Desbriyani C, et al. Belitung Nursing Journal. 2017 October;3(5):603-611
Received: 13 March 2017 | Accepted: 30 October 2017
http://belitungraya.org/BRP/index.php/bnj/

ORIGINAL RESEARCH **ISSN: 2477-4073**

EFFECT OF CONSUMING TEMULAWAK (CURCUMA XANTHORRHIZA ROXB.) EXTRACT ON BREAST MILK PRODUCTION IN POSTPARTUM MOTHERS

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ABSTRACT
Background: The dominant factor inhibiting breastfeeding is the lack of milk production. The extract of temulawak (curcuma xanthorrhiza Roxb) is considered having an effect to increase breast milk production.
Objective: To examine the effect of temulawak (curcuma xanthorrhiza Roxb) extract to increase milk production in postpartum mothers in the working area of Ambarawa Community Health Center, Indonesia.
Methods: This was a quasi-experimental study with non-equivalent control group design conducted on October-December 2016. There were 38 respondents included using consecutive sampling, with 19 assigned in the intervention and control group. Paired t-test and independent test were used for data analysis.
Results: Findings showed that there were significant increases of prolactin hormone (p = 0.000), breast milk volume (p = 0.001), baby's urinary frequency (p = 0.001), baby's defecation frequency (p = 0.000), and baby's sleep duration (p = 0.000) after given temulawak (curcuma xanthorrhiza Roxb) extract.
Conclusion: Temulawak (curcuma xanthorrhiza Roxb) extract had a significant effect in increasing breast milk production and prolactin levels in postpartum mothers. Thus, it is recommended that temulawak (curcuma xanthorrhiza Roxb) extract can be an option for postpartum mother to increase milk production.

Keywords: temulawak, curcuma xanthorrhiza Roxb, breast milk production

INTRODUCTION

Exclusive breastfeeding is breast milk given to infants for 6 months without additional fluids such as formula milk, orange, honey, tea and water, and no added solids such as bananas, milk porridge, biscuits, rice porridge.[1] UNICEF data show that out of 136.7 million babies are born worldwide and only 32.6% of those exclusively breastfed in the first 6 months.[2] In industrialized countries, non-

Editor's Note: This article has been updated on 9 July 2020 in terms of minor changes in the reference format. The update is according to BNJ Policy on article correction.

exclusive breastfed infants have a high mortality rate compared to infants given exclusive breastfeeding. While in developing countries only 39% of mothers are exclusive breastfeeding. [2]

One of the government policies in supporting the provision of breast milk is poured in Government Regulation No. 33 chapter 6 of 2012, that every mother giving birth should provide exclusive breastfeeding to her baby. Breastfeeding reduces the risk of acute infection such as diarrhea, pneumonia, Hemophilus influenza, meningitis and urinary tract infections.[3] Factors affecting breast-feeding failure are lack of mother's knowledge of exclusive breastfeeding (32%), for instance, mothers discontinue breastfeeding due to less milk production, which is considered as a dominant factor.[4] If breast milk is produced smoothly, then other factors will be easily handled. Efforts to overcome the problem of milk production are to give synthetic or herbal drugs that can increase milk production. The examples of synthetic drugs are domperidone, metoclopramide, chlorpro-mazine and sulfuride; and the examples of herbal drugs are temulawak, katuk leaves, fenugreek, and fennel and cumin seeds.[5]

However, modern/synthetic lactagogue drugs are not widely known, therefore an alternative lactagogue drug is required. One of natural ingredients used to overcome the problems of breast milk production is the extract of temulawak (curcuma xanthorhiza Roxb). Essential oils in the extract of temulawak can increase milk secretion, which leads to the increase of the child's weight and prevent infant mortality.[6] Besides, temulawak is easily found in Java, Maluku and Kalimantan, with affordable price for the middle-low economic community.[7]

