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The effect of oxytocin massage and fennel aromatherapy on milk fluidity in lactating women within the Kawalu Health Centre Working Area, Tasikmalaya

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ABSTRACT

Background *: A lack of prolactin and oxytocin hormone stimulation can decrease the amount and delivery of breast milk, affecting the baby's growth and development. Oxytocin massage mixed with fennel aromatherapy is another option for improving breast milk quality and quantity. Fennel aromatherapy is a pure liquid from the fennel plant. It contains fatty acids, flavonoids, vitamins, and minerals, such as calcium, that are excellent for their relaxing effects and can enhance breast milk supply.*
Objectives*: This study aimed to see how oxytocin massage and fennel aromatherapy affected the optimal flow of breast milk in breastfeeding women in the Public Health Centre of Kawalu working area in Tasikmalaya.*
Methods *: Using a two-group pretest-posttest design, conduct a quasy experiment employing a quantitative approach. The intervention group used fennel aromatherapy for oxytocin massage; on the other hand, the control group used Virgin Coconut Oil (VCO) for oxytocin massage. Non-probability sampling was used, along with a simple random sampling technique. There were 19 respondents in the intervention group and 19 in the control group. Mother and baby indicators were measured using an observation sheet.*
Results *: The paired sample t-test results in the intervention group obtained a p-value of 0.000 (p-value ≤0.05), the control group obtained a p-value of 0.037 (p-value ≤0.05), and the independent t-test results in the intervention and control groups obtained a p-value of 0.006 (p-value ≤0.05).*
Conclusions*: Oxytocin massage and fennel aromatherapy affect the optimal flow of breast milk in nursing mothers in the working area of Kawalu Public Health Centre in Tasikmalaya. The present study explores the potential effects of fennel aromatherapy on breastfeeding mothers, specifically focusing on its impact on breast milk optimal flow and the potential role of oxytocin massage in this context.*

KEYWORD : *fennel aromatherapy; breastfeeding mothers; optimal flow of breast milk; oxytocin massage;*

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INTRODUCTION

Breast milk, also known as human milk or human breast milk, is a natural source of nourishment for infants with a composition specifically tailored to support optimal growth and development. It encompasses many advantageous components, including various nutrients, hormones, immune factors, and substances that facilitate growth and development (1). Notably, breast milk offers protective properties against allergies and infections through antibodies, such as immunoglobulins and anti-inflammatory agents. Colostrum, the initial secretion of breast milk within the first few days after birth, is rich in protein and immunological substances, including immunoglobulins such as IgG, IgA, and IgM, while relatively low in fat and carbohydrates(2,3).

According to the United Nations International Children's Emergency Fund (UNICEF), the prevailing rate of exclusive breastfeeding stands at a mere 38%. Furthermore, the World Health Organisation (WHO) asserts that the extent of exclusive breastfeeding coverage continue to have relatively low rates in numerous ASEAN nations, including Indonesia. Based on data from Basic Health Research, the extent of exclusive breastfeeding in Indonesia is reported to be merely 52.5%. In the specific context of West Java, the prevalence of exclusive breastfeeding in 2022 reached 77%, indicating a marginal rise of 0.54% compared to the preceding year's figure of 76.46%. Nevertheless, this percentage remains below the national objective of 80% (4,5) According to the data provided by the Tasikmalaya Health Office in 2022, out of a total of 6,476 infants, only 4,379 infants (67.6%) received breast milk in the age range of 0-6 months. Among the twenty-two Public Health Centres in Tasikmalaya, Mangkubumi Public Health Centre had the highest coverage of infants receiving breast milk, with 517 infants (64%). In contrast, Kawalu Public Health Centre had the lowest coverage, with 180 infants (53.89%)(6).

The observed phenomenon within the community pertains to hindrances that impede the unimpeded progression of breast milk. These hindrances arise from insufficient stimulation of the prolactin and oxytocin hormones, thereby reducing the quantity of breast milk produced and the act of breastfeeding itself. Consequently, these factors exert a significant effect on the growth and development of the infant (7). The hormones prolactin and oxytocin impact breast milk's synthesis and release, influencing the prolactin and let-down reflex. The release of prolactin hormone occurs in response to stimulation from the baby's suckling on the mother's breast. This stimulation activates the nerve fibres located in the mother's nipple, hence facilitating increased milk production in the breast. The hormone oxytocin induces muscular contractions that facilitate the development of milk ducts, propelling both the ducts and the milk towards the areola. Subsequently, the milk is transferred into the baby's mouth via

suction (8). Several strategies have been identified to promote the release of prolactin and oxytocin hormones, including breast milk expression, proper breast care, early initiation of breastfeeding (IMD), and responsive breastfeeding practices(9,10).

