Research Article

Effectiveness of Long Bean Leaf Green Noodles in Enhancing Prolactin Levels in Breastfeeding Mothers

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Abstract

Breastfeeding plays an important role in meeting the nutritional needs of infants and is useful in preventing malnutrition in children. However, insufficient breast milk is one of the obstacles in this process. Interventions that usually used for increasing breast milk can be done pharmacologically using Domperidone. On the other hand, the drug can trigger side effects, then the use of herbs is recommended. Long bean leaves (*Vigna sinensis L.*) are plants that are rich in nutrients and can stimulate prolactin through the phytocemichal contents[1-3].

Objectives: The aims of the research to be carried out is to formulate and analyze the effectiveness of Green Noodles based on long bean leaves (*Vigna sinensis L.*) to help increase prolactin of breasfeeding mother.

Methods: The research method used is a quasi-experimental with a Nonrandomized Control Group Pretest-Postest Design consisting of an experimental group (given green noodles) and a control group (given plain Noodles) using 10 respondents for each group. The intervention was carried out for 14 days by giving green noodles 2 times a day for 14 days.

Results: Green noodles contain 4 times higher levels of polyphenols than white noodles with amounts of 384.55 mg/kg and 85.39 mg/kg respectively. Based on the results of pre and post interventions in both intervention and control groups, it was found that breastfeeding mothers who consumed Green Noodles experienced an increase in prolactin levels (p value 0.004) and mothers who consumed plain noodles did not experience a significant increase in prolactin levels (p value 0.283). The lack of respondents and previous research that directly discusses the benefits of the longbean leaves requires further research to strengthen the research results to be implemented for breastfeeding mothers.

Conclusion: Consuming green noodles can help increasing prolactin hormone on breastfeeding mother in Jatinegara Health Center.

Keywords: Breastmilk; Long Bean Leaves; Breastfeeding; Prolactin; *Vigna sinensis L.*

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INTRODUCTION

Breastfeeding plays an important role in the growth and development of children to prevent various types of malnutrition such as wasting, stunting, obesity and micronutrient deficiencies. In addition, breastfeeding contributes to providing protection against infectious diseases[4] Exclusive breastfeeding for infants aged 0-6 months is very important because the nutrition in breast milk can improve the growth and development of children[5]. Inadequate breastfeeding causes 16% of children to die each year. Based on survey data from 2016-2022, 46% of newborns start breastfeeding within one hour of birth. Meanwhile, 71% of women continue to breastfeed their babies for at least one year, at the age of two years[6]. In Indonesia, in 2023, the percentage of infants under 6 months who receive exclusive breastfeeding is 72.99% for male infants and 75.02% for female infants and 76.39% in DKI Jakarta[7]. In 2022, East Jakarta is one of the cities with the second lowest rate of breastfeeding for infants under 6 months of age, namely 15.6% with an average duration of breastfeeding of 11.19 months[8]. Several obstacles such as sore or painful nipples, insufficient breast milk production, and breast swelling can cause the breastfeeding process to be less than optimal.[9] Nutrition is a need that must be met in the breastfeeding process because it determines the quality and quantity of breast milk production, then lack of nutrition or fluids will correlate with inhibited breast milk production.[10-12] This will then have an impact on the health, growth and development of children.[4] Breast milk production can be increased pharmacologically and non-pharmacologically. Interventions to increase breast milk pharmacologically can be done by administering Domperidone. The results of a study on 355 breastfeeding mothers who consumed Domperidone at

a dose of 20mg to more than 61mg per day were quite effective. However, almost half of the respondents experienced side effects such as weight gain and dry mouth and use with higher doses triggered more severe side effects. In this study, 9% of respondents stopped taking Domperidone due to side effects.[13] On the other hand, non-pharmacological interventions can be done by using herbal plants that have been proven to provide positive benefits with minimal side effects, one of which is katuk and lembayung or long bean leaves.[14] This is also supported by previous research in 1875 breastfeeding mothers stating that giving Domperidone caused 23% of respondents to experience side effects compared to herbal galactogogues, namely 3%.[15] Long beans (*Vigna sinensis L*.) as a vegetable that is very popular with the public, contain very high vitamins and minerals, and have great potential to be developed (1). Long bean leaves or lembayung are plants that are already known to the public, easy to get and economical. These leaves have a lactogogum effect that is useful to stimulate the hormones oxytocin and prolactin through alkaloids, saponins, polyphenols, steroids, and flavonoids that can overcome the problem of breast milk deficiency.[16,3]

In previous studies, consuming 200 grams of long bean leaf per day for 7 days can increase the amount of breast milk.[17] The benefits of these in increasing breast milk production can be seen from the characteristics of fulfilling the needs for breast milk in infants, namely the frequency of defecation, urination, weight and frequency of sleep in infants and prolactin level.[18-20]

