukma, Hidayati, and Nurhasiyah Jamil 2017), and nutrition (Soetjiningsih 2014).

According to (King, Tekoa L. King, Mary C. Brucker, Jan M. Kriebs 2015), uterine involution includes reorganization and expulsion of the decidua/endometrium which is characterized by a decrease in size and weight as well as a change in the location of the uterus and is also characterized by the color and number of lochia. The decidua remaining in the uterus after the detachment and expulsion of the placenta and membranes consists of the basalis zone layer and portions of the spongiosa zone layer of the basal decidua (at the attachment of the placenta) and the decidua parietal (which lines the uterine portion). This decidua undergoes reorganization into 2 layers. The degenerative and necrotic superficial layer will be shed as part of the lochia discharge and a functional and healthy deep layer near the myometrium. The endometrium is regenerated through the proliferation of glandular epithelium. Epithelium

grows at the placental attachment site. This endometrial growth makes the blood vessels that have clotted at that place at the attachment site brittle so they break down and are released in the form of lochia..

Varney adds that subinvolution occurs when the uterine contractions do not occur as they should. And the history usually includes lochia periods longer than normal, followed by leukorrhea and profuse and irregular hemorrhage.

2. The Effects of Giving Yellow Sweet Potato and Moringa Leaves to Breast Milk Production

Postpartum women need adequate and balanced nutrition, especially protein and carbohydrates. Nutrition in breastfeeding mothers is closely related to breast milk production which is closely related to baby growth. Calorie requirements during breastfeeding are proportional to the amount of milk produced. An average mother should consume 2,300-2,700 cal when breastfeeding. The food consumed by the mother is useful for carrying out activities, metabolism, acting as reserves in the body, milk producing, and the breast milk itself (Soetjningsih 2014). Yellow sweet potato contains 119 kcal/100 g of energy and moringa leaves contain 92 kcal/100 g of energy (Persagi 2009). This amount is sufficient for breastfeeding mothers.

According to (Adriani ,M; Wiratmadji 2012), the daily requirement of Vitamin A for women is 500 RE. Meanwhile, breastfeeding mothers need an additional 350 RE/day. Similarly, according to (Almatsier 2011), women aged 19 years and over have an AKA of 500 RE/day and if they breastfeed babies aged 0-6 months, they need to get an additional 350 RE/day. The content of yellow sweet potato has the highest vitamin A value, which is 4,948 µg or equivalent to 412 RE or 4,079 SI. When it has been steamed, the vitamin A of yellow sweet potatoes becomes 4,427 µg or equivalent to 369 RE or 3,650 SI. Meanwhile, based on the results of the examination of the Food and Nutrition Studies Center of UGM 2016, the content of vitamin A in moringa leaves is 1305.245 g / 100 grams, and according to Persagi (2009) the beta-carotene content in them is 3,266 µg / 100 grams.

All mothers who were respondents in this study had consumed two capsules of vitamin A, with a total intake of 400,000 SI (120,000 RE). According to the World Health Organization

(WHO) in (Adriani, M; Wiratmadji 2012), mothers and babies will benefit from the consumption of high-dose vitamin A capsules up to 180 days (6 months) after the delivery. So it is suspected that the vitamin A donated by capsules for postpartum women is $\pm 2\ 000$ SI (650 RE) per day with an adequate level of vitamin A of 76.50%.

The results of the Mann-Whitney test showed that there was a significant relationship between vitamin A intake from foods containing vitamin A and food sources of only vitamin A and breast milk production ($p < 0.05$). This means that the higher the consumption of food sources of vitamin A, the more adequate breast milk production will be. In addition, the consumption of foods that contain little vitamin A in large quantities can also affect the adequacy of breast milk production.

The results of the research by Pidada *et al.* Cited from Marwah *et al.* (2010) added that steroids and vitamin A play a role in stimulating the proliferation of alveolar epithelium so that new alveoli will form and there will be an increase in the number of alveoli in the udder gland. This is because vitamin A functions in helping the production of steroids (Almatsier 2011). Steroids and vitamin A play a role in stimulating the proliferation of the alveolar epithelium of the breast so that new alveoli will form and there will be an increase in breast milk production (Adriani ,M; Wiratmadji 2012).

The results of this study are in accordance with research conducted by Bibi Ahmad Chahyanto and Katrin Roosita that showed that vitamin A intake was significantly related to breast milk production ($p < 0.05$). This is because vitamin A is an important micronutrient for postpartum women. Vitamin A helps the anterior pituitary in stimulating the prolactin hormone in brain epithelial cells and activate epithelial cells in the alveoli to accommodate milk in the breast.

Conclusion and Suggestions. Based on the results of the study, the authors convey the conclusions as follows: Uterine involution in postpartum women who consumed yellow sweet potato obtained an average decrease in UFH on day 10, and uterine involution in postpartum women who consumed moringa leaves obtained an average decrease in UFH on days 9-10 . The average breast milk production in postpartum women who consumed yellow sweet potato increased by 206.31 ml/24 hours, and the average breast

milk production in postpartum women who consumed moringa leaves increased by 297.46 ml/24 hours. There was no effect of the consumption of yellow sweet potato and moringa leaves on uterine involution based on a decrease in UFH ($p=0.767$). However, there was an effect of the consumption of yellow sweet potato and moringa leaves on postpartum women's breast milk production ($p=0.037$).

It is suggested that Professional Organizations can cooperate with related parties (Health Offices) in disseminating the results of this evidence-based research to help increasing breast milk production by using local food. Organizing scientific meetings related to the results of studies conducted by members of the midwifery profession with the same theme can also be done so that proceedings on the use of local food to improve the quality of life of postpartum women can be published. The Health Offices need to be able to conduct cross-program and cross-sectoral collaborations in order to include the use of local food that is already based on evidence as a procedure in providing health education to postpartum women. For midwives, they need to promote the use of local food, especially moringa leaves, to the wider community by providing periodic counseling to third trimester pregnant women so that during postpartum/breastfeeding they can consume them to increase breast milk production, and it is better to provide knowledge for cadres about the use of local food, especially moringa leaves to increase breast milk production

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