Original Article

Effectiveness of Foxy Oil Combined with Oxytocin Massage on Breast Milk Production among Postpartum Mothers in Indonesia: A Quasi-Experimental Study

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ABSTRACT

Background: Optimal breast milk production meets infants' nutritional needs, crucial in stunting prevention. Many postpartum mothers face insufficient milk production, which can affect infant weight gain and increase the risk of stunting. The innovation of combining oxytocin massage with Foxy Oil is expected to enhance breast milk volume, frequency of wet diapers, and infant weight gain—key indicators in stunting prevention.

Methods: This study used a quasi-experimental design with purposive sampling, involving 60 postpartum mothers: 30 in the intervention group and 30 in the control group. Statistical analyses were conducted using SPSS 26 for univariate and bivariate data. Data normality was tested using the Kolmogorov-Smirnov test and bivariate analysis with the Mann-Whitney test. Breastfeeding optimisation was assessed based on breast milk volume, number of wet diapers, and infant weight over one month in the working area of Tanjung Morawa Community Health Centre. The husband or a close family member performed an Oxytocin massage twice daily for 10–15 minutes.

Results: Bivariate analysis after oxytocin massage showed significant effects on breast milk volume ($p = 0.000$), number of wet diapers ($p = 0.000$), and infant weight ($p = 0.039$). The analysis indicates that the combination of Foxy Oil and oxytocin massage positively affects breast milk production, frequency of wet diapers, and infant weight gain.

Conclusion: Foxy Oil's innovation, combined with oxytocin massage, can be widely applied in midwifery practice to support successful exclusive breastfeeding and contribute to stunting prevention.

***Keywords*:** Breast Milk; Foeniculum Vulgare; Oxytocin Massage; Postpartum Mothers; Stunting.

Implications for Practice:

- Integrating oxytocin massage with anise-based Foxy Oil into routine clinical care can enhance lactation support by increasing breast milk volume, infant output, and early weight gain.
- Incorporating this evidence-based intervention into midwifery education and postpartum counseling can strengthen non-pharmacological strategies that promote exclusive breastfeeding and early infant health.
- Scaling this low-cost, low-technology approach into community health policies can support resource-constrained LMIC settings by improving breastfeeding outcomes and contributing to stunting prevention efforts.

Introduction

Exclusive breastfeeding is a target in the global Sustainable Development Goals (SDGs), specifically Goal 3 in the health sector, with indicators aiming to reduce the neonatal mortality rate to 12 per 1,000 live births and the under-five mortality rate to 25 per 1,000. Exclusively breastfeeding for six months, followed by continued breastfeeding up to two years alongside complementary foods, can reduce under-five mortality by approximately 13%. Around 16% of neonatal deaths can be prevented if infants are breastfed from the first day of life, and initiating breastfeeding within the first hour of birth can lower the risk of infant mortality by approximately 22% (UNICEF, 2021). The Global Breastfeeding Collective aims to achieve a 70% breastfeeding rate by 2030. According to survey data from 2016 to 2022, 46% of newborns were breastfed within the first hour of birth. Meanwhile, 71% of women continued breastfeeding for one year, but the rate drops to 45% for breastfeeding up to two years. Therefore, national efforts to promote breastfeeding must be strengthened and sustained (UNICEF & WHO, 2023).

In line with one of the eight development agendas, the 2025–2045 National Long-Term Development Plan (RPJPN) aims to achieve the "Golden Indonesia 2045" vision by accelerating the reduction of stunting in children under five. The national stunting prevalence in 2023 was 21.5%, with a target of 18% by 2025 (BPS, 2025). Increasing the coverage of exclusive breastfeeding in Indonesia is one of the performance indicators as an intermediate outcome for stunting reduction (Bappenas, 2019). The prevalence of stunting in North Sumatra Province in 2023 was 18.9%, still below the national prevalence of 21.5%. The highest percentage was observed in Deli Serdang Regency at 33.8%. One sub-district with low exclusive breastfeeding coverage for infants under six months is Tanjung Morawa, where only 9% of infants (390 out of 4,546 live births) received exclusive breastfeeding. (Dinkes Sumut, 2024).