The use of long bean leaf as vegetables or juice has begun to be used by the community to increase breast milk production, but this food is a product that can only be consumed at one time because it does not last long. While instant noodles are fast food that is very dominant and in demand by the Indonesian people. In 2020, instant noodle consumption was 12.6 billion servings, an increase of 120 million servings or 0.96% compared to the previous year.[21] Based on this, the urgency of conducting research is the development of long bean leaf products to increase the value and durability of the product. Utilizing these leaves in the form of noodles is a good thing and a unique innovation because in addition to increasing interest in consuming vegetables, it has an impact on increasing breast milk production by prolactin level and can increase the economic value of the community. So that research will be conducted on the Formulation and Analysis of the Effectiveness of Green Noodles Based on long bean Leaves (*Vigna sinensis L*.) to Increase prolactin

METHODS

This study was a quasi-experimental study with Nonrandomized Control Group Pretest-Postest Design consisting of two groups, namely the experimental and control groups. The inclusion criteria were breastfeeding mothers who had baby on age 0-6 months, having insufficient breastmilk, babies given exclusive breastfeeding, not career women, did not experience problems in the breastfeeding process such as mastitis or abscesses and were committed to following the study. The exclusion criteria included babies given food or drinks other than breast milk, and mothers consuming breastmilk Booster. The interfering variables in this study were the daily meal consumed by the mothers, maternal compliance and hormonal conditions which could vary among respondents. Then to avoid this, researchers conducted observations and documentation every day on WhattApps group to monitor eating activities and document 2 times a day for the consumption of green noodles and plain noodles for each respondent. on the other hand, researchers also always provide motivation and encouragement to respondents to always provide exclusive breastfeeding and provide counseling about breast milk and the benefits of longbean leaves in between studies to increase respondents' knowledge and interest in completing this study.

The study was conducted on 2 groups, namely breastfeeding mothers who were given Green Noodles (intervention group) and plain noodles (control group) with each group consisting of 10 respondents. Noodles as much as 100 grams were given twice a day for 14 days. The polyphenol content in green noodles was analyzed quantitatively in the SGI Laboratory (Saraswanti Genomic Institute) Bogor laboratory using spectrophotometry by analysts. Then prolactin levels were checked before and after the intervention, using the Rayto Type RT-2100C Elisa Analyzer with PRL reagent.

Ethical clearance approval for this study was obtained from Health Research Ethics Committee Binawan University with the following number 160/KEPK-UBN/VI/2024.

RESULTS

In this research, phytochemical tests were carried out on green noodles and plain noodles (without long bean content) to detect the polyphenol compound which is a substance that is useful in stimulating the hormone

prolactin in breastfeeding mothers. The process was carried out using spectrophotometry at the Saraswanti Genomic Institute (SIG) laboratory. Based on the test results, it was found that the polyphenol content in green noodles and plain noodles was 384.42mg/kg and 85.85 respectively. These results (Table 1) show that green noodles contain 4 times more polyphenols than plain noodles.

Table 1. Polyphenols of Green Noodle Composition

Type of Noodles	Parameter	Unit	Simplo	Duplo	Limit Of Detection	Method
Green Noodles	Polyphenols	mg / kg	384.55	384.42	-	18-9-20/MU/SMM-SIG (spektrofotometry)
Plain Noodles	Polyphenols	mg / kg	85.39	85.38	-	18-9-20/MU/SMM-SIG (spektrofotometry)

After conducting research on respondents in the intervention and control group for 14 days, Data analysis was carried out using the Paired t Test. Based on the results showed that there was a significant difference (p value 0.004) in the intervention group before and after being given green noodles. Meanwhile for the control group there was no significant difference (p value 0.283).

Table 2. The Differences of The Amount of Prolactin in Breastfeeding Mothers after Giving Green Noodles

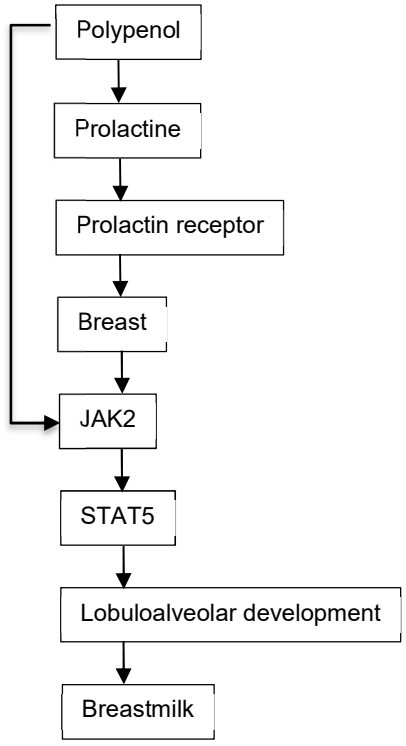
Intervention Group				Control Group			
n	**Mean**	**SD**	**P**	**n**	**Mean**	**SD**	P
10	-19.00240	15.55437	0,004	10	-2.21300	6.13129	0,283

