ORIGINAL RESEARCH

SWEET POTATO (*IPOMOEA BATATAS* L.) LEAF: ITS EFFECT ON PROLACTIN AND PRODUCTION OF BREAST MILK IN POSTPARTUM MOTHERS

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ABSTRACT

Background: Sweet potato leaf is assumed to be one of alternative herbs that can increase breast milk production. However, there were no studies found in the literature that examine the sweet potato leaves to increase the levels of prolactin and milk production.

Objective: To examine the effect of sweet potato (*Ipomoea batatas* L.) leaf on the level of prolactin and milk production in postpartum mothers.

Methods: This was a quasi-experimental study with pretest-posttest design with control group, conducted on November 2016 to December 2016 in the Health Center (Puskesmas) of Boyolali I. Thirty respondents were selected using consecutive sampling, which were divided to be 15 respondents in intervention group and 15 respondents in control group. Enzyme-linked immunosorbent assay (ELISA) was used to measure prolactin levels, while breast milk production was measured based on the volume of breast milk and baby's weight. Data were analyzed using Independent t-test and paired t-test.

Results: Finding showed that there was a significant difference in prolactin levels between the intervention (270.43) and control group (156.28) after intervention with p-value 0.000, and a significant difference in breast milk production in terms of breast milk volume (intervention group 136.33; and control group 119) with p-value 0.028; and baby's weight (intervention group 3030.3; and control group 2787.33) with p-value 0.000.

Conclusion: There was a significant effect of sweet potato (*Ipomoea batatas* L.) leaf on the levels of prolactin and breast milk production. Thus, it could be suggested that sweet potato leaves should be considered to be one of alternative treatments for health care providers, especially for midwives to help breastfeeding mothers in increasing their breast milk production and prolactin levels. Further research is needed to examine all factors affecting breast milk production.

Keywords: postpartum, breastfeeding, prolactin, *Ipomoea batatas* L.

INTRODUCTION

The Indonesian survey reported that 38% of mothers stop breastfeeding due to lack of breast milk production,[1] which is caused by various factors such as psychological and nutritional factors. Based on the health profile in Department of Health of Central Java, it showed that the scope of exclusive breastfeeding in 2014 amounted to 57.06%.[2] This figure was still very low compared with the achievement target of exclusive breastfeeding, which is 80%.[2] While according to the profile of Department of Health of Boyolali, it was reported that the exclusive breastfeeding coverage in 2014 was 62%, which was very low to achieve the target of exclusive breastfeeding in Boyolali, 70%.[3] In line with that target, the Health Center (Puskesmas) of Boyolali I had the lowest coverage of exclusive breastfeeding in 2014, which amounted to 29.8% and gradually decreased to 23.3% in 2015.[4]

One of the factors that affect breast milk production is food. Based on the report, food consumed by breastfeeding mothers in the Health Center of Boyolali I do not always contain enough necessary nutrients, which make the mammary glands of mothers work imperfectly that affect the production of breast milk.[4] However, food is the basic need of human being and has a major influence on health. Thus, pregnant mothers should take nutritious foods that have a source of energy and able to increase breast milk seceretion.[5] This is consistent with the research stated that a breastfeeding mother does not need to eat too much, but enough to keep the balanced nutrition and satisfy hunger.[6] This is also in line with the study indicated that there was a relationship between nutrition and breast milk production in mothers who breastfeed 0-6 months.[7]

In this regard, sweet potato leaves are considered as the herbal food that can stimulate the increase in the level of prolactin and milk production in breastfeeding mothers during postpartum.[8] Sweet potato leaves contain elements of lipids and hormones structure in which the active compound is actively involved in milk production because it shows lactagogue effect. Lactagogue is a substance contained in the leaves of sweet potato that can facilitate breast milk.[8] In addition, according to the index of nutritional quality, sweet potato leaves are good sources of protein, fiber, and minerals, especially K, P, Ca, Mg, Fe, Mn, and Cu. [8]

Several studies have been conducted using sweet potatoes as a therapy, revealed that there was a relationship with the acceleration of uterine involution in Klaten, and there was a significant effect of sweet potatoes on the increase of hemoglobin.[9] However, there are no studies found in the literature that examine the sweet potato leaves to increase levels of the hormone prolactin and milk production. Therefore, this study aims to examine the effect of sweet potatoes' leaves (*Ipomoea batatas* L.) on the level of prolactin and the production of breast milk in postpartum mothers in the working area of the Health Center of Boyolali I.

METHODS

Design
This was a quasi-experimental study with pretest-posttest design with control group. The dependent variables in this study were the prolactin level and milk production, while the independent variable was sweet potato (*Ipomoea batatas* L.).

Setting
This study was conducted on November 2016 to December 2016 in the Health Center (Puskesmas) of Boyolali I.