One strategy employed to enhance the quality and quantity of breastmilk is using oxytocin massage, which facilitates a more efficient process of creation and secretion. (11). The Oxytocin massage technique involves applying pressure along the spine to promote the secretion of prolactin and oxytocin hormones, facilitating a more efficient production of breast milk (12). The study examines the impact of a skin-to-skin oxytocin massage, characterised by moderate pressure, administered daily for 15 minutes over three consecutive days.

The objective is to assess how much this intervention can enhance oxytocin hormone levels while concurrently reducing adrenocorticotropin hormone levels in lactating women (13). Several factors can affect the efficacy of the oxytocin massage. These include psychological factors such as actively listening to the sound and maintaining proximity to the baby, which can stimulate milk production and release. Additionally, creating a calm and comfortable environment during breastfeeding, feeling confident about the sufficiency of breast milk, and employing relaxation therapy to alleviate stress and promote natural tranquillity can support nerve and hormonal balance. Furthermore, receiving support from one's spouse and family, as well as employing techniques such as gently pulling and rotating the nipple to facilitate milk flow, can also contribute to the success of the massage(14).

Aromatherapy involves the utilisation of essential oils, which are pure aromatic plant extracts, to facilitate the traditional medicinal practice of promoting bodily well-being, mental relaxation, and peace of mind[15]. There are multiple methods for implementing aromatherapy, including inhalation, internal consumption, and topical application. When essential oils are mixed with oxytocin massage and applied topically, it has been observed that the relaxation experienced by mothers can be enhanced.

Fennel essential oil, derived from the Fennel plant through distillation, is a relatively underutilised substance. It is characterised by its composition of fatty acids, flavonoids, vitamins, and minerals, including calcium. This particular oil can enhance lactation and support the digestive health of both mothers and infants. Fennel aromatherapy applied to the back contains fatty acids, flavonoids, vitamins and minerals which will be absorbed through the integumentary system which will cause stimulation delivered via the neurotransmitter acetylcholine, the aromatherapy content enters through the circulatory system to the brain and the stimuli delivered are interpreted as olfactory stimuli, simultaneously the receptors in the respiratory center (olfactory epithelium) in the medulla oblongata will process these olfactory stimuli and provide stimulation to the limbic system

which is sent to the hypothalamus, amygdala and hippocampus to provide positive stimulation. feedback to control emotions and mental health so that it will make the mother feel better, with relaxed conditions, blood circulation and the hormonal system will be relatively smoother so that the breastfeeding process will be better(16).

The physiological impact of topically using essential oils during an oxytocin massage might affect the functioning of the neurological and lymphatic systems. Additionally, the skin can absorb a significant portion of the essential oils in this context. These substances can be detected in the exhaled air during a time frame ranging from 20 to 60 minutes. The user did not provide any text to rewrite (15). Based on the researcher's direct experience in this research process, there were several limitations experienced and could be several factors for future researchers to pay more attention to. This research certainly has shortcomings that need to be corrected in future research. Several limitations in this research include: The available research time is relatively short while the sample requirements are large.

The respondent's address is quite far away and the community is less open to students, meaning that when this research takes place, cadres must accompany it. Limited research instruments mean there are not enough researchers to conduct this research. The instruments used in this research focused on the smoothness of breastfeeding from mother and baby factors, without paying attention to socio-cultural, economic and other aspects.

MATERIALS AND METHODS

The present investigation employed a rapid experimental design featuring a two-group pretest-posttest design consisting of an intervention group and a control group. The research was carried out in August 2023, specifically in *Gunung Tandala Village*, located in the Kawalu Subdistrict of Tasikmalaya. The participants in this study consisted of breastfeeding mothers whose infants were between the ages of 0 and 6 months and who reported concerns about the lack of activity in their breast milk. The selection technique employed in this study was simple random sampling.

A total of 38 samples were selected and divided into two groups: the intervention group, consisting of 19 samples, and the control group, also comprising 19 samples. The inclusion criteria for this study encompassed several factors. Firstly, participants must express their willingness to participate and be available during the data collection. Additionally, they were required to be nursing and residing with other family members.

Furthermore, both the mothers and babies were expected to be in good health and not have any allergies to essential oils. Lastly, the study focused on infants aged 0-6 months without formula milk during the research.The intervention group received instruction from the family regarding applying

oxytocin massage with fennel aromatherapy. In comparison, the control group of families received instruction solely on oxytocin massage utilising virgin coconut oil (VCO), with a recommended application frequency of once daily for 15 minutes over three days(13). During the massage, a diluted dose of Fennel essential oil was administered, consisting of 0.2 cc of Fennel oil diluted in 0.6 cc of VCO, resulting in a 25% concentration (17). The successful use of essential oils can be affected by various factors, such as the dosage administered, the individual's age, overall health condition, and skin sensitivity. In order to mitigate the risk of skin irritation and enhance the absorption of essential oils, diluting them with carrier oils is imperative. Examples of suitable carrier oils are coconut oil, olive oil, avocado oil, walnut oil, sunflower oil, linseed oil, sweet almond oil, and macadamia nut oil (17). The present study has undergone ethical assessment at KEPK Tasikmalaya Health Polytechnic of Ministry of Health and has been deemed ethically feasible with the assigned reference number DP.04.01/16/115/2023.

