

Effect Lactagogue Moringa Leaves (*Moringa oleifera* Lam) Powder in Rats White Female Wistar

¹Titi Mutiara K, ²Harijono, ²Teti Estiasih, ³Endang Sri W.

¹Study Program of Tata Boga, Department of Industrial Technology, State University of Malang

²Department of Post Harvest Technology, Faculty of Agricultural Technology, University of Brawijaya, Malang of Indonesia

³Faculty of Medical, University of Brawijaya, Malang of Indonesia

ABSTRACT

This study concerning the effect of facilitating test breast milk (power lactagogum) leaf powder moringa (*Moringa oleifera* Lamk.) That were subjected to blanching in the manufacturing process of white rats (*Rattus norvegicus*) female Wistar. To measure the lactagogue used method of weighing babies suckling rats (weighing method). In this method the parent mice were divided into four groups: parent mice fed supplemental moringa leaf powder with boiled blanching treatment, parent mice fed with moringa leaf powder added with steam blanching treatment, parent mice fed with moringa leaf powder added to the blanching treatment boiled + sodium bicarbonate and parent control mice. Each group consisted of 6 rats cubs. Moringa leaf powder dosage used was 0.042 mg / g body weight, 0.084 mg / g bw / day, 0.168 mg / kg bw / day and the control (without giving sonde) which is administered orally. Weight gain is used as the basis of infant rats increased milk production that is inhaled by the child and newborn rats weighing performed on days 1, 3, 5, 7, 9, 11, 13 and 15 of lactation. The difference in describing the child's weight rats increased milk production host mice. The data obtained were statistically analyzed using SPSS 16 for windows. The results showed that significantly Moringa leaves can increase milk production. Dose 0.042 mg / g body weight to the parent mice had increased milk production. Pup weight increased with increasing doses of Moringa leaf powder. Steam blanching treatment in the manufacture of flour is the best treatment.

KEYWORDS: *Moringa oleifera* Lamk., Blanching, weighing method, lactagogue.

INTRODUCTION

Fulfilment of nutritional needs of infants 0-6 months of absolute acquired through breast milk [1]. It is based that malnutrition at age less than 2 years will have an impact on physical growth, brain development, intelligence, and productivity; where the impact is largely irreversible (irreversible). Seeing the importance of breastfeeding, breastfeeding government campaigned by Mother. Reality shows are not all new mothers can breastfeed successfully, thus encouraging the use of drugs derived from chemicals and are able traditional to increased breastmilk (have an effect lactagogue).

Theoretically, compounds that have the effect of which is a phytosterols lactagogue. The ability of phytosterols enrich breast milk related to its role in the reflex of prolactin, which stimulates reflex alveoli to produce milk and role as a precursor in the formation of steroid hormones [2].

Phytosterols are plant sterols found in plants and has a structure similar to cholesterol. Phytosterols are plant sterols used as precursor hormones and reproductive growth. Thinking about the structure and how it works resemblance to cholesterol (sterol mammals) [3]. Cholesterol seems to work copied by phytosterol compounds such as cholesterol, phytosterol like when the body is in mammals [4]. Moringa leaves are foods that contain phytosterols. The results of the research that has been conducted in several countries in Asia and Africa, moringa leaves (*Moringa oleifera* L.) is a food that can be used as facilitating breastfeeding [5][6][7][8]. Allegedly based content phytosterols, the leaves can increase the production of breast milk.

Utilizing moringa leaves into flour constitute solutions to extend the power saved and diversify products. Preparation of Moringa leaf powder in some countries, is done by the help of sunlight and shade. Drying as this takes a long time, temperature instability, poor hygiene, a brownish colour, received power lower than blanching vegetables before drying and dried using a dryer cabinet [19].

An action research to determine the power of Moringa leaf powder lactagogum treated early blanching animal and determining the best dose needs to be studied. So that research results are expected to be the basic steps to used moringa leaves in the development of culinary models for breastfeeding mothers.