The implementation of exclusive breastfeeding faces several obstacles, including the perception that maternal breast milk is insufficient, a lack of knowledge, work-related constraints, and the marketing of formula milk (Singh et al., 2024). A qualitative study among breastfeeding mothers showed that all participants reported experiencing barriers to exclusive breastfeeding based on their personal experiences (N. A. A. H. Y. S. Manjorang, 2024). In line with previous research conducted in the same area, Tanjung Morawa Sub-district, there is a relationship between maternal knowledge and parity with the provision of prelacteal feeding, which hinders successful exclusive breastfeeding. Low maternal understanding is influenced by the environment and exposure to information promoting formula milk, making mothers more likely to believe that formula is better than exclusive breastfeeding. Additionally, mothers experiencing psychological distress may have reduced milk production, leading them to provide prelacteal feeds (Silaban et al., 2023).

Efforts to increase breast milk production through non-pharmacological approaches are considered more economical and flexible. Some non-pharmacological methods include using Family Medicinal Plants (TOGA) and techniques such as acupressure, acupuncture, and massage (Yuliani et al., 2022). Oxytocin massage on the fifth and sixth ribs, performed along the spine from the fifth and sixth ribs to the shoulder blades, stimulates the parasympathetic nerves to activate the posterior pituitary gland, releasing oxytocin. This massage technique triggers the let-down reflex,

promoting the secretion of oxytocin, which causes contraction of the myoepithelial cells around the alveoli and facilitates the flow of breast milk from the alveoli through the ducts via the sinuses (Nurindah Sari et al., 2023). In line with previous research, oxytocin massage performed for 3–5 minutes twice daily on postpartum mothers improved breast milk flow, enhancing maternal breastfeeding self-efficacy (Silaban et al., 2025). Knowledge, social support, and psychosocial factors help mothers who experience difficulties with breastfeeding (N. A. A. H. Manjorang, 2023).

Fennel (Foeniculum vulgare) is a culinary spice and a traditional medicinal herb. It contains a galactagogue, which promotes prolactin production and enhances lactation. (Karma et al., 2024). Fennel seeds contain essential oils composed of anethole, a phytoestrogen, fenchone, estragole, and 1,8-cineole (eucalyptol), all excreted into breast milk. Laboratory distillation of 5 kg of Foeniculum vulgare seeds can yield approximately 29 g of essential oil (Khasanah et al., 2022) 1 Proximate analysis of fennel in rats showed higher crude protein and caloric content compared to papaya leaves, which are present in breast milk (Ekacahyaningtyas et al., 2020). Administration of fennel oil to rats, along with aqueous extract (0.5 g/kg) and ethanol extract (1 g/kg), was found to stimulate prolactin production (Ahmadi et al., 2020). By increasing lactation and prolactin levels in breastfeeding mothers, fennel in tea preparations can help improve breast milk volume, as indicated by head circumference, daily wet diapers, and bowel movements, without causing adverse side effects (Zeeshan et al., 2023). Fennel essential oil contains fatty acids, flavonoids, vitamins, minerals, and calcium. When applied to the back, the oil is absorbed through the integumentary system, stimulating afferent nerves in the limbic system that signal the anterior pituitary gland, resulting in prolactin secretion into the bloodstream. At the same time, the relaxing effect of fennel essential oil is mediated through neurotransmitters that stimulate the brain's limbic system, promoting prolactin release, while the amygdala and hippocampus help regulate emotions as well as physical and mental health (Purnamasari & Hindiarti, 2021).

Although numerous studies have demonstrated the effectiveness of oxytocin massage in increasing breast milk production, a research gap remains, as few studies have integrated oxytocin massage with herbal essential oils containing natural galactagogues, such as anise. This combination has the potential to provide a more potent physiological effect through a dual mechanism: mechanical stimulation of oxytocin receptors and the hormonal effects of the anethole compound in fennel, which increases prolactin.