Previous research stated that infusion of 20% and 40% of temulawak (curcuma xanthorhiza Roxb) could increase milk production significantly.[8] There was an influence of temulawak consumption by postpartum mother to the smoothness of milk production.[9] Curcuma xanthorhiza Roxb contains lipid elements and hormonal structures in which these active compounds play an active role in the milk production process as they exhibit the lactagagum effect.[10] In addition, it contains polyphenols, which also play a role in increasing prolactin levels.[5] Thus, with the benefits of curcuma xanthorhiza Roxb, this study aims to examine its effect in postpartum mothers in the community health center of Ambarawa, East Java, where little is known about the study of curcuma xanthorhiza Roxb.

METHODS

Design

This research used a quasi-experimental study with non-equivalent control group design. The study was conducted on October-December 2016 conducted in the working area of Ambarawa Community Health Center.

Population and Sample

The target population in this study was postpartum mothers who exclusively breastfed in the working area of Ambarawa Community Health Center. There were 38 respondents included using consecutive sampling, with 19 assigned in the intervention and control group. The inclusion criteria for mothers were: 1) Postpartum mothers at day 1 (24 hours postpartum) until the 15th day of treatment, 2) Primiparous mother, 3) No abstain from eating during the research, 4) No using hormonal contraceptives, 5) No

experiencing abnormalities in the breast such as swelling, blisters, and inverted putting (nipple no protruding / go inside), 6) Enough gestational age at the time of delivery (38-41 weeks), 7) No consuming alcohol, 8) No smoking for mothers and family, 9) No consuming herbs and breast milk supplements, and 10) Getting breast care. The inclusion criteria for infants were: 1) Good suction reflexes, 2) Received an exclusive breastfeeding, and 3) Baby's weight > 2500 gr. The exclusion criteria were: 1) Mothers allergic to curcuma xanthorhiza Roxb, 2) Mothers experiencing complications such as severe preeclampsia, eclampsia, cardiac abnormalities or other conditions leading to unsmooth breastfeeding, and 3) No health problems with the babies, such as yellow.

Intervention

The experiment group was given the extract of temulawak (curcuma xanthorrhiza Roxb) with dose 250 mg taken 3 times daily (morning, afternoon and evening) after feeding for 14 days and given a postpartum care standard, while the control group was only a given standard postpartum care, including initiation of early breastfeeding, nutritious food, drinking 8 glasses of water daily, and consuming Fe tablets for 40 days postpartum and vitamin A 2x200.000 IU, early ambulation, personal hygiene, rest, and breast care.

Instruments

The demographic information (respondents' demographic data and characteristics) sheets and observation sheet were used in this study developed by the researcher. And infant observation sheets included babies' weight, defecation and urinary frequency, and number of sleeping hours after breastfeeding; while maternal observation sheets included breast milk volume. The measurement of milk production was done twice before and after treatment for both groups on the first day and the fifteenth day.

Ethical Consideration

Prior to data collection, informed consent was performed and signed by each respondent, which researcher explained about the objectives and procedures in this study. This research has met the requirements of the ethical conduct of the Health Research Commission of POLTEKKES Semarang with number: 179 / KEPK / Poltekkes-Smg / EC / 2016.

Data Analysis

Paired t-test and independent test were used for data analysis.

RESULTS

Table 1 shows that there was no significant difference in mean levels of prolactin hormone before intervention was administered between the experiment group and the control group ($p = 0.906$). However, there was a significant difference in mean levels of prolactin after given intervention in the experiment and control group ($p = 0.002$). And it is shown there was a higher average increase of prolactin hormone level (98.61ng/ml) compared with the control group (26.98 ng/ml). Independent t-test also showed a significant mean difference of increase of prolactin hormone level between experiment group and control group ($p = 0.000$).