Population and Sample
Thirty respondents were selected using consecutive sampling, which divided to be 15 respondents in intervention group and 15 respondents in control group. The inclusion criteria of the sample were: postpartum mothers at day 1, willing to be respondent, having a baby only breastfed exclusively (except medicine, vitamin and mineral at the time of the study), aged 20-35 years, primipara, well sucking reflex of the baby, no abstinence from food, infant weight > 2500 grams, no smoking and consuming alcohol, health condition of mother and baby, normal shape of nipple, no consuming other herbs or supplements facilitating breastfeeding, and having sufficient gestational age at the time of delivery (38-40 weeks).

Intervention
The intervention group received the processed food of purple sweet potato (*Ipomoea batatas* L.) leaves in 200 grams once per day. The food was mixed with boiled until soft and administered for 14 days in the morning at 08.00 pm. The intervention was given by the researchers with the help of enumerators. All the foods must be finished. Before the intervention, all respondents were checked for pretest on breast milk production and blood samples for checking prolactin.

Instrument
To measure the level of prolactin, Enzyme-linked immunosorbent assay (ELISA) was used as metoden immunoassay that uses an enzyme as a label. Blood sampling in each respondent was taken and examined in the laboratory of GAKI Undip. Breast milk production was measured based on the volume of breast milk by pumping, the baby's weight with digital scale.

Ethical Consideration
This study has been approved by the Research Ethics Committee of the Health Ministry Polytechnic Semarang (POLTEKKES SEMARANG) with No. 009/KEPK/polytechnic-SMG/EC/2017.
Data were collected after obtaining the study permission from the Political Office of Head of Regency (Kesbangpol) of Boyolali and from Boyolali Health Department. An informed consent was performed in each participant. The researchers in this regard explained about the objective and procedures in this study. Maintaining the confidentiality of the data of the respondents remained important, and there was no coercion to join this experiment, so all respondents could withdraw at any time. If they agreed with the procedures, then all of them were asked to sign the written informed consent.

Data Analysis
Data in this study were analyzed using Independent t-test and paired t-test.

RESULTS
Characteristic of the Respondents
The characteristics of the respondents in this study were described in terms of age, educational level, working status, sleep pattern, breastfeeding frequency, and calmness. Table 1 shows that the characteristics of the respondents between intervention and control group were homogeneous in terms of age (0.363), educational level (0.699), working status (0.526), sleep pattern (0.202), breastfeeding frequency (0.131), and calmness (0.741). Most of the respondents in both groups aged 25 years, having senior high school as their educational background, working, having 4-5 sleeping hours, 8-9 times of breastfeeding per day, and calmness.

Table 1 Characteristics of respondents

Variable	Group		p-value (homogeneity)
	Intervention	Control	
Age (year)			
Mean	25.07±1.033	25.00±0.845	0.363
Median	25	25	
Min ± max	23±27	24±27	
Education ∑ (%)			
Basic (SD, SMP)	40%	33.3 %	
Senior high school (SMA)	46.7 %	53.3 %	0.699
University	13.3%	13.3 %	
Working status ∑ (%)			
Working	53.3 %	60 %	0.526
Not Working	46.7 %	40 %	
Sleep pattern (hour)			0.202
Mean	4.80±0.676	4.67±0.816	
Median	5	4	
Min ± max	4±6	4±6	
Breastfeeding frequency (per day)			
Mean	9.27±1.35	8.67±0.915	0.131
Median	9	8	
Min ± max	8±10	8±12	
Calmness			
Mean	5.67±0.900	6.13±0.915	0.741
Median	6	6	
Min ± max	4±7	4±7	

Table 2 The Difference of Prolactin levels before and after given intervention in the intervention and control group

Variable	Group		p-value[2]
	Intervention	Control	
Before intervention[1]			
Mean ± SD	182.19±76.55	145.90±43.80	0.122
Min ± max	96± 334	81.83±248.66	
After intervention[1]			
Mean ± SD	270.43±89.66	156.28±43.84	0.000*
Min ± max	143.61±424.38	83.46±251.97	
Difference of prolactin before and after intervention			
p-value[3]	0.003*	0.000*	
Mean difference			
Mean ± SD	88.24±60.82	10.38±11.42	0.000*
Min ± max	15.14±194.60	1.63±34.37	

Source: [1]Descriptive [2] Wilcoxon Test [3]Mann-Whitney Test) *p-value=<.05 SD: Standard Deviation

Table 2 shows that there was no significant difference of prolactin between intervention group (182.19) and control group (145.90) before intervention with p-value 0.122. While the significant difference between intervention (270.43) and control group (156.28) was found after the intervention with p-value 0.000. Mann-Whitney test also shows that there was a significant mean difference between the two groups (p-value 0.000).