The conceptual framework of this study describes the causal relationship as follows: oxytocin massage → increased oxytocin hormone secretion → increased milk ejection reflex → increased breast milk volume → increased infant intake → infant weight gain → stunting prevention. Combining oxytocin massage and Foxy oil (aniseed-based) is expected to strengthen these physiological pathways by stimulating the nervous and endocrine systems. This study was conducted to test whether the combination of Foxy Oil with oxytocin massage can increase breast milk production and support infant growth in postpartum mothers.

Methods

Study Design

This study used a quasi-experimental design with two groups: an intervention group and a control group. This design was chosen to compare the effectiveness of oxytocin massage with and without Foxy Oil

on breast milk production and infant growth outcomes. Research reporting followed the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) guidelines for reporting non-randomised intervention studies. The study was conducted in the Tanjung Morawa Community Health Centre (Puskesmas) area, Deli Serdang Regency, Indonesia.

This intervention is not registered in the clinical trial registry because it is community and non-pharmacological. Still, the protocol was developed based on empirical literature and consultation with professional midwifery personnel to ensure safety and ethical compliance.

Participants

The study population was postpartum mothers residing in the Tanjung Morawa Community Health Centre (Puskesmas) working area, Indonesia. Inclusion criteria included mothers willing to participate, able to read and complete the observation log, and in good health. Exclusion criteria included mothers with severe medical complications or conditions that could hinder breastfeeding. A total of 60 respondents participated, consisting of 30 in the intervention group and 30 in the control group. There was no dropout during the study (0%).

The sampling technique used was purposive sampling. The adequacy of the sample size was based on a power analysis calculation using the formula: $n = [(Z\alpha/2 + Z\beta)^2 \times 2\sigma^2] / (\mu_1 - \mu_2)^2$, with a 95% confidence level ($\alpha = 0.05$) and 80% power ($\beta = 0.2$). The calculation results indicate a minimum requirement of 25 respondents per group. Therefore, 30 respondents per group are sufficient to detect significant differences between groups.

Instruments

The instruments used included a daily observation sheet (logbook) to record breast milk volume at each feeding, the number of wet diapers in 24 hours, and the baby's weight on day 30. The observation sheet was pilot tested on 10 postpartum mothers outside the study sample to assess clarity and ease of completion. Inter-observer reliability testing yielded a Cronbach's α value of 0.89, indicating high consistency.

Infant weight was measured using a Tanita BD-815U digital infant scale with an accuracy of ±10 grams. Calibration was performed weekly using standard weights of 3 kg and 5 kg to ensure accurate measurement results. Two trained enumerators performed weighing to minimise inter-observer bias. All instruments were tested for content validity by obstetrics and child health experts.

Intervention

The intervention group received an oxytocin massage using Foxy Oil, while the control group received only an oxytocin massage without oil. Foxy Oil is an essential oil made from anise seeds (Foeniculum vulgare) containing anethole and fenkhone, two active components with galactagogue properties that can increase prolactin secretion and strengthen the oxytocin reflex. The combination of oxytocin massage and fennel oil is expected to provide dual physiological effects through mechanical stimulation of the parasympathetic nervous system and hormonal influence on the pituitary gland.

The intervention was carried out by the husband or a close family member who had received training from the research midwife. The intervention procedure was conducted for 30 days, twice daily (morning and night), for 10–15 minutes each time. Two to three drops of oil were applied to the mother's back, from the fifth to sixth ribs, along the spine towards the scapula. A gentle, rhythmic massage was then

performed to stimulate the release of the hormone oxytocin.

Intervention adherence was monitored through weekly home visits by field midwives and daily logs completed by participants. Safety checks were conducted every three days to ensure no skin irritations, pain, or allergic reactions from the oil use. No significant side effects were observed during the study.