Table 1 Mean difference of Prolactin hormone before and after given intervention between the experiment and control group

Prolactin variable	Group		*p value*[2]
	Experiment	Control	
Before intervention[1] Mean ± SD Min ± max	 167.022 ± 71.11 54.65 ± 280.47	 169.63 ± 63.73 74.61 ± 310.88	0.906
After intervention Mean ± SD Min ± max	 265.63 ± 54.76 161.09 ± 352.48	 196.62 ± 73.15 79.37 ± 365.52	0.002*
Mean difference in prolactin before and after intervention *p value*[3]	 0.000	 0.032	
Mean difference of the increase[2] Mean ± SD Min ± max	 98.61± 48.69 9.65 ± 184.79	 26.98 ± 50.59 1.82 ± 216.76	0.000*

(*Note: [1]Descriptive, [2]Indepent t-test, [3]Paired sample test*)

Table 2 Mean difference of breast milk volume before and after intervention in the experiment and control group

Breast milk volume	Group		*p value*[2]
	Experiment	Control	
Before intervention[1] Mean ± SD Min ± max	 2.2105 ± 1.54 1.00 ± 5.00	 2.315 ± 1.60 0.00 ± 5.00	0.838
After intervention Mean ± SD Min ± max	 265.00 ± 34.39 200.00 ± 320.00	 219.47 ± 42.29 150.00 ± 280.00	0.001
Mean difference in breast milk volume before and after intervention *p value*[3]	 0.000	 0.000	
Mean difference of the increase[2]			
Mean ± SD	262.79 ± 33.75	217.16 ± 41.88	0.001
Min ± max	198 ± 317	149 ± 279	

(*Note: [1]Descriptive, [2]Independent t-test, [3]Paired sample test*)

Table 2 shows that there was no significant difference in mean of breast milk volume before intervention between the experiment and control group (p = 0.838), but after given intervention there was statistically a significant difference in mean of breast milk volume between both group (p = 0.001). The extract of temulawak (curcuma xanthorrhiza Roxb) showed a higher effect on breast milk volume compared to the control group, which the mean difference in the increase in breast milk volume in the experiment group was 262.79 ml/day, while in the control group was 217.16 ml/day. Paired t-test showed that there was a significant difference of the increase in breast milk volume between both groups (p = 0.001).

Table 3 Mean difference of baby's weight before and after intervention

Baby's weight	Group		*p value*[2]
	Experiment	Control	
Before intervention[1] Mean ± SD Min ± max	 3081.58 ± 343.27 2500 ± 3800	 3055.26 ± 402.04 2500 ± 3800	0.533
After intervention Mean ± SD Min ± max	 3351.05 ± 336.00 2700 ± 4010	 3084.21 ± 388.39 2600 ± 3850	0.030
Mean difference in baby's weight before and after intervention *p value*[3]	 0.000	 0.000	
Mean difference of the increase [2] Mean ± SD Min ± max	 269.47 ± 131.549 100 ± 610	 78.95 ± 58.49 0 ± 200	0.000

(*Note : [1]Descriptive, [2]Indepent t test, [3]Paired sample test*)

Table 3 shows that there was no significant difference in mean of baby's weight before intervention between the experiment and control group (p = 0.533), but there was statistically a significant difference in mean of baby's weight between both group (p = 0.030) after given intervention. The extract of temulawak (curcuma xanthorrhiza Roxb) showed a higher effect on baby's weight compared to the control group, which the mean difference in the increase in baby's weight in the experiment group was 269.47 gram, while in the control group was 78.95 gram. Paired t-test showed that there was a significant difference of the increase in baby's weight between both groups (p = 0.000).

