

Effects of oxytocin massage and moringa cookie consumption on colostrum excretion time in postpartum women

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Abstract

Delayed colostrum secretion can hinder the success of exclusive breastfeeding, often due to insufficient stimulation of prolactin and oxytocin. This study aimed to examine the effect of oxytocin massage and *Moringa oleifera* cookie consumption on accelerating colostrum excretion. A quasi-experimental post-test-only design with a control group was employed. The study involved 40 primigravida women in their third trimester, selected through purposive sampling and divided into an intervention group and a control group. The intervention group received oxytocin massage and consumed moringa cookies from the 38th week of gestation until postpartum colostrum release, while the control group received standard care. Data were collected through obser-

vation, and analysis was conducted using the independent *t*-test. Results showed a significant reduction in colostrum excretion time in the intervention group (mean=5.95 hours) compared to the control group (mean=9.00 hours) with a mean difference of 3.05 hours. The difference was statistically significant ($p=0.001$; $\alpha=0.05$). These findings suggest that oxytocin massage combined with moringa cookie consumption may effectively stimulate earlier colostrum release. Implementing such interventions during late pregnancy could support early breastfeeding initiation and improve neonatal health outcomes.

Introduction

Exclusive breastfeeding refers to the practice of feeding infants breast milk alone from birth to six months, without any additional foods or liquids (except for medications, vitamins, and minerals).^{1,2} Exclusive breastfeeding is a crucial factor in reducing infant mortality rates. According to the World Health Organization (WHO), exclusive breastfeeding can save approximately 1.5 million lives of infants in developing countries annually. The WHO recommends exclusive breastfeeding as the sole source of nutrition for infants up to six months of age.

Breast milk is a unique biological fluid that meets the nutritional and immunological needs of infants.³ Breast milk undergoes three stages: colostrum, transitional milk, and mature milk. Colostrum, a thick, yellowish fluid, is produced in the first three days postpartum.⁴⁻⁶ Providing colostrum offers protection against various diseases in infants, as it contains antibodies that prevent malnutrition.⁷⁻¹⁰ However, the prevalence of exclusive breastfeeding, including colostrum, within the first 24 hours remains low globally. In Ethiopia, the percentage of mothers who do not provide colostrum to their infants ranges from 6.3% to 52.9%. According to the WHO, approximately 43% of infants worldwide receive breast milk, including colostrum, within one hour of birth. In Indonesia, only 37.3% of infants receive colostrum.¹¹⁻¹⁶

According to data from the Indonesian Ministry of Health (2019), 31.36% of children fall ill due to the lack of exclusive breast milk, including colostrum. Moreover, 80% (16,156) of neonatal deaths occur within the first six days. Infectious diseases, which can be prevented by providing breast milk, including colostrum, are the primary cause of infant mortality.¹⁷ Babies who do not receive colostrum often receive pre-lacteal foods, such as water, honey, or formula milk, as substitutes for colostrum. The provision of pre-lacteal foods is a major factor contributing to the failure of exclusive breastfeeding.¹⁸⁻²²

Failure to provide colostrum is often due to decreased milk production after childbirth.²³ Many mothers experience difficulties with breast milk production on the first day after delivery, primarily due to suboptimal breast milk hormone function. Delayed breast milk production can be attributed to postpartum tension, fatigue, and stress, which elevate cortisol levels and inhibit the hormones responsible for breast milk production. Efforts to stimulate

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the production of prolactin and oxytocin hormones are essential.²⁴⁻²⁶ Prolactin is the primary hormone regulating breast milk production, while oxytocin facilitates breast milk release.^{27,28} Simple non-pharmacological interventions, such as massage techniques or oxytocin massage, can enhance breast milk release.

