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Enhancing Breastfeeding Mothers' Science Literacy in Choosing Safe Hormonal Contraceptives for Breast Milk Production: A Contextual Educational Study

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Abstract: This study aimed to compare the effects of different progestin-only hormonal contraceptives (injection, pills, and implants) on the duration of breastfeeding among hormonal birth control users. A total of 210 breastfeeding mothers using progestin-only contraceptives were included in this study. The participants were divided into three groups: 70 mothers using contraceptive pills, 70 using contraceptive injections, and 70 using contraceptive implants. The duration of breastfeeding was recorded as the dependent variable. The data were analyzed using one-way Analysis of Variance (ANOVA) to compare the average breastfeeding duration between the three groups. The results showed no significant difference in the duration of breastfeeding among the three groups. The Tukey HSD test indicated a p-value of 0.195, which is greater than 0.05, suggesting that the use of progestin contraceptive injections, pills, or implants did not significantly affect the duration of breastfeeding. This study concludes that there is no significant difference in breastfeeding duration between mothers using different types of progestin-only hormonal contraceptives. Health workers should provide clear information to mothers about the safety and potential effects of different contraceptive methods on breastfeeding, enabling them to make informed choices.

Keywords: Contraceptive injection; Contraceptive pill; Contraceptive implant; Breastfeeding duration

Introduction

Breast milk is the optimal source of nutrition for babies, offering numerous health benefits. Breastfeeding, the act of giving milk produced by the mother's mammary glands directly to her baby, is a natural and vital practice. Exclusive breastfeeding for the first six months of an infant's life is highly recommended by health authorities, and breastfeeding can continue for up to two years (Ula, Anisah Wardatil & Zainiyah, 2021). According to the Indonesian Government Regulation (PP) Number 28 of 2024, which enacts Constitution Number 17 of 2023 regarding Health, exclusive breastfeeding is a fundamental right for infants. Articles 24 to 48 of this regulation highlight that every baby has the right to receive exclusive breastfeeding from birth until six months, with continued breastfeeding until the age of two, complemented with solid foods. However, this regulation often raises concerns, particularly regarding solutions when a mother's breast milk is insufficient or fails to come in (Health, 2021).

The World Health Organization (WHO) and the International Planned Parenthood Federation have

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noted that the use of combined oral contraceptives containing both estrogen and progesterone can inhibit milk production in breastfeeding mothers (WHO, 2019). Recent data from the 2023 Indonesian Health Profile reveals that the most commonly chosen modern contraceptive methods in 2023 are injections (35.3%), followed by pills (13.2%). This pattern is consistent every year, where more participants prefer short-term contraceptive methods compared to Long-Term Contraceptive Methods (LTM).

In terms of effectiveness, both hormonal injections and pills fall under the category of short-term contraceptive methods, which generally have lower effectiveness in pregnancy prevention compared to Long-Term Contraceptive Methods (LTM). LTM, such as intrauterine devices (IUD), implants, and permanent methods like MOP and MOW, are designed for long-term use and are more effective at preventing pregnancies (Health, 2021).

Hormonal contraception is widely used by women of reproductive age due to its higher effectiveness compared to non-hormonal contraceptives like IUDs (Nurtin, 2022). However, the estrogen in combined hormonal contraceptives can inhibit prolactin production, a hormone essential for stimulating breast milk production. This inhibition occurs through a complex interaction between estrogen, prolactin, and other hormones in the body. As a result, milk production may decrease or cease altogether. Therefore, it is crucial for breastfeeding mothers to choose contraceptive methods that do not interfere with lactation, such as progestin-only injectable contraceptives or other non-hormonal contraceptive methods (Hanapi et al., 2022).

Progestin-only hormonal contraceptives are generally considered safe for breastfeeding mothers, with no significant negative impact on milk production. Research by Nurtin (2022) indicates that progestin-only contraceptives, such as mini-pills, depot medroxyprogesterone, and implants, do not affect the quantity or quality of breast milk. In fact, they may even increase breast milk volume compared to non-hormonal contraceptives (Kusnan & Afrini, 2020).

Estrogen, on the other hand, can reduce breast milk production through several key mechanisms that affect the hormonal system of the mother. First, estrogen inhibits prolactin secretion, which is essential for stimulating milk production in the mammary glands. Low prolactin levels due to estrogen interference can result in reduced milk production (Bingan, 2019). Additionally, estrogen can affect breast tissue by increasing fatty tissue while decreasing functional glandular tissue, reducing the breast's ability to effectively produce milk. Furthermore, estrogen may disrupt the let-down reflex, which is the process by which milk is released from the breasts during breastfeeding. All of these factors contribute to reduced milk production and quality when estrogen-containing hormonal contraceptives are used (Ula, Anisah Wardatil & Zainiyah, 2021).