Oxytocin Massage Procedure

The oxytocin massage was performed along the spine from the cervical region to the fifth or sixth ribs to stimulate the oxytocin reflex and support breast milk production. The procedure included the following steps:

- **Preparation**
  - Explain the procedure to the mother using simple and clear language.
  - Ensure a comfortable, private, and well-ventilated environment.
  - Prepare necessary tools: FOxy Oil, warm water, washcloth, small towel, documentation sheet, and pen.
  - Perform hand hygiene following the six-step technique.
- **Patient positioning**
  - The mother is seated, leaning forward with arms resting on a table and head supported on arms.
  - Ensure the breasts are uncovered but hanging naturally without tension.
- **Massage procedure**
  - Apply FOxy Oil to both hands.
  - Rub along both sides of the spine using clenched fists with thumbs facing up/forward.
  - Press firmly in small circular motions from the neck to the shoulder blades for 2–3 minutes.
  - Provide comfort and reassurance throughout, adapting the procedure to the mother's physical and emotional condition.
- **Post-procedure care**
  - Wipe the oiled back area with a towel.
  - Sanitize all equipment used.
  - Wash your hands using the six-step technique.
  - Document the procedure and any observations.
- **Professional attitude**
  - Maintain polite, supportive, and respectful interaction.
  - Consider the mother's educational, socioeconomic, and emotional background in providing care.

Data Collection

Data was collected prospectively over a month using self-completed observation sheets completed by respondents and verified by the researcher. Data entry was double-entry and cross-checked to ensure accuracy. Incomplete or missing data were handled using the listwise deletion method.

All data was stored on an encrypted, password-protected computer, to which only the principal investigator had access. Participants' identities were replaced with numeric codes to ensure confidentiality and privacy.

Data Analysis

Data analysis was performed using SPSS software version 26.0. The Kolmogorov–Smirnov test for normality was used, and because the data were not normally distributed, the study of differences between groups was performed using the Mann–Whitney U test. Effect size was calculated using Cohen's d formula to measure the strength of the intervention, with the help of an online calculator (SocSciStatistics Effect Size Calculator). A Cohen's d value of 0.2 is considered small, 0.5 is medium, and ≥0.8 is large.

Statistical assumptions were tested first, with the significance level set at $p < 0.05$ and 95% confidence intervals (CI) reported for each outcome.

Ethical Considerations

Before data collection, all respondents were provided with an explanation of the study's purpose, benefits, and procedures, and signed an informed consent form. This research was conducted per the ethical principles of the Declaration of Helsinki regarding research involving human subjects.

Results

Table 1. Respondent characteristics (n=60)

Variable	Control Group (n = 30)		Experimental Group (n = 30)		Total (n = 60)	
	n	%	n	%	n	%
Age						
< 20 years	5	16.7	3	10.0	8	13.3
20-35 years	20	66.7	24	80.0	44	73.3
>35 years	5	16.7	3	10.0	8	13.3
Parity						
Primigravida	9	30.0	6	20.0	15	25.0
Multigravida	16	53.3	19	63.3	35	58.3
Grandemultigravida	5	16.7	5	16.7	10	16.7
Education						
Junior High School	3	10.0	2	6.7	5	8.3
Senior High School	18	60.0	22	73.3	40	66.7
Coollege	9	30.0	6	20.0	15	25.0
Work						
Housewife	17	56.7	13	43.3	30	50.0
Work	13	43.3	17	56.7	30	50.0

Table 2. Comparison of breast milk volume, wet diapers, and infant weight between experimental and control groups (n = 60)

Variable	Mean ± SD	Min–Max	Mean Rank	Sum of Ranks	U	p-value
Breast milk volume (mL)						
With Foxy Oil	645.83 ± 28.24	600–700	38.33	1150.00	115	< 0.001
Without Foxy Oil	621.37 ± 21.67	580–630	22.67	680.00		
Number of wet diapers (times/day)						
With Foxy Oil	6.97 ± 0.81	6–9	41.37	1241.00	124	< 0.001
Without Foxy Oil	5.87 ± 0.43	5–7	19.63	589.00		
Infant weight (g)						
With Foxy Oil	3160.00 ± 279.59	2550–3800	35.13	1054.00	349	0.039
Without Foxy Oil	3041.67 ± 263.30	2650–4000	25.87	776.00		