Research objective: To study the power lactagogum Moringa leaf powder in increasing the milk production holding white rats wistar strain; Looking dose and blanching of the best methods to increase milk production holding white Wistar rats. Benefits of Research: Improving economic value and use value of moringa leaves (*Moringa oleifera*), as a reference to assess the food that has the effect lactagogue and guidance

*Corresponding Author: Titi Mutiara, Study Program of Tata Boga, Department of Industrial Technology, State University of Malang, Indonesia. Email: mutiarauam@yahoo.co.id

in the preparation of the diet for breastfeeding mothers as well as take advantage of the potential of local food that is cheap and has a high nutritional value.

MATERIALS AND METHODS

This research is experimental research. The design used is Post-test Randomized Control Design with Complete Randomized Design. In this study there are two treatments that blanching treatment and doses flour. Treatment consists of blanching steamed, boiled, boiled + sodium bicarbonate and unblanching.

Treatment blanching:

Blanching boiled: Moringa leaves are washed, then boiled with a ratio of 100 g of Moringa leaves: 1 l boiling water, boil for 5 minutes. Then removed and put in ice and weighed. Steam blanching: Moringa leaves weighing 100 g washed, then steamed for 5 minutes. Then removed and put in ice water and weighed.

Boil blanching + sodium bicarbonate: Moringa Leaf washed, and then boiled with a ratio of 100 g of Moringa leaves: 1 l boiling water given 1500 ppm sodium bicarbonate, boiled for 5 minutes. Then removed and put in ice water and weighed.

While the dose given was 0.042 mg / g body weight mouse stem, 0.084 mg / g body weight and the mother rat 0.168 mg / g body weight mother rats.

Moringa leaf powder dosing based on research Madrano and Perez (2005), amounting to 2100 mg per day to a group of nursing mothers. When calculated by weight breastfeeding mothers who assumed weighing 50 kg, the dose for each kg of body weight are:

$$50 \text{ kg} = (2100 \text{ mg}) / (50 \text{ kg}) = 42 \text{ mg / kg body weight} = 0.042 \text{ mg / g body weight..}$$

For administration to the mice with different weight, it can be calculated as follows:

$$\text{Administered dose} = \text{weight mother rat} \times 0.042 \text{ mg / g body weight mouse stem.}$$

The research was conducted in the laboratory of Food Nutrition Universities Study Centre of Gadjah Mada in June-July 2011, which aims to determine the effect of leaf powder moringa (*Moringa oleifera*) to increase milk secretion wistar strain of white mice and determine the best dose. This study is purely experimental with completely randomized design that uses 4 pregnant female rats.

Treatment doses were divided into four groups. The control group (K) was not given moringa leaf powder, and the treatment group (P1, P2, P3) at a dose of 0042 mg / g body weight / day, 0084 mg / k body weight / day, 0168 mg / g body weight / day. Moringa leaf flour was diluted with 2 ml of distilled water and given to the parent mice. Each group consists of 6 (six) rat pups and the mother mice were treated daily orally by force feeding in early pregnancy until the 14th day lactation period. During the treatment, the mice were fed the same standard diit AIN-93 G [10][11]. Diit comprises: 39.7486% Corn starch, 20% casein, 13.2% Maltodextrin, 10% sucrose, 7% soybean oil, 5% powdered cellulose, 3.5% mineral mix, 1.0% vitamin mix, 0.30% L-cystine, 0.25% choline bitartrate, and 0.0014% TBHQ (Reeves, 1997) and drinking water were given ad libitum.

Measurement Number of breastmilk

Data secretion of breast milk feeding method used a test method or test weighing method. Child weight mice weighed every other day starting on day 1, 3, 5, 7, 9, 11, 13 and the 15 period of breastfeeding. The data obtained were analysed by ANOVA and then followed by Least Significant Difference test ($\alpha = 0.05$) using SPSS 16 for windows. If the results showed an increase in pup weight, it can be stated that Moringa leaves can increase the production of breast milk and see how the correlation between increasing doses of Moringa leaf powder solution to increase breast milk production.