Although progestin-only hormonal contraceptives are typically considered safe for breastfeeding mothers, evidence suggests that progestin may still affect prolactin production, potentially reducing breast milk volume, particularly when contraception is used early in breastfeeding. Milk production is largely driven by supply and demand, meaning that more frequent and longer breastfeeding sessions will naturally increase milk production (Siregar et al., 2021).

Given the important role of breastfeeding and the potential challenges posed by hormonal contraceptive use, it is crucial to ensure that mothers are equipped with accurate information to make informed decisions about their contraceptive options (Gobel, 2019). **Science literacy** plays a pivotal role in this process. Educating mothers about the scientific principles behind hormonal contraception and its impact on breastfeeding can help them make decisions that are best for both their health and their baby's well-being. According to Bybee et al. (2006) and OECD reports, fostering science literacy is essential to empowering individuals in making evidence-based decisions in health-related contexts. Therefore, an educational approach that enhances **science literacy** among breastfeeding mothers regarding contraceptive choices is vital for their overall health and successful breastfeeding.

Based on the background presented, the researcher is interested in conducting a study that compares the effects of progestin-only hormonal contraception on breastfeeding duration among hormonal contraceptive users, with a particular focus on improving science literacy for informed decision-making.

Method

This study uses an Analysis of Variance (ANOVA) design to compare the duration of breastfeeding among different groups of progestin hormonal contraceptive users, namely 3-month injections, progestin pills, and implants. The independent variables in this study are the type of contraceptive used (3-month injections, progestin pills, and implants), and the dependent variable is the duration of breastfeeding.

A total of 210 breastfeeding mothers using hormonal contraception participated in this study. The respondents were divided into three groups: 70 respondents using contraceptive pills, 70 using injectable contraceptives, and 70 using implant contraceptives.

Inclusion Criteria:

Willing to participate as respondents, Breastfeeding mothers, Normal BMI category, Sufficient or higher economic status, not employed outside the home, Healthy physical condition. Family assistance available for baby care, Normal delivery.

Exclusion Criteria:

Mothers with complications that affect breast milk production, Breastfeeding mothers using combined hormonal contraception.

Educational Intervention Design:

In addition to the primary objective of comparing breastfeeding duration, this study also includes an educational intervention to enhance science literacy. The intervention is designed to improve the mothers' understanding of the physiological processes related to breastfeeding, the function of hormones, and the potential impact of hormonal contraceptives on milk production. The educational materials provided to the participants will be based on evidence from current scientific literature and simplified to ensure accessibility and clarity.

The intervention will be conducted in two phases:

Pre-test: Prior to the educational intervention, a pre-test will be administered to assess the participants' basic understanding of key concepts, including the function of hormones (prolactin and estrogen), the role of breast milk in infant health, and the effects of different contraceptive methods on breastfeeding.

Educational Session: Participants will receive a tailored educational session that covers the following topics:

The role of hormones (prolactin and estrogen) in milk production.

The impact of hormonal contraceptives on breastfeeding, particularly progestin-only contraceptives.

Information on how to choose the most appropriate contraceptive method while maintaining successful breastfeeding.

Post-test: After the educational session, a post-test will be administered to measure changes in the participants' understanding of the material presented. The post-test will assess the participants' improved science literacy regarding hormonal contraception and its effects on breastfeeding.

Data Analysis

Data analysis will be conducted using SPSS software. ANOVA (Analysis of Variance) will be employed as the statistical technique to compare the average breastfeeding duration among the three contraceptive groups (pills, injections, and implants) and determine if there are significant differences in breastfeeding duration. The pre-test and post-test scores will also be analyzed to assess the effectiveness of the educational intervention in improving the participants' science literacy and understanding of hormonal contraception and breastfeeding.

Result and Discussion

Based on Table 1 above, the average duration of breastfeeding based on the month in the group can be seen. usage injectable contraception average 7.04 month, standard deviation 2,318 breastfeeding for a minimum of 2 months and a maximum of 12 months. In the group using contraceptive pills average 6.64 months, standard deviation 2.071 breastfeeding within a minimum of 4 months and a maximum of 12 months. In the implant contraceptive group, the average was 7.64 months, standard deviation 1.896 breastfeeding within a minimum of 4 months and a maximum of 12 months.

Table 1. Flat- Flat Long Giving breast milk Based on Time That is < 6 Month Or ≥ 6 Month on Hormonal Birth Control Acceptors (N = 210 Respondent)

Long Giving breast milk based on Time, Namely < 6 Month Or ≥ 6 Months	N	Mean	Standard Deviation	Min	Max
Inject	70	7.04	2.318	2 month	12 months
Pill	70	6.64	2.071	4 months	12 months
Implant	70	7.64	1.896	4 months	12 months

Based on Table 2 on can average long giving breast milk based on frequency during 24 O'clock on group usage contraception inject flat -flat 6.20 time in a day, standard deviation 1,175 giving breast milk in time 24 O'