Table 3. Distribution of respondents by trend of change in measured variables (n = 60)

Variable	Increased n (%)		Stable		Decreased	
	n	%	n	%	n	%
Breast milk volume (mL)						
With Foxy Oil	28	93.3	2	6.7	0	0.0
Without Foxy Oil	20	66.7	8	26.7	2	6.7
Number of wet diapers (times/day)						
With Foxy Oil	27	90.0	3	10.0	0	0.0
Without Foxy Oil	19	63.3	9	30.0	2	6.7
Infant weight (g)						
With Foxy Oil	26	86.7	4	13.3	0	0.0
Without Foxy Oil	18	60.0	10	33.3	2	6.7

Most respondents were aged 20–35 (73.3%) and multigravida (58.3%), demonstrating characteristics of mothers of active reproductive age and breastfeeding experience. The majority have a high school education (66.7%) and have a balanced distribution of employment between homemakers and working mothers (50% each). The similarity in baseline characteristics between groups suggests that differences in study results were more due to the oxytocin massage intervention with Foxy Oil, rather than to respondent demographic factors (**Table 1**).

Significant differences between the intervention and control groups were found in all measured variables. The volume of breast milk in the group receiving oxytocin massage with Foxy Oil was higher (average 645.83 mL) compared to the group without oil (621.37 mL), with a p value < 0.001. The frequency of wet diapers also increased significantly in the intervention group (6.97 times/day) compared to the control (5.87 times/day), with a p value < 0.001. In addition, infant weight was higher in the Foxy Oil group (3160 g) compared to the control (3041.67 g), with a p value = 0.039. These results indicate that combining oxytocin massage and Foxy Oil significantly increased breast milk production, infant urination frequency, and weight gain (**Table 2**).

Most respondents in the oxytocin massage group with Foxy Oil experienced improvements in all observed variables. A total of 93.3% of mothers showed an increase in breast milk volume, a 90% increase in the frequency of wet diapers, and an 86.7% increase in infant weight. In contrast, in the group without Foxy Oil, the increase in each variable was lower, namely 66.7% for breast milk volume, 63.3% for wet diapers, and 60% for infant weight. These findings confirm that using Foxy Oil in oxytocin massage consistently positively affects breast milk production and infant growth compared to oxytocin massage without oil (Table 3).

Discussion

The results showed that oxytocin massage combined with Foxy Oil significantly increased breast milk volume, diaper frequency, and infant weight compared to oxytocin massage without oil. These findings demonstrate a synergistic effect between mechanical stimulation through oxytocin massage and the hormonal effects of anise oil (Foeniculum vulgare) contained in Foxy Oil, resulting in increased oxytocin reflex and more optimal prolactin secretion.

Physiologically, oxytocin massage works by stimulating the parasympathetic nerves, which activate the posterior pituitary gland to release the hormone oxytocin, which then triggers the milk ejection reflex (Khasanah et al., 2022). Meanwhile, Foxy Oil contains the active compounds anethole and fenkhone, which are phytoestrogens, mimicking the activity

of estrogen and stimulating prolactin secretion through the hypothalamic-pituitary axis (Karma et al., 2024). This dual effect strengthens lactation by increasing alveolar myoepithelial cell contractions and prolactin hormone secretion. Previous research supports these findings. Purnamasari and Hindiarti (2021) reported that the use of fennel oil increased the smoothness of breast milk flow in postpartum mothers, while Rifqiyati and Wahyuni (2019) found that fennel leaf infusion increased the diameter of the alveoli and lactiferous ducts in the mammary glands of lactating animals. In addition, aromatherapy research also shows that the volatile components of fennel oil can activate the limbic system through olfactory stimulation, reduce stress, and increase oxytocin secretion (Zeeshan et al., 2023).

