

THE EFFECTIVENESS OF FLAXSEED (*Linum usitatissimum*) AND BLACK SEEDS (*Nigella sativa*) COOKIES TO INCREASE BREASTMILK VOLUME IN SLEMAN DISTRICT

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Abstract

Infant and baby mortality rate were still high in Indonesia and mortality rate will be lowered through giving exclusive breastmilk. Exclusive breastfeeding target were still out of the national target, one of the cause is lack of breastmilk production. Flaxseed and blackseed are seeds that are believed to increase the volume of breast milk. Flaxseed and blackseed receive less attention to be developed towards the direction of phytopharmaca although the potential is very large. Therefore, it is necessary to develop alternative preparations of flaxseed and blackseed as a cookies. The aim of this study was to analyze the effect of flaxseed (*Linum usitatissimum*) and blackseed (*Nigella sativa*) cookies on increasing breast milk volume. The subjects in this study were the first day postpartum mothers in Sleman Regency who met the sample criteria. This study was a post-test only one group design study. The sample in this study were 38 respondents. These cookies was given for 10 days. Data were collected and analysed by non parametric test, the Mann Whitney test. The results showed that there was an effect of flaxseed and blackseed cookies on the increase in breast milk volume ($p < 0.05$). The highest breastmilk volume on the 7th day (82,5%) of post partum, and on the 11th (15%). The conclusions in this study are that there is an effect of giving flaxseed and blackseed cookies to increase the volume of breast milk.

Keywords: black seeds, breastmilk volume, cookies, flaxseed

1. INTRODUCTION

Infant Mortality Rate (IMR) and Toddler, are still relatively high in Indonesia, each at 32 and 40/1,000 live births.[1] The high mortality rate is caused by nutritional factors by 53%.[2] Breastfeeding optimally, able to prevent 1.4 million deaths worldwide in toddlers every year.[3] Achievement of exclusive breastfeeding in Indonesia is 80%, but this is still far from the national target, which is only 54.3%. In Yogyakarta, exclusive breastfeeding coverage is 60%. The proportion of exclusive breastfeeding for infants up to 4 months in urban areas (44.3%) is lower than in rural areas (52.8%).[4]

Less milk production, is one of the factors causing exclusive breastfeeding failure. Nutritional and hormonal factors (prolactin and oxytocin) are the main factors that influence milk production. [5, 6] One way to increase the volume of breast milk is by giving galactagogue.

Linum usitatissimum (flaxseed) and *Nigella sativa* seed (black seeds) have been used in traditional medicine to be a galactagogue. They have been shown to increase the release of prolactin, production milk, or growth of mammary gland. *N sativa* seeds has been used in folk medicine for its many useful effects especially during lactation time. One of the research confirmed that *N. sativa* can stimulate milk production in rats, and it is concluded the traditional use of *N sativa* seeds as a lactogenic agent. [7] *N sativa* or its constituents such as thymoquinone demonstrated several pharmacological activities such as anti-inflammatory [8], anti-ischemic [9-13], antioxidant and antieicosanoid [7,13-15], anticonvulsant [10,16], antibacterial [9,17], antihistaminic [18,19], antitussive [20], antihypertensive [21,22], hypoglycemic [23,24], antinociceptive [25], hepatoprotective [26], immunopotentiating [27], and calcium channel

blocking [28] effects. *N. sativa* seeds possess many kinds of compounds, which account for the various pharmacological effects of this plant. Seeds of *N. sativa* contain fixed oils (about 30%) and volatile oils (average 0.5%, maximum 1.5%); this plant is also a rich source of unsaturated fatty acids, amino acids and proteins, carbohydrates, quinones (such as thymoquinone, nigellone, and thymohydroquinone), alkaloids and terpenoids, carvacrol, t-anetholet, crude fiber, and minerals such as calcium, iron, sodium, and potassium [29,30].

Linum usitatissimum (flaxseed) has been a focus of interest in the field of functional foods because of its potential health benefits, such as antioxidant activity and lactation. Fifty percent of the energy in human milk is supplied by fat, which is necessary to provide energy for the rapid growth of the newborn infant. Fat also supplies omega 3 and omega 6 essential fatty acids needed to complete the development of the brain, retina, and other organs including the skin. The omega 3 fatty acid, DHA and the omega 6 fatty acid, AA are stored in adipose tissue and can be secreted into breast milk after mobilization. Dietary sources can supply DHA and AA directly, or DHA dan AA can be synthesized from their precursors, which are α linolenic acid (ALA) and linolenic acid, respectively. Flaxseed is rich in ALA, the precursor fatty acid in the synthetic steps that ultimately result in DHA.