Table 3 The difference of the volume of breast milk before and after intervention

Variable	Group		p-value[2]
	Intervention	Control	
Before intervention[1]			
Mean	4.40±2.02	3.80±1.85	0.406
Min ± max	1±8	1±8	
After intervention [1]			
Mean	136.33±24.01	119±16,05	0.028*
Min ± max	105 ±185	95±155	
Difference of breast milk volume before and after intervention			
p-value[3]	0.000*	0.000*	
Mean difference[2]			
Mean	131.93±24.56	115.20±16.09	0.036*
Min ± max	100±180	92±154	

Source: [1]Descriptive [2] Paired Sample Test [3]Mann-Whitney Test *p-value=<.05 SD: Standard Deviation

As shown in Table 3, there was no significant difference of volume of breast milk before intervention between intervention (4.40) and control group (3.80) with p-value 0.406. However, after intervention there was a significant difference of breast milk volume between intervention (136.33) and control group (119) with p-value 0.028. Further analysis also shows that there was a mean difference between the two groups (p-value 0.036).

Table 4 The difference of baby's weight before and after intervention

Variable	Groups		p-value[2]
	Intervention	Control	
Before intervention[1]			
Mean	2748±230.34	2660.67±157.68	0.236
Min ± max	2500±3200	2450±3050	
After intervention[1]			
Mean ± SD	3030.3±210.27	2787.33±167.73	0.002*
Min ± max	2750±3400	2600±3200	
Difference of baby's weight before and after intervention			
p-value[3]	0.000	0.000	
Mean Difference			
Mean ± SD	282±42.29	126.67±37.16	0.000*
Min ± max	200±300	100±200	

Source: [1]Descriptive [2] Paired Sample Test [3]Mann-Whitney Test *p-value=<.05 SD: Standard Deviation

Table 4 shows that there was a significant difference of baby's weight after intervention between the intervention group (3030.3) and control group (2787.33); and further analysis shows that there was a significant mean difference between both groups with p-value 0.000.

DISCUSSION

Findings of this study showed that there was a significant difference of prolactin levels, breast milk volume and baby's weight between intervention and control group, which also indicated that there was a significant effect of sweet potato on the levels of prolactin. These results have proved that the contain in sweet potato is actually working, as literature said that breastfeeding mothers need an additional 800 calories per day during lactation, protein, minerals and vitamins. Sweet potato leaves contain a fairly high protein,

equivalent to the energy source of carbohydrates, 4 calories per gram of protein, vitamin A and vitamin C.[10]

In fact, vitamin A in the sweet potato leaves is very high, which according to the literature, vitamin A is one of the most critical vitamins during pregnancy and the breastfeeding period. If the vitamin A supply of the mother is inadequate, her supply to the fetus will also be inadequate, as will later be her milk. These inadequacies cannot be compensated by postnatal supplementation.[11] In addition, these sweet potato leaves are considered as an excellent source of antioxidant polyphenols, including anthocyanins and phenolic acids such as caffeic, monocaffeoylquinic (chlorogenic), and sweet potato dicaffeoylquinic. Polyphenol plays a key role in increasing prolactin.[10]

On the other hand, the babies' weight in this study were also increased after 14 days consuming sweet potato. However, it might be influenced by the breastfeeding frequency of the baby, which was 8-9 times per day. Additionally, literature also said that there are some factors influencing breast milk production, such as stimulation of the mammary gland, breast care, the regularity of the baby sucking, health condition of mothers, and food and nutrition of mothers. It could be said that sweet potato leaves for 14 days combined with the frequency of breastfeeding, nutrition of mothers, and the other factors could increase the baby's weight and milk production.

So, this study provided the benefits of sweet potato leaves, which is not only able to increase the hemoglobin in pregnant women and make uterine involution faster, but also can increase breast milk production and prolactin levels.

Limitation of the Study
The limitation of this study included: 1) food was only subjectively controlled by just asking the respondents based on the criteria that mother did not abstain from eating only during the study. While the aspects of food culture that need to be avoided after childbirth were not further explored, and 2) the breast milk production was only measured two times (before and after treatment), not per day during 14 days of intervention. It might affect the results.

CONCLUSION

Based on the findings of this study, it could be concluded that there were increased levels of prolactin and breast milk production after given sweet potato leaves. In other words, there was a significant effect of sweet potato (*Ipomoea batatas* L.) leaves on the level of prolactin and breast milk production. Thus, it could be suggested that sweet potato leaves should be considered to be one of alternative treatments for health care providers, especially midwives to help breastfeeding mothers in increasing their breast milk production and prolactin levels. Further research is needed to examine all factors affecting breast milk production, and measurement of the volume of breast milk production should be performed daily during intervention. In addition, intake nutrition of the mothers should be considered.

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