Table 4 Mean difference of baby's urinary frequency before and after intervention

Baby's urinary frequency	Group		*p value*[2]
	Experiment	Control	
Before intervention[1] Mean ± SD Min ± max	 3.58 ± 1.017 2 ± 5	 3.42 ± 1.121 2 ± 5	0.652
After intervention Mean ± SD Min ± max	 9.21 ± 1.273 7 ± 11	 6.47 ± 1.429 4 ± 10	0.000
Mean difference in baby's urinary frequency before and after intervention *p value*[3]	 0.000	 0.000	
Mean difference of the increase [2] Mean ± SD Min ± max	 5.63 ± 1.739 2 ± 9	 3.05 ± 1.840 1 ± 5	0.000

(*Note : [1]Descriptive, [2]Indepent t test, [3]Paired sample test*)

Table 4 shows that there was a statistically significant difference in baby's urinary frequency after given intervention (p = 0.000), and the higher effect was shown in the experiment group compared to the control group (p = 0.000). The mean difference in the increase in baby's urinary frequency in the experiment group was 5.63 times per day, while in the control group was 2 times per day. Paired t-test showed that there was a significant difference of the increase in baby's urinary frequency between both groups (p = 0.000).

Table 5 Mean difference of baby's defecation frequency before and after intervention

Baby's defecation frequency	Group		*p value*[2]
	Experiment	Control	
Before intervention[1] Mean ± SD Min ± max	 2.74 ± 0.653 2 ± 4	 2.37 ± 1.116 1 ± 5	0.222
After intervention Mean ± SD Min ± max	 5.79 ± 1.357 4 ± 7	 4.05 ± 0.848 3 ± 6	0.000
Mean difference in baby's defecation frequency before and after intervention *p value*[3]	 0.000	 0.000	
Mean difference of the increase [2] Mean ± SD Min ± max	 3.05 ± 1.079 1 ± 4	 1.68 ± 1.336 0 ± 5	0.001

(*Note : [1]Descriptive, [2]Independent t test, [3]Paired sample test*)

Table 5 shows that there was a statistically significant difference in baby's defecation frequency after given intervention (p = 0.000), and the higher effect was shown in the experiment group compared to the control group (p = 0.000). The mean difference in the increase in baby's defecation in the experiment group was 3.05 times per day, while in the control group was 1.68 times per day. Paired t-test showed that there was a significant difference of the increase in baby's urinary frequency between both groups (p = 0.001).

Table 6 Mean difference of baby's length of sleep before and after intervention

Baby's length of sleep	Group		*p value*[2]
	Experiment	Control	
Before intervention[1] Mean ± SD Min ± max	 16.26 ± 1.558 13 ± 19	 15.42 ± 1.865 13 ± 19	0.140
After intervention Mean ± SD Min ± max	 19.58 ± 0.838 18 ± 21	 17.26 ± 1.79 15 ± 20	0.000
Mean difference in baby's length of sleep before and after intervention *p value*[3]	 0.000	 0.000	
Mean difference of the increase [2] Mean ± SD Min ± max	 3.32 ± 1.565 0 ± 6	 1.84 ± 1.119 0 ± 4	0.002

(*Note : [1]Descriptive, [2]Independent t test, [3]Paired sample test*)

Table 5 shows that there was a statistically significant difference in baby's length of sleep after given intervention (p = 0.000), and the higher effect was shown in the experiment group compared to the control group (p = 0.000). The mean difference in the increase in baby's length of sleep in the experiment group was 3.32 hours, while in the control group was 1.84 hours. Paired t-test showed that there was a significant difference of the increase in baby's urinary frequency between both groups (p = 0.002).

DISCUSSION

The purpose of this study was to examine the effect of the extract of temulawak (curcuma xanthorrhiza Roxb) on prolactin hormone, breast milk production (volume of breast milk, babies urinary and defecation frequency, and baby's sleep duration.

Findings of this study revealed that there was a significant effect of the extract of temulawak (curcuma xanthorrhiza Roxb) on prolactin hormone, breast milk production, babies urinary and defecation frequency, and baby's sleep duration. This provides the evidence that the extract of temulawak (curcuma xanthorrhiza Roxb) is effective for postpartum mothers.