However, some studies have shown conflicting results. Ahmadi et al. (2020) reported that fennel supplementation did not always significantly increase breast milk volume, especially with varying doses and extraction methods. This difference may be due to contextual factors, such as frequency of application, massage technique, and the mother's level of emotional relaxation, which also influence the oxytocin reflex. Therefore, the optimal effect of the combination of oxytocin massage and Foxy Oil may also be influenced by family support and the mother's psychological state during breastfeeding.

A study stated that although direct literature on wet diapers is limited, these findings are consistent with research on oxytocin massage, which enhances the breast milk let-down reflex, causing infants to nurse more frequently and receive greater fluid intake (Purnamasari & Hindiarti, 2023). Pediatric health information emphasises that healthy infants typically produce 6–8 wet diapers per day, indicating adequate hydration and sufficient nutrition from breast milk (MedShun, 2025).

Optimal breastfeeding practices, including exclusive breastfeeding, have been shown to reduce the risk of stunting by up to 13%. Practical indicators, such as the number of wet diapers, help healthcare providers ensure that infants are receiving adequate intake, allowing for early intervention if signs of insufficient nutrition are detected (Victora et al., 2021).

Monitoring infant growth through monthly weight measurements is an essential strategy for the early detection of undernutrition risk. Insufficient weight gain or loss during the early months of life may indicate inadequate intake, infections, or other conditions contributing to stunting (WHO, 2023b). This suggests that the early stages of life represent a “window of opportunity” for stunting prevention(WHO, 2023a). Furthermore, infants with low weight gain during the first six months are at a higher risk of stunting in early childhood. Therefore, monitoring infant weight is a strategic step for the early detection and prevention of stunting (Thahir et al., 2023).

In terms of implementation, this intervention has excellent potential in midwifery practice and public health programs. Oxytocin massage with Foxy Oil is a safe, easy-to-perform, and low-cost non-pharmacological method that can be integrated into lactation education in primary care facilities such as community health centres (Puskesmas), maternity clinics, and integrated health posts (Posyandu) (Yuliani et al., 2022)Intervention increases breast milk production, contributes to infant weight gain, and prevents stunting in the first 1,000 days of life.

However, this study has several limitations. The relatively small sample size (n=60) limits the generalizability of the

results to a broader population. The study only evaluated the short-term effects on breast milk production over one month without directly measuring oxytocin and prolactin hormone levels. Furthermore, the use of a self-observation sheet has the potential to introduce reporting bias. Future studies should use randomised designs with larger sample sizes, hormonal biomarker measurements, and longitudinal monitoring to assess the long-term impact on infant growth and stunting prevention.

Implications and limitations

The findings contribute conceptually to midwifery science by expanding the theoretical understanding of lactation support through the integration of fennel oil–based aromatherapy as an additional stimulus for maternal relaxation, oxytocin reflex activation, and prolactin secretion, thereby enriching existing models of physiological breastfeeding enhancement. However, the study's small sample size, purposive sampling method, short observation period, lack of blinding, and reliance on self-reported data limit the robustness and generalizability of its conclusions, indicating the need for future research employing randomized designs, objective hormonal measurements, and extended follow-up to strengthen the evidence base.

Relevance to Practice

The results of this study can be directly applied in midwifery practice and maternal-child health programs. Oxytocin massage with Foxy Oil is recommended as a routine lactation support intervention in community health centres (Puskesmas), maternity clinics, and integrated health posts (Posyandu). Midwives can train husbands or family members to perform massage twice daily postpartum to increase the oxytocin reflex and breast milk production. Furthermore, health departments can develop community-based training to integrate this method into programs to prevent stunting and increase the success of exclusive breastfeeding.