The efficacy of oxytocin massage as a non-pharmacological intervention to enhance breast milk (colostrum) production has been extensively studied. Several studies have demonstrated that oxytocin massage is a non-pharmacological approach that can increase breast milk production in postpartum mothers. This massage technique involves stimulating the spine (vertebrae) between the fifth and sixth ribs, which can increase oxytocin hormone production.²⁹ Research has shown that oxytocin massage can enhance breast milk production by up to 11.5 times by stimulating the spinal muscles and reducing cortisol levels by 28%. The massage stimulates neurotransmitters, which activate the *medulla oblongata* and send signals to the hypothalamus to release oxytocin from the posterior pituitary. Additionally, massaging the spinal muscles can reduce tension, alleviate stress, and stimulate the milk ejection reflex.^{24,30}

The prolactin hormone can be increased through the consumption of moringa leaves. Moringa plants (*Moringa oleifera* Lamk) can be incorporated into the diet of breastfeeding mothers, as they contain phytoesterol compounds that enhance and facilitate breast milk production, exhibiting a lactagogum effect.³¹ Compounds with a lactagogum effect include sterols, which belong to the steroid group.³² Research has shown that moringa leaf extract is safe for consumption by pregnant women in their third trimester, causing no complications during labor and no impact on uterine involution. Furthermore, studies have demonstrated that the extract can increase breast milk volume.^{16,32}

Collaborative efforts are necessary to facilitate timely colostrum excretion, specifically through the administration of oxytocin massage and consumption of moringa cookies. These interventions can stimulate the prolactin and oxytocin hormones, thereby enhancing milk production and release. It is expected that oxytocin massage and moringa cookie consumption will increase milk production, enabling mothers to provide colostrum to their babies as soon as possible.

Materials and Methods

Research design

This research is analytical research with a quasi-experiment with a post-test design with a control group. Locations for data collection were carried out in two areas of Independent Midwife Practice (PMB), the Cimahi City area and the Bandung Regency area.

Study participants

This study's population consisted of primigravidas with a gestational age of 38-42 weeks who were receiving Antenatal Care (ANC) at the Independent Midwife Practice in Cimahi Tengah District, Cimahi City, and Ebah District, Bandung Regency. Data collection was conducted through observations in two groups: the intervention group and the control group. The intervention group comprised 20 pregnant women who received oxytocin massage and consumed moringa cookies, whereas the control group consisted of pregnant women who only received standard care. The intervention was administered over 12-14 days, starting from the 38th week of pregnancy until colostrum production postpartum. Statistical analysis was performed using the independent *t*-test.

Participants met the inclusion criteria, which included pregnant women who had not yet produced colostrum at the time of sampling, planned to have a normal delivery, and intended to breastfeed their babies. Purposive sampling was employed to select a sample of 40 respondents who met the inclusion criteria and provided informed consent.

Variables, instruments, and data collection

The independent variables in this study were oxytocin massage and consumption of moringa cookies, while the dependent variable was the time of colostrum release. Data collection was conducted on two groups: the intervention group and the control group. The intervention group consisted of participants who received an oxytocin massage and consumed moringa cookies.

Oxytocin massage intervention

The oxytocin massage intervention involved midwives administering oxytocin massage to mothers at the research location. Prior to the intervention, all midwives were briefed on the correct technique. During the intervention, mothers were instructed to remove their upper clothing, sit comfortably, and lean forward. They placed their hands on a bed in front of them and rested their head on their hands.

The midwife then massaged the mother's back using a rotating motion with thumbs lubricated with baby oil, focusing on the spine between the 5th and 6th ribs. The massage lasted for 3 rotations or 10-15 minutes. The midwife's hands were clenched with thumbs pointing forward. This massage was performed daily, twice a day (morning and evening), for 12-14 days. The intervention was suspended during childbirth and resumed after completion of the labor process. Oxytocin massage ceased when examination of the breast areola confirmed colostrum release.

Consumption of moringa cookies

The consumption of *Moringa oleifera* cookies occurred simultaneously with the oxytocin massage intervention, wherein mothers consumed the cookies subsequent to the completion of the oxytocin massage session. Cookie consumption was carried out twice daily (morning and evening) for 12-14 days. Consumption was paused during the labor process and resumed upon completion. The intervention ceased when examination of the breast's areola massaging confirmed colostrum release.