RESULTS AND DISCUSSION

Based on this research, it appears that the group of rats that consume Moringa leaf powder found an effect include: (1) the baby mice are born with a higher weight. This can be seen in Table 1 (2) pup weight gain and test statistics are significantly different at the level of 5%, (3) Weight loss offspring increases with increasing doses of Moringa leaf powder

Table 1 The mean birth weight infant rats by different doses

Treatment	The birth weight infant rats by different doses		
	0,042 mg/g bw	0,084 mg/g bw	0,168 mg/g bw
Control	3.3	3.3	3.3
Unblanching	6.06	6.39	5.89
Boil blanching	4.38	4.17	4.22
Stem blanching	5.53	6.05	6.47
Boil +natrium bicarbonate	5.1	5.23	5.71

Quality of food during pregnancy will directly increase the baby's weight to be born. As there is known to increase protein needs during pregnancy. The need was used for fetal growth and growth of the mammary gland in preparation for lactation. The results of the analysis of a variety show supplementary feeding treatment in the form of Moringa leaf powder in the parent mice, providing significant effect on birth weight offspring. Birth weight is lowest in young control rats (3.3 g) and highest in young rats treated with stem gift of Moringa leaf powder dose 0.168 mg / g mm stem mice by treatment with steam blanching. The analysis showed that weaning weight between the control with the addition of Moringa leaf powder in the feed significantly different parent. This is presumably because the parent control mice fed with Moringa leaf powder added.

The results of the increased secretion of breast milk showed the highest weight offspring for treatment administration of Moringa leaf powder steam blanching method with a dose of 0.168 mg / g body weight mother rats that weighed 62.83 g and lowest in the control rat pups weighing 17.33 g. The data can be seen in Table 2.

Table 2 Weight infant rats after 15 days

Treatment	The body weight infant rats by different doses		
	0,042 mg/g bw	0,084 mg/g bw	0,168 mg/g bw
Control	17.33	17.33	17.33
Boil blanching	18.39	24.13	30.78
Unblanching	19.56	28.78	33.5
Boil+natrium bicarbonate blanching	20.67	31.39	54.5
Steam blanching	26.56	36	62.83

The role of phytosterols above is the formation of the hormone estrogen. Estrogen plays developing milk ducts in the glands in most species. Estrogen also stimulates the growth of milk ducts and milk glands alveoli. Estrogen affects the growth and proliferation of mammary gland ducts. Estrogen also increases the concentration of estrogen receptors (ER) in the reproductive organs [12].

This was confirmed by the results of research conducted by Sa'roni, et al. [13] that the hormone estrogen stimulates the growth of mammary glands and increases plasma prolactin. Estrogenic potency in moringa leaves containing compounds derived from such fitosteroid stigmasterol, sitosterol, and kampesterol, can be used as a precursor of sex steroid hormones, one of which is estrogen. This is due to structural similarity with cholesterol fitosteroid three compounds.

Referring Santosa *et al.* [14] milk production may increase or decrease depending on the stimulation of the mammary glands, especially in the first week of lactation. Mechanism lactagogum power of a compound can occur include directly by stimulating the activity of protoplasm secretory cells of the mammary gland, stimulates nerve endings in the mammary gland secretory thus increase milk secretion, or hormone prolactin stimulates working on alveolar epithelial cells. This is related to the presence of phytosterol compounds present in Moringa leaf powder. Theoretically, compounds that have the effect of which is a sterol lactagogum. Laktogogum effect of Moringa leaf powder is given, showing good results in productivity improvements to mother's milk of rats seen weight gain pups. The process of milk production in the mammary gland alveoli was affected by steroid hormones work. When the baby suckles, the mammary gland sends stimuli to the brain. The brain then reacts secrete prolactin hormone into the bloodstream to return to the mammary gland. The hormone prolactin stimulates milk maker cells to work producing milk. Cells milk maker did not actually work right when the baby suckles. Most of the hormone prolactin in the blood was for about 30 minutes after the feeding. The more often smoked baby, the more milk is produced. After the feeding process is complete, then most of the hormone prolactin to mammary gland cells and stimulate milk maker to work. The hormone prolactin for milk production was the next work. Smoked baby milk today was already available in the mammary gland at the mouth of the ducts [15].