The research employed a standardised breast milk optimal flow observation sheet, initially developed by Budiati (2009) and subsequently modified by Nur'ani (2017). The significance level was set at 5%. The obtained correlation coefficient r results 0.976> r results 0.811. This instrument was utilised to assess and monitor the optimal flow of breast milk production based on indicators provided by mothers and infants (18). The data were subjected to analysis using the Paired Sample t-test due to the normal distribution of the data, as confirmed by the Shapiro-Wilk normality test (p-value ≥ 0.05). The obtained p-values for the optimal flow of breast milk measurements before and after the intervention in the intervention group were 0.082 and 0.281, respectively. Similarly, the p-values for the optimal flow of breast milk measurements before and after the intervention in the control group were 0.074 and 0.079, respectively.

Table 1. Characteristics of respondents

Characteristics (n=38)		Number	Results
Age	< 20 years	1	2.60%
	20-30 years	17	44.70%
	>30 years	20	52.60%
Education	Primary School	5	13.20%
	Junior High School/	13	34.20%
	Senior High School/	17	44.70%
	Higher Education	3	7.90%
Parity	Primiparous	16	42.10%
	Multiparous	20	52.60%
	Grandemultipara	2	5.30%
Occupation	Working	5	13.20%
	Unworking	33	86.80%

RESULTS AND DISCUSSION

RESULTS

Univariate Analysis Characteristics of Respondents

Based on the data presented in **Table 1**, most participants, precisely 52.6%, > 30. Furthermore, 44.7% of the respondents have completed their education up to the junior high school level, while an equal percentage

(52.6%) have experienced multiple pregnancies. Concerning employment, most respondents (86.8%) were found to be unemployed.

Breastmilk optimal flow before and after action in the intervention group and control group

Table 2 demonstrates that the mean of the intervention group before the action was obtained was mean = 12.05, and the mean of the control group before the action was obtained was mean = 12.21.

Table 2. Mean score of breast milk optimal flow before action in the intervention group and control group

Variable	Mean	Std. deviation	Min-max
Optimal flow of breastfeeding before action in Intervention group	12.05	2.147	8-15
Optimal flow of breastfeeding before action in control group	12.21	1.398	8-15

Table 3. Mean score of breast milk optimal flow after action in the intervention group and control group

Variable	Mean	Std. deviation	Min-max
Optimal flow of breastfeeding after action in Intervention group	14.63	0.831	12-15
Optimal flow of breastfeeding after treatment in control group	13.37	1.606	12-15

Table 3 demonstrated that the mean of the intervention group after the action was obtained with a mean = 14.63, and the mean of the control group after the action was obtained with a mean = 13.37.

Bivariate Analysis

Average difference of oxytocin massage and fennel aromatherapy on breast milk optimal flow in breastfeeding mothers

Based on **Table 4, Table 5, and Table 6** bellow, it can be revealed that the p-value with the Paired Sample t-test analysis with an α value ≤ 0.05 and a significance value of 0.000 is smaller than the 5% significance level (p-value = 0.000 ≤ 0.05) in the intervention group and a significance value of 0. 037 is smaller than the 5% significance level (p-value = 0.037 ≤ 0.05) in the control group, after comparing the intervention group and the control group, a significance value of 0.006 is obtained which is smaller than the 5% significance level (p-value = 0.006 ≤ 0.05), so it can be stated that there is a difference in the mean before and after giving action both in the intervention group and the control group.

Table 4. Mean difference in breast milk optimal flow before and after the intervention group in breastfeeding mothers in the Kawalu Public Health Centre working area, Tasikmalaya 2023

Variables	N	Mean	Std. deviation	P-*value*
Optimal flow of breast milk before action in the Intervention group	19	12.05	2.147	0.00
Optimal flow of breast milk after treatment in the Intervention group	19	14.63	0.831	

Table 5. Mean difference of breast milk optimal flow before and after the control group in breastfeeding mothers in the working area of Kawalu Health Centre, Tasikmalaya 2023.