Moringa cookies were prepared by researchers with the following composition: margarine, butter, powdered sugar, honey, egg yolk, cherries, wheat flour, moringa leaf powder, and cornstarch. Each cookie weighed 100 g and contained 10 g of dry moringa leaf powder. Prior to administration, *Moringa oleifera* cookies underwent organoleptic and nutritional content testing. Organoleptic test results indicated that the cookies had a fairly good taste, a crunchy texture, and were suitable for consumption. Laboratory tests revealed that every 100 g of moringa cookies contained 401 kcal, 21 g of fat, 12 g of protein, and 34 g of carbohydrates.

Measurement of the time of colostrum release

The time of colostrum release was measured by calculating the duration from delivery to the release of colostrum. To check for colostrum release, a midwife massaged the areola area of the mother's breast shortly after delivery. Colostrum checks were performed by midwives at 1-hour intervals. Colostrum was considered released if, after massage, breast milk was visible in the areola area. Conversely, if no breast milk was visible after massage, colostrum release was not declared. The measurement results were documented on the provided observation sheet.

Data analysis

Data were processed using SPSS for Windows version 16. Bivariate analysis was used to determine differences in colostrum excretion time between pregnant women who received an intervention and those who did not, using the independent *t*-test.

Ethical clearance

The study received authorization from the Health Research Ethics Commission, Poltekkes Kemenkes Bandung, as evidenced by approval No. 21/KEPK/EC/X/2020. Written informed consent was obtained from all participants in the study.

Results

The demographic characteristics of mothers in the control group (receiving standard treatment) and the intervention group (receiving oxytocin massage and consuming moringa cookies) are summarized in Tables 1 and 2. The majority of mothers in the control and intervention groups had a high school education level (90.0% and 85.0%, respectively) and were unemployed (90.0% and 75.0%, respectively).

Table 2 shows the average age of mothers. In the control group, the average maternal age was 21.10 years (SD=2.174). The intervention group had an average maternal age of 21.45 years (SD=2.585 years).

In the control group, the average birth weight of the children was 3,115 g (SD=406.88 grams). In comparison, the average birth weight of babies in the postpartum group that received oxytocin massage and consumed moringa cookies was 3,042 grams (SD=505.57 grams).

Regarding the average breastfeeding frequency in the two postpartum groups, the group that did not receive oxytocin massage combined with moringa cookie consumption had an average of 9.7 (SD=1.895). In comparison, the intervention group had an average of 10.35 (SD=1.843).

The average time of colostrum release in the intervention group differed significantly from that of the control group. The intervention group demonstrated a shorter average time to colostrum release (5.95 hours post-delivery) compared to the control group (9.00 hours post-delivery). The difference in colostrum release time was statistically significant ($p=0.001$, $\alpha=0.05$), indicating that mothers who received oxytocin massage and consumed moringa cookies had a faster colostrum release time compared to those who did not.

Discussion

This study investigates the collaborative effects of oxytocin massage and Moringa cookie consumption on colostrum excretion time during the postpartum period. Colostrum excretion time is defined as the duration between labor onset and colostrum release from the breasts. Data analysis revealed a significant difference in mean colostrum excretion time between the intervention group (oxytocin massage and moringa cookie consumption) and the control group (no oxytocin massage or moringa cookie consumption). Specifically, the intervention group demonstrated a shorter colostrum excretion time (mean=5.95; SD=2.45) compared to the control group (mean=9.00; SD=2.90). The difference between the two groups was statistically significant ($p=0.001$; $\alpha=0.05$).

Colostrum is a thick, yellowish, milky liquid produced in the first three days postpartum.^{4,5} The lactation process involves two

reflex mechanisms: the prolactin reflex and the oxytocin reflex, which play crucial roles in milk production.³³ The action of the prolactin hormone is influenced by various factors, including emotional state. Hormones associated with feelings of happiness and joy, such as dopamine, serotonin, and catecholamines, affect prolactin and oxytocin function.³⁴ In the early postpartum period, decreased milk production (colostrum) may occur due to inadequate stimulation of prolactin and oxytocin hormones.^{26,35} Simple non-pharmacological interventions, such as massage techniques or oxytocin massage, can help increase milk production.