The weight of weaning rat pups results are influenced by the availability of water mains milk. Mother's milk production is influenced by the level of development of the epithelial cells of the mammary gland during pregnancy and early lactation. Growth and development of the mammary glands were regulated by hormones mammaganik which is also the hormone of pregnancy [16]. Steroids found in food serves stimulate

estrogen formation [12]. The hormone estrogen stimulates the growth of milk ducts in the mammary glands and mammary gland alveoli. Increased secretion of estrogen during pregnancy, in addition to support embryo implantation also maintain pregnancy and to prepare the mammary glands to synthesize milk after birth [12].

Sterol compound is estrogenic, so based on their hormonal effect may increase the production of breast milk. According Humenick *et al.* [17], sterols affect the level of maturity of the ASI. These compounds are associated significantly with the smoothness and the formation of breast milk.

Lactagogum compound is a compound that can increase milk secretion. A compound that has the power lactagogum was reflected by the increase in milk production or increased volume of milk secreted. Theoretically, compounds that have the effect of which is a sterol lactagogum. Sterols are compounds steroids [15]. According to Wu *et al.* [14], which play a role in reflex steroid prolactin? In general, serves as a precursor steroid steroid hormone formation. Research and Janeczko and Skoczowski [20] also revealed that lactating rats, steroids significantly increased 4-fold mammary tissue. Reproductive organs are a target of steroid hormones, consisting glandula mammary alveoli where the collection of milk synthesis is also the reproductive organs, so it is a target organ of steroid. The induction of mammary gland alveoli phytosterol on the expected increase in the synthesis of protein, so it can result in increased secretion of breast milk.

Breast milk is the only nutrient for the neonate. Increased milk secretion was very positive impact for weight gain in children. The increase in weight gain in children increased significantly positive will affect the growth and development early in life. In addition, the early secretion of breast milk contains colostrum, which contains a variety of immunoglobulin that plays an important role in the immune system of the child (newborn). Willingness abundance of milk will have a very positive experience with weight gain in children [14].

Westfall [15] explained that, the milk is very important in the first week of the child's early life. In this period the correlation between milk consumption with weight gain is very positive. For practical purposes, the increased milk production in early lactation period can be estimated fairly accurately on the growth of children. The correlation between the consumption of milk and weight loss will be negative child during lactation when the mother gets crappy food rations during lactation. Feed supplements that can induce an increase in milk secretion, are likely to impact on the child's weight increase in rats.

The hormone prolactin stimulates the cells of the alveoli that serve to make the milk [15]. Factors that stimulate prolactin secretion would stimulate adenohipofise (anterior pituitary) to exit prolactin [16]. According Haenlei [19], the genetic influences on the production of milk has 25% heritability values. In other words, 75% of the high and low milk production was determined by feeding and management. If feeding and management of dairy goats were given to both, then milk production will be better.

Moringa leaves are readily accepted by animals and seem to have no toxic effects or contain factors that limit the intake. Supplementation with moringa leaves at a rate of 0.3% of BW producing dairy cows by 5.7 kg / day, and this represents an increase of 13% compared to the control treatment, which was grazing alone. Sarwatt *et al.* [20] found that when residues in cattle feed, cottonseed flour is replaced with moringa leaves at level 10, 20 and 30% of DM, milk production significantly increased respectively by 1.4, 0.9 and 0.8 kg of beef / day. No effect of the replacement of the feed with the moringa leaf powder on the amount of solids, fat and protein content of milk.

CONCLUSION

Moringa leaf is a food that can increase the production of breast milk. The results showed administration of Moringa powder can increase milk production holding mice significantly. Starting dose 0.042 mg / g body weight significantly rats parent can make milk secretion increased holding white mouse and rat pups weight increased with the dose given.