Conclusion

This study demonstrated that combining oxytocin massage with Foxy Oil significantly increased breast milk volume, diaper frequency, and infant weight compared to massage without oil. This effect suggests a synergy between the mechanical stimulation of massage and the phytoestrogen content of fennel oil, which enhances the oxytocin reflex and prolactin secretion. This intervention is safe, easy to implement, and effective in supporting exclusive breastfeeding and preventing stunting. Therefore, Foxy Oil massage is suitable for integration into midwifery practice and maternal-child health programs at the primary care level.

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CrediT Authorship Contributions Statement

Marta Armita Br Silaban: Conceptualization, Methodology, Supervision

Novita Andriani Br Manjorang: Software, Validation, Formal Analysis, Writing - Review & Editing

Debby Chintya Yun: Investigation, Resources, Data Curation, Project Administration

Erin Padilla Siregar: Writing - Original Draft, Review & Editing
Mutia Pratiwi: Writing - Original Draft
Sri Nengsih Sihombing: Visualization, Funding Acquisition

Conflicts of Interest

There is no conflict of interest.

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References

Ahmadi, F. B., Pourghorban, A., Kharghani, S., Shahmirzadi, A. R., Haghjoyan, S. M., Heydari, O., Babakhanian, F., & Ghahremani, S. (2020). The effect of fennel and black seed on breast milk, prolactin levels and anthropometric index in human and animal samples: a review. *International Journal of Pediatrics*, *8*(3), 11063–11069. https://doi.org/10.22038/ijp.2020.46722.3790

Bappenas. (2019). Strategi Nasional Percepatan Pencegahan Anak Kerdil (Stunting) Periode 2018-2024. In *Bappenas* (Vol. 11, Issue 1).

BPS. (2025). *Profil Kesehatan Ibu Dan Anak 2024* (Vol. 10).

Dinkes Sumut. (2024). Profil Kesehatan Provinsi Sumatera Utara Tahun 2023. In *Profil Kesehatan Provinsi Sumatera Utara Tahun 2023*.

Ekacahyaningtyas, M., Mustikarani, I. K., & Utami, R. D. P. (2020). Pijat Oksitosin Menggunakan Fennel Essential Oil Mempercepat Pengeluaran Kolostrum Ibu Post Partum Sectio Cesarea. *Intan Husada: Jurnal Ilmu Keperawatan*, *8*(2), 12–22. https://doi.org/10.52236/ih.v8i2.186

Karma, N., Rathore, P., Choudhry, K., & Abstract, M. (2024). a Review on Antifungal Activity of Medicinal Plants. *International Research Journal of Modernization in Engineering Technology and Science*, *11*(2), 826–833. https://doi.org/10.56726/irjmets50915

Khasanah, U., Febrian Shalas, A., & Rifai Pratita Ihsan, B. (2022). Peningkatan Nilai Ekonomi Tanaman Adas (Foeniculum vulgare) Melalui Penyulingan Minyak Atsiri. *Tri Dharma Mandiri*, *2*(2), 63–69. https://doi.org/10.21776/ub.jtridharma.2022.002.02.63

Manjorang, N. A. A. H. (2023). EXPERIENCES OF FIRST-TIME MOTHER IN EXCLUSIVE BREAST- FEEDING : A SCOPING REVIEW. *Jurnal Aisyah: Jurnal Ilmu Kesehatan*, *9*(63), 15–27.

Manjorang, N. A. A. H. Y. S. (2024). PENGALAMAN IBU PRIMIPARA DALAM MEMBERIKAN AIR SUSU IBU (ASI) EKSKLUSIF DIPUSKESMAS GAMPING II. *Prepotif : Jurnal Kesehatan Masyarakat*, *8*(3), 4869–4888.

Nurindah Sari, R., Nurhanifah, T., & Nirmala Jona, R. (2023). Efektivitas Pijat Oksitosin dengan Minyak Adas

(Fennel Essensial Oil) Terhadap Produksi ASI. *Health Research Journal of Indonesia (HRJI)*, *1*(6), 237–248.