Oxytocin massage is a massage of the spine from the 5th to 6th rib up to the shoulder blades. The purpose of the oxytocin massage is to calm mothers and help them relax, thereby increasing their affection toward their baby and stimulating the release of oxytocin, which can accelerate the release of breast milk.²³ This massage will facilitate the work of the parasympathetic nerves, conveying commands to the back of the brain to release oxytocin. The way oxytocin massage works is by providing a stimulus to the vertebrae, specifically to ribs 5-6, which then increases stimulation to the posterior pituitary, causing it to secrete the oxytocin hormone.³⁶ The success of oxytocin massage as a non-pharmacological effort to increase colostrum production has been widely studied. Several studies have shown that oxytocin massage can stimulate the hormone oxytocin. A study has supported the statement above, indicating that colostrum spending time in the oxytocin massage intervention group was faster than in the control group, which was 23.04 hours after the baby was born.^{30,37-39}

Various factors, including lactogogum, influence the production of the prolactin hormone. Lactogogum is a substance that has the function of increasing milk production. Consuming foods containing lactogogum is a non-pharmacological effort that can increase milk production.⁴⁰ Moringa is a local food ingredient that has the function of increasing milk production, as it contains various phytosterol compounds. The content of phytosterols in every 100 g of moringa consists of 1.15% sitosterol and 1.52%

Table 1. Characteristics of pregnant women related to education and employment in control and intervention groups.

Variable	Control group		Intervention group	
	n	%	n	%
Education				
High school	18	90.00	17	85.00
Academy/university	2	10.00	3	15.00
Work				
No	18	90.00	15	75.00
Yes	2	10.00	5	25.00

Table 2. Characteristics of pregnant women, including the age of the mother and the baby's birth weight, in the control and intervention groups.

Variable	Control group	Intervention group
	Mean±SD Median (range)	Mean±SD Median (range)
Age of mother (years)	21.10±2.17 21.00 (19-25)	21.45±2.58 21.00 (19-25)
Baby's birth weight (g)	3,115.00±406.88 3,15 (2,500.00-3,600.00)	3,042.50±505.57 2,75 (2,500.00-3,700.00)

stigmaterol, which can stimulate milk production.

Moringa oleifera has a potential effect in supporting the timing of colostrum excretion and is declared safe for consumption by third-trimester pregnant women, as it does not cause complications in the delivery process and does not affect the process of uterine involution.^{16,31,32}

Moringa cookies are an effort to create products from moringa leaves that can be utilized, especially by pregnant and lactating women, to support the prolactin hormone and enhance breast milk production.³² Several research results state that consumption of moringa can stimulate the hormone prolactin. A study involving the administration of 800 mg of moringa leaf powder extract for three months to breastfeeding mothers increased breast milk production by 66.2%. Another study, involving the administration of 50 g of moringa biscuits for one month to breastfeeding mothers, found that it improved breast milk quality.³² Based on the results of this study, it can be estimated that the colostrum excretion time may be reduced if the mother applies oxytocin massage in combination with consuming moringa cookies.

Limitations

Based on the researchers' direct experience in this study, several limitations were identified. Firstly, the small sample size (n=40) may not be representative of the larger population, limiting the generalizability of the findings. Secondly, the study's geographical area was limited, which may restrict the objectivity of the results. Moreover, other variables, such as the participants' diet, may influence the time of colostrum release and were not controlled for in this study.

These limitations highlight the need for future research to address these concerns by increasing the sample size, expanding the study's geographical scope, and accounting for potential confounding variables, such as diet.

Conclusions

This study found that postpartum mothers who received oxytocin massage and consumed moringa cookies experienced significantly faster colostrum release than those who did not. These findings support the use of non-pharmacological interventions – specifically oxytocin massage and lactagogue-rich foods, such as moringa cookies – to stimulate early colostrum production. Healthcare providers are encouraged to educate and counsel pregnant women on these methods to promote timely breastfeeding initiation.

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