During the puerperium, energy requirements increase and nutrient intake, such as carbohydrates, fats and proteins are closely related to the volume of milk produced per day. [31-34] Cookies are made with a balance between flour, sugar, fat, and eggs, and are snacks that most preferred by breastfeeding mother. Wheat flour as raw material for making cookies can be substituted with flaxseed and black seeds flour. In this study, flour was substituted with flaxseed simplicia flour and black seeds which is expected to increase the volume of breast milk.

2. METHODS

The subjects in this study were initially 40 postpartum mothers in Sleman Regency, but in the end became 38 postpartum mothers because 2 mothers gave formula milk then were declared drop out. Inclusion criteria: primiparous and / or multiparous mothers; mothers who give birth to term, single, and healthy babies; mothers do not use other drugs to increase milk production; and mothers who are willing to become respondents. Exclusion criteria: mothers who have breast problems, namely flat / sunken nipples and a history of surgery on the breast; mothers who experience severe complications and need treatment; mothers with diabetes mellitus and or hypertension; and mothers who smoke and or drink alcohol. The mother is declared drop out if the mother does not consume cookies 2 days in a row; Mother resigns when intervention or control is given; mother moves an unknown address; mothers experience pain and need treatment; and babies are given formula milk or nutrient intake other than breast milk.

This study was a quasi-experimental post-test only one group design study. The independent variables in this study were the administration of flaxseed and Black Seed, the dependent variable was the volume of breast milk, and the confounding variables were maternal age, frequency of breastfeeding, and maternal nutritional status.

The variable age of the mother is assessed as soon as the baby is born. The measurement of breastmilk volume was carried out on the 3rd, 7th and 11th day of postpartum with a manual breastpump, before the baby suckles or 2 hours after the baby suckles to return milk production to the volume before feeding to the baby, both breasts are pumped for \pm 30 minutes or not there is milk removal after being pumped for 2 minutes, the pumping results are measured using a measuring tube in ml units.

Flaxseed and black seeds cookies are made by substituting wheat flour with flaxseed flour and black seeds (65%:20%:15%) The use of flaxseed and black seeds flour in the substitution of

wheat flour is based on doses that have been clinically tested. Cookies are made on a basic of 100 g, as many as 9 pieces per day, diameter 6.1 cm, weight of pieces 9.5 g, with the addition of chocolate flavor, and given for 10 days, from the first day to the 10th day of puerperium. Cookies with chocolate flavoring is based on the results of organoleptic tests, cookies with added chocolate flavor have the best color, aroma, texture, and taste compared to without flavoring.

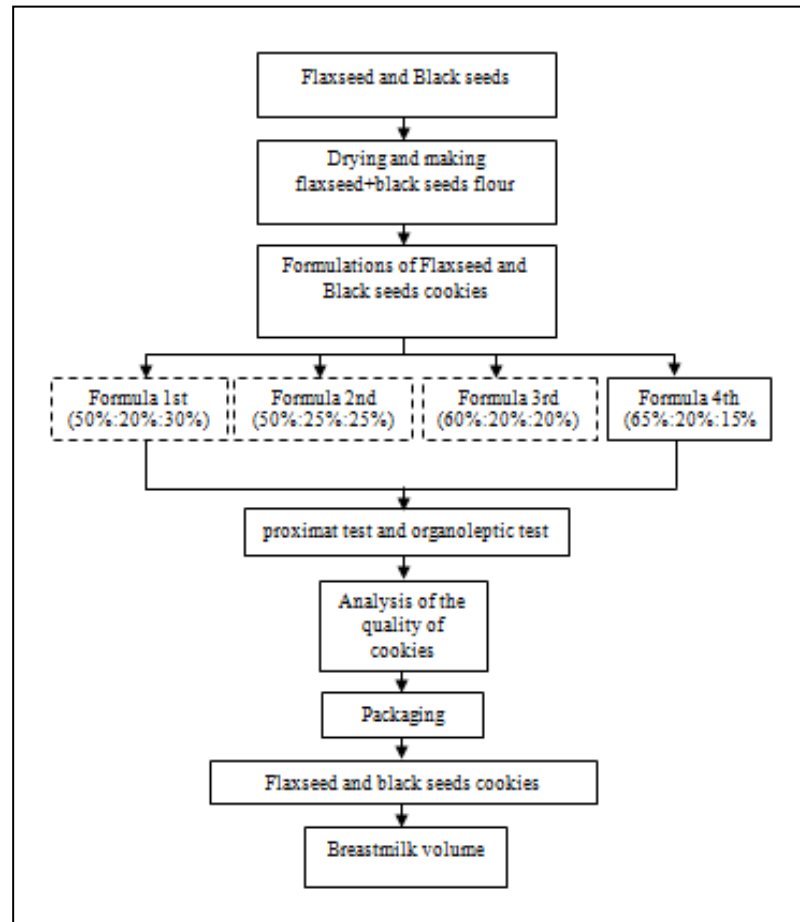


Figure 1. Flowchart “how to make a flaxseed+black seeds cookies”