Purnamasari, K. D., & Hindiarti, Y. I. (2021). Metode Pijat Oksitosin, Salah Satu Upaya Meningkatkan Produksi ASI Pada Ibu Postpartum. *JURNAL KESEHATAN PERINTIS (Perintis's Health Journal)*, *7*(2), 1–8. https://doi.org/10.33653/jkp.v7i2.517

Purnamasari, K. D., & Hindiarti, Y. I. (2023). The Effect of Oxytocin Massage on Weight among Infant in Sub-Urban and Rural Areas. *International Journal of Nursing and Health Services (IJNHS)*, *6*(5), 303–308. https://doi.org/10.35654/ijnhs.v6i5.747

Rifqiyati, N., & Wahyuni, A. (2019). Fennel (Foeniculum vulgare) Leaf Infusion Effect on Mammary Gland Activity and Kidney Function of Lactating Rats. *Nusantara Bioscience*, *11*(1), 101–105. https://doi.org/10.13057/nusbiosci/n110117

Silaban, M. A., S, D., Sipayung, I. D., & Lestari, A. (2023). Hubungan Pengetahuan Dan Paritas Ibu Dengan Pemberian Makanan Prelakteal Di Desa Bangun Rejo Kecamatan Tanjung Morawa Kabupaten Deli Serdang 2023. *An-Najat : Jurnal Ilmu Farmasi Dan Kesehatan*, *1*(2).

Silaban, M. A., Sinaga, E. D., Manjorang, N. A., Rachmat, A., Saragi, H., & Aisyah, S. (2025). Pengaruh Pijat Oksitosin Terhadap Kelancaran Produksi ASI pada Ibu Bersalin di Klinik Afisya Kabupaten Deli Serdang Provinsi Sumatera Utara Tahun 2025 STIKes Mitra Husada Medan , Indonesia. *Corona: Jurnal Ilmu Kesehatan Umum, Psikolog, Keperawatan Dan Kebidanan*, *3*, 167–173.

Singh, R., Mohanasundari, S. K., Meena, S. K., B, R., Vashishtha, N., Pratheeba, Mrs., & Preethi, Mrs. (2024). Effective Approaches to Addressing Challenges in Exclusive Breastfeeding. *International Journal For Multidisciplinary Research*, *6*(3), 1–19. https://doi.org/10.36948/ijfmr.2024.v06i03.20844

Thahir, A. I. A., Li, M., Holmes, A., & Gordon, A. (2023). Exploring Factors Associated With Stunting in 6-Month-Old Children: A Population-Based Cohort Study in Sulawesi, Indonesia. *Nutrients*, *15*(15). https://doi.org/10.3390/nu15153420

UNICEF. (2021). *Protecting child rights in a time of crises*.

UNICEF, & WHO. (2023). Global Breastfeeding Scorecard 2023 Rates Of Breastfeeding Increase Around The World Through Improved Protection And Support. *World Health Organization (WHO)*, 1–9.

Victora, C. G., Christian, P., Vidaletti, L. P., Gatica-Domínguez, G., Menon, P., & Black, R. E. (2021). Revisando la Desnutrición Materna E Infantil en Países de Ingresos Bajos Y Medios: Avances Variables Hacia Una Agenda Inconclusa. *The Lancet*, *397*(10282), 1388–1399. https://doi.org/10.1016/S0140-6736(21)00394-9.Revisiting

Yuliani, N. R., Larasati, N., Setiwandari, & Nurvitriana, N. C. (2022). Peningkatan Produksi ASI Ibu Menyusui dengan Tatalaksana Kebidanan Komplementer. *Seminar Nasional Hasil Riset Dan Pengabdian*, *III*(3), 17–27.

Zeeshan, A., Akram, H., Qasim, S., Naseer, A., Nazar, F., & Rafique, O. (2023). The Healing Touch of Foeniculum vulgare Mill. (Fennel): A Review on Its Medicinal Value and Health Benefits. *Journal of Health and Rehabilitation Research*, *3*(2), 793–800.

https://doi.org/10.61919/jhrr.v3i2.226