DISCUSSION

In the breastfeeding process, there are two important hormones are needed, namely oxytocin and prolactin.[22] The oxytocin hormone functions to flow breast milk while prolactin produces breast milk. Prolactin (PRL) is a pleiotropic hormone released from anterior lactotrophic cells. The pituitary gland also originates from an extrapituitary source and plays an important role in regulation lactation in mammals.[23] Prolactin is secreted by the anterior pituitary, nervous system, uterus, ovaries, and glands in the breasts. Prolactin binds to the PRL receptor, which is expressed in many cells and tissues, including the pituitary, mammary glands, placenta, and ovaries. In the lactogenesis process, PRL concentrations increase as a result of stimulation of the baby's sucking at the breast. This increase in PRL concentration prevents ovulation (anoestrus) and stops implantation (diapause).[24] Prolactin is needed for the process of breast milk secretion. Production and volume of breast milk is determined by several factors, namely local factors and the process of emptying breast milk regularly. in addition, oxytocin has a role in stimulating neuroendocrine reflexes that produce stimulation of myoepithelial cells surrounding the alveoli and breast milk ducts. Prolactin secretion occurs periodically, with peaks lasting up to 75 minutes occurring 7 to 20 times daily. During pregnancy, serum prolactin continue to increase from 10 ng/mL before pregnancy to 100-200 ng/mL at term.[25] After giving birth, basal prolactin levels decrease, but in breastfeeding mothers, baby sucking on the nipple, intensity and frequency of breastfeeding can increase prolactin secretion.

On the other hand, prolactin levels cannot be used to determine milk volume.[26] Apart from being stimulated by the baby's sucking, increasing prolactin levels can also be supported by providing foods that are high in antioxidants such as polyphenols. Based on the results of laboratory tests, green noodles contain 384.42 mg/kg of polyphenols. This is certainly very beneficial and contributes to increasing breast milk production by increasing prolactin levels. This is also proven by previous research which states that eating foods containing polyphenols such as long beans can increase breast milk production.[18-20,27] Polyphenols can help form glands in the breasts and act as galactagogues.[28].The mechanism by which polyphenols help increase maternal prolactin levels is through a complex mechanism with prolactin receptors.

Polyphenols can stimulate galactagogues by maintaining prolactin. Prolactin binds to its receptor, namely the prolactin receptor (Prlr) to signal through the binding of endocrine and prolactin to the hypothalamus-pituitary-gonad (HPG). Binding to PRLR results in stimulation of JAK2 tyrosine kinase activity and subsequent phosphorylation of multiple tyrosine residues and activation of signal transducer and activator of transcription (STAT) proteins, in particular STAT5 (JAK2/STAT5 signaling) which is required for lobuloalveolar development and transcriptional regulation of breast milk protein genes in mammary glands, then breast milk production can be secreted properly.[23,29-31] In addition to stimulation through the prolactin receptor pathway, polyphenol compounds can stimulate the JAK-STAT pathway directly.[32] On the other hand, polyphenols triggered upregulation of breast tissue-specific genes, fatty acid bioavailability, lipogenesis, and adiponectin pathways. Regulation of adipokines and PPAR determines lipid homeostasis and inflammatory responses to maintain breast milk quality. Based on this, it also shows that lipids in breast milk can be modulated by foods containing polyphenols.[33]



Picture. 1 The mechanism of polyphenols stimulates prolactin to increase breast milk production.

Based on the results of research that has been carried out it can be concluded that giving green noodles based on *Vigna sinensis L*. which are rich in polyphenols can help stimulate prolactin production and sufficient prolactin production can support successful breastfeeding in breastfeeding mothers in Jatinegara Health Care. Further studies are needed in larger populations and the use of other parameters in the breastfeeding process to strengthen these findings.

ACKNOWLEDGEMENT

The researcher would like to thank all parties involved in this research, especially the Ministry of Education and Research (Kemdikbudristekdikti) for the PDP grant (Penelitian Dosen Pemula/Beginner Lecturer Research) that has been given to us to finance all research and publication activities, Binawan University which has provided facilities in the form of a laboratory to carry out the process of making leaf flour and green noodles, examining prolactin levels as well as consultation with analyst for ELISA results and to DPPMK especially Mrs. Maryuni who has facilitated the researcher to obtain funding, ethical permits and cooperation in conducting the research.

CONFLICT OF INTEREST

Reseachers declare that there is no conflict of interests in the research.

CONCLUSION

Based on the research, 5% Green noodles based on *Vigna sinensis L.* contain 384.42 mg/kg polyphenols which can help increase prolactin level in breastfeeding mother with p value 0,004 in Jatinegara Health Care.

This study produced the same results as the previous study using longbean leaves,[19,27] but in this study there was an increase in the quality of the shape of the vegetables, Noodles, that could increase the storage time and interest in using natural ingredients to support the breastfeeding process.

The limitations of this study is the small number of breastfeeding mothers that was only conducted in the Jatinegara Health Center work area, the respondents were not housed in one place during the intervention and the lack of related research on the benefits of longbean leaves on prolactin levels as a reference source.

Further research is needed to with a larger population, improve the taste and texture of green noodles, the effects on the maternal kidney system and baby digestion and other variables to strengthen the benefits and downstreaming of nutritious food for breastfeeding mothers.

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