3. RESULTS AND DISCUSSION

Flaxseed and black seeds cookies were given for 10 days (first day of postpartum until 10 days of postpartum). The measurement of breastmilk volume was carried out on the 3rd, 7th, and 11th day of postpartum.

Based on the table 2, there was a significant difference in the 3rd, 7th, and 11th day of puerperium after consume flaxseed and black seeds cookies daily. Table 3 shows the average of breastmilk volume. The highest increase of breastmilk volume occurred on the 7th day of puerperium with an increase in percentage of 82,5%.

Table 1. Characteristics of Education, Employment Status, Nutritional Status, and Frequency of Breastfeeding

Characteristic	Group	
	Flaxseed and Black seeds Cookies	
	n	%
Education		
Junior high school	5	16,7
Senior high school	10	33,3
College	15	50
Employment status		
Work	20	66,7
Doesn't work	10	33,3
Nutritional status		
Low	5	16,7
Moderate	25	83,3
High	0	0,0
Obesity	0	0,0
Frequency of breastfeeding		
<8 x/day	0	0,0
8-12 x/day	17	56,7
>12 x/day	13	43,3

Table 2. The effect of Flaxseed and Black Seeds Lactation Cookies to Increase Breastmilk Volume

Breast milk volume	Flaxseed and Black seeds cookies	p value
3rd day		
Median (min-max)	68,0 (278)	0,001
Mean±SD	81,2±58,1	
7th day		
Median (min-max)	136,5 (52-364)	<0,001
Mean±SD	148,2±69,9	
11th day		
Median (min-max)	129,5 (40-321)	0,003
Mean±SD	170,5±69,5	

*)Mann-Whitney test

Table 3. The Increase of Breastmilk Volume (%) After Consuming Flaxseed and Black Seeds Cookies Daily

Breastmilk Volume	Mean	Difference	%
3rd day	81,2	-	-
7th day	148,2	67,0	82,5%
11th day	170,5	22,3	15%

Lactation is the process of production, secretion, and expenditure of breast milk.[35] The success of this process is influenced by nutritional factors, such as nutritional status and maternal nutritional intake, and non-nutritional factors including hormonal factors, maternal age, parity, gestational age, maternal and infant health, habits mother (smoker and alcohol consumption), frequency of breastfeeding, and maternal psychiatric state. [6,36] Statistically, the results of the study on the effect of giving flaxseed and black seeds cookies on increasing ASI volume showed significant differences with the increase in the seventh day at 82.5 %.

Increasing the volume of breast milk due to cookies given are cookies with the addition of flaxseed simplicia flour (20%) and black seeds (15%). Flaxseed and black seed are herbs galactogogues which are believed to increase the quality and quantity of breast milk. A study of giving black seeds to milk production that has been tested in mice found that there was an increase in milk production 31.1% and 37.6% compared to the control group not given black seeds. This is because black seeds contains an element of lipids and a hormone structure where these active compounds play an active role in the milk production process because they show the effect of lactagagum. [7, 37] The content of polyphenols in black seeds also plays a role in increasing levels of prolactin and oxytocin.

Another study confirmed that flaxseed increased the breast-milk, plasma, and erythrocyte contents of the omega 3 fatty acids ALA, EPA. Flaxseed can increase levels of prolactin and oxytocin, and contain nutrients that can be used as raw material for breastmilk synthesis [38].

In this study, cookies are made with the addition of ingredients that will add to the nutritional value of cookies. During the puerperium the mother's need for nutrition also increases. A study conducted in mice during lactation showed that breastfeeding mice fed a high-fat diet (20 g / 100 g) significantly increased milk production compared to those given a low-fat diet (2.5 g / 100 g). [32] A high-protein diet is also able to increase breastmilk production and a low-protein diet will be reflected in low protein concentrations in milk. [15].

4. CONCLUSION

Our result showed that there was an effect of flaxseed and blackseed cookies on the increase in breast milk volume ($p < 0.05$). The highest breastmilk volume on the 7th day (82,5%) of post partum, and on the 11th (15%). The conclusions in this study are that there is an effect of giving flaxseed and blackseed cookies to increase the volume of breast milk.

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