Variables	N	Mean	Std. deviation	P-*value*
Optimal flow of breast milk before treatment in the control group	19	12.21	1.398	0.037
Optimal flow of breast milk after treatment in the control group	19	13.37	1.606	

Table 6. Mean difference of breast milk optimal flow after the intervention and control groups in breastfeeding mothers in the working area of Kawalu Public Health Centre, Tasikmalaya 2023

Variables	N	Mean	Std. deviation	P-*value*
Optimal flow of breast milk after treatment in Intervention group	19	14.63	0.831	0.006
Optimal flow of breastfeeding after action in the Control group	19	13.37	1.606	

DISCUSSION

Characteristics of Respondents

As individuals surpass 30, there is a notable decline in reproductive hormone functionality. However, they tend to exhibit commendable emotional maturity and possess diverse experiences about breast-feeding infants. Mothers who are unprepared for childbirth or breastfeeding may experience psychological effects, including feelings of dread, bewilderment, and worry, which can hinder the release of prolactin and oxytocin hormones (20). Individuals educational attainment significantly impacts parental abilities and efforts, facilitating goal achievement and influencing external responses(21).

Breast milk optimal flow after the intervention and control groups

Mothers with a history of multiple pregnancies tend to exhibit more excellent proficiency in breastfeeding and infant care as their parity increases. The successful initiation and continuation of breastfeeding can enhance a mother's self-assurance and confidence, thereby facilitating the release of oxytocin hormone (21).

Mothers who are not employed have greater availability to dedicate their time to caring for their infants and families, allowing for increased attention and the opportunity for extended periods of nursing (19). The results of the univariate analysis conducted on the intervention and control groups demonstrated a mean rise in both groups before and after the intervention implementation. The viscosity of breast milk during lactation is affected by the principle of supply and demand, wherein frequent breast emptying leads to an augmentation in milk production. To achieve optimal milk ejection, it is essential to induce the secretion of the oxytocin hormone through infant suction or oxytocin massage (19).

The efficacy of the oxytocin hormone is significantly impacted by the maternal

affective and cognitive states, facilitating the seamless progression of the nursing process. The mother must maintain a tranquil and relaxed state during breastfeeding. If the mother experiences stress, it can impede milk release and hinder the let-down reflex.

This hindrance is attributed to the discharge of the adrenaline hormone, also known as epinephrine, which induces vasoconstriction in the blood vessels of the alveoli. Consequently, the secretion of the oxytocin hormone is diminished, leading to a disrupted let-down reflex. This disruption can result in an accumulation of breast milk, leading to breast swelling and ultimately causing complications such as breastfeeding difficult-ies, pain, inflammation, and potentially abscess formation (19,22). The findings from the bivariate analysis indicate that the p-value associated with the optimal flow of breast milk was lower in the intervention group than in the control group. This observation aligns with previous research suggesting that oxytocin massage and fennel aromatherapy have a positive impact on increasing breast milk optimal flow in lactating mothers (23). The statistical significance of the difference between the optimal flow of breast milk before and after applying oxytocin massage and fennel aromatherapy was determined using the Paired Sample t-test. Based on the results, the hypothesis decision is to accept the alternative hypothesis (Ha) and reject the null hypothesis (Ho), indicating a significant difference in the optimal flow of breast milk before and after the intervention. The sound effects of oxytocin massage combined with fennel aromatherapy can be attributed to the simultaneous activation of two distinct pathways inside the human body. The application of mechanical stimulation to the sympathetic nerves located inside the thoracic T1-T4 region induces a state of bodily relaxation. Enhanced blood circulation facilitates the transmission of stimuli to the limbic system via the neurotransmitter acetyl-choline. Consequently, this process elicits a positive response from the anterior and posterior pituitary glands, producing prolactin and oxytocin hormones in the bloodstream. Ultimately, these hormonal secretions stimulate the myoepithelial cells within the mammary alveoli, producing and releasing breast milk (16).

Applying fennel aromatherapy to the back can induce relaxation due to fatty acids, flavonoids, vitamins, and minerals. These compounds are absorbed through the integumentary system and subsequently stimulate the release of the neurotransmitter acetylcholine into the bloodstream. The stimuli delivered by acetylcholine are then interpreted by the respiratory centre located in the olfactory epithelium. From there, the information is transmitted to the hypothalamus, amygdala, and hippocampus, resulting in a positive feedback loop that regulates emotional and mental states, ultimately promoting a sense of comfort and relaxation. This relaxed state benefits the circulatory and hormonal systems, potentially

improving breastfeeding (16).

CONCLUSION AND RECOMMENDATION

A disparity in breast milk optimal flow was revealed between those who engaged in oxytocin massage combined with fennel aromatherapy and those who underwent oxytocin massage utilising virgin coconut oil (VCO) alone. The study's findings revealed that the average optimal flow of breast milk in the intervention group exhibited a mean rise of 2.58. In contrast, in the control group, it demonstrated a mean increase of 1.16. These results suggest that oxytocin massage and fennel aromatherapy significantly enhance breast milk optimal flow among lactating mothers.

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