In addition, the extract of temulawak (curcuma xanthorrhiza Roxb) is very rich in antioxidants, and contains secondary metabolite component of curcuminoid and flavonoid group and has a relatively high antioxidant activity compared to alpha tocopherol, which is popular antioxidant compound. The extract of the extract of temulawak (curcuma xanthorrhiza Roxb) also contains high vitamin A and excellent source of polyphenols to help increasing milk production and prolactin. [11]

Polyphenols are a broad and naturally occurring group of compounds having varying structures and having at least one phenolic group in their structure. Polyphenols are a group of chemicals found in plants that play a role in providing color.[12] The extract of temulawak (curcuma xanthorrhiza Roxb) has a high enough protein content, a source of energy equivalent to carbohydrates.[13]

On the other hand, the key to successfully starting breast milk production is to make the baby suck the mammary glands regularly based on need and in the correct position. Some factors that affect the smoothness of breast milk that stimulates the muscles of the mammary glands are the regularity of infant sucking, the mother's condition, the food and the mother's rest.[14,15]

However, breast milk produced by the mother's mammary glands is not the same every time, it is said that the volume of milk will decline over time.[16] In the first days of the baby's birth, if the mamae is sufficiently applied, it will be generated gradually 10-100 ml of milk, and will be optimal to 400-450 ml / day to 10-14 days. Breastfeeding factors may also affect the volume of breast milk. [14]

Besides, the sign that the baby is getting enough milk is that the baby's weight does not drop by more than 10% compared to birth weight and the baby's weight returned like birth weight at 10-14 days after birth.[17] For this study, baby's weight increased for 14 days after mothers consumed temulawak extract, which because of the milk production increased so that frequency of infant suckling more frequent and longer that impact on baby weight gain equal to 0.2-0.3 kg. [18]

Breast milk production will adjust the baby's needs; therefore, it is highly recommended to breastfeed on demand. The more the volume of breast milk, the more babies get the milk sufficiency, and it is shown from the urinary frequency > 6 times a day, with urine clear color, not yellow. If there are urine crystals in the urine with red color, it may be the sign of less milk.[19] The milk sufficiency can also be seen from the bowel movement. The

better baby gets milk, the more frequent the defecation, which is > 4 times per day.[16] At the age of 4 days until 4 weeks, defecation in each time of baby's breastfeeding is normal. The characteristics of the feces should be yellowish with white milk or seedy milk when the baby aged 4-5 days. But if the baby's age > 5 days, the feces is like a meconium, which may be one of the signs of less breastfeeding.[19]

Additionally, the results of this study revealed that the effect of temulawak extract showed an increase in the average number of babies sleeping duration. However, it is also influenced by the mothers. When the mother feels relaxed, the hormone oxytocin will be secreted and the milk production is more smoothly. Babies who have enough milk will have sleep duration for 3-4 hours after feeding. [19] The results of this study are also in line with the previous studies, which indicated that there was a significant effect of temulawak extract on breast milk production and prolactin levels. [8,9]

CONCLUSION

There was a significant effect of the extract of temulawak (curcuma xanthorrhiza Roxb) on prolactin hormone and breast milk production (breast milk volume, baby's urinary and defecation frequency, and baby's sleep duration). It is suggested that temulawak (curcuma xanthorrhiza Roxb) extract can be an option for postpartum mothers to increase milk production.

Declaration of Conflicting Interest
None declared.

Funding
This study was supported by Magister Applied Midwifery, Politeknik Kesehatan Kementrian Kesehatan Semarang, Indonesia.

Authorship Contribution
All authors have equal contribution in this study.

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Cite this article as: Desbriyani C, Hadisaputro S, Suherni T, Suwondo Ari, Supriyana. Effect of consuming temulawak (curcuma xanthorrhiza Roxb.) extract on breast milk production in postpartum mothers. *Belitung Nursing Journal.* 2017;3(5):603-611. https://doi.org/10.33546/bnj.188