REFERENCES

1. Mills A.F. 1990. Surveillance for anaemia: risk factors in patterns of milk intake. *Arch Dis Child* 65(4): 428–431
2. Padmavathi P. and M.P. Rao. 1990. Nutritive value of Sauvopus androgynus leaves. *Plant Foods Human Nut.* 40:107-113.
3. Bingel AS, Farnsworth NR. 1991. Bingel AS, Farnsworth NR. Higher plants as potential sources of galactagogues. *Econ Med Plant Res* 1991:1-54.
4. Zhou W, Song Z, Kanagasabai R, Liu J, Jayasimha P, Sinha A, Veeramchanemi P, Mikler MB, Nes WD. 2000. Mechanism-based enzyme inactivators of phytosterol biosynthesis (Review). *Molecules* 9:185-203.
5. Maroyi, A. 2008. The utilization of *Moringa oleifera* in Zimbabwe: a sustainable livelihood approach

6. Estrella, M.C.P., Mantaring J.B.V. and David, G.Z., 2000. A double blind randomised controlled trial on the use of malunggay (*moringa oleifera*) for augmentation of the volume of breastmilk among non-nursing mothers of preterm infants. *Philipp J Pediatr.* 49: 3–6.
7. Fuglie, L.J. The Miracle Tree: *Moringa oleifera*: Natural nutrition for the tropics, (Church World Service, Dakar, 1999). pp68. Revised in 2001 and published as The Miracle Tree: *The Multiple Attributes of Moringa*, pp172.
8. Madrano, G.B. dan Perez, M.L. 2005. *The efficacy of Malunggay (Moringa oleifera) given to near term pregnant women in including early postpartum breast milk production – a double blind randomized clinical trial.*
9. Ross, I.A., 1999. *Medicinal Plant of the World: Chemical Constituents, Traditional and Modern Medicinal Uses*. Humana Press, Totowa, New Jersey, pp.231–239.
10. Totano, N., Nishiyama, T. and Tateishi, S. 2009. Oil in commercial standard diet needs its product specifications. *Journal of Oleo Science.* 58 (9) 447-452.
11. Lien, E.L., F.G. Boyle, J.M. Wrenn, R.W. Perry, C.A. Thompson, and J.F. Borzelleca. 2001. Comparison of AIN-76A and AIN-93G diets: A 13-week study in rats. *Food and Chem. Toxicol.* 39:385-392
12. Ross, I.A., 1999. *Medicinal Plant of the World: Chemical Constituents, Traditional and Modern Medicinal Uses*. Humana Press, Totowa, New Jersey, pp.231–239.
13. Sa'roni, Tonny Sadjimin, Mohammad Sja'bani & Zulaela. 2004. Effectiveness of the saupus androgynus (l.) Merr leaf extract in increasing mother's Breast milk production. Article. *Media Litbang Kesehatan*. Volume XIV (3): 20-24.
14. Santosa, C.M, Widjajakusuma, R., Rimbawan, Bukit, P., 2002 , The effect of 'bangun-bangun' leaves (*coleus amboinicus*, l.) consumption by lactating mothers on milk secretion and breast-fed infant growth, Abstract, *J of The ASEAN Federation of Endocrine Societies (JAFES)* 20: 150S.
15. Westfall, Rachel Emma. 2003. Galactagogue herbs: a qualitative study and review. *Canadian Journal of Midwifery Research and Practice*. Volume 2. Number 2
16. Kirk, S. 2010. Endocrinology of pregnancy. *Journal Endocrinology of Pregnancy*. 1-10.
17. Humenick SS. et al. 1994. The maturation index of colostrum and milk (micam): a measurement of breast milk maturation. *J Nurs Measurement* 2:16–86.
18. Janeczko, A and Skoczowski, A. 2005. Mammalian sex hormones in plants. *Folia Histochemica Et Cytophysiologica*. Vol. 43, No. 2. pp. 71-79
19. Haenlei, G. 2002. Feeding Goats for Improved Milk and Meat Production. Department of Animal and Food Sciences University of Delaware, USA.
20. Sarwatt, S.V., Milang'ha, M.S., Lekule, F.P., Madalla, N., 2004. *Moringa oleifera* and cottonseed cake as supplements for smallholder dairy cows fed Napier grass. *Livest. Res. Rural.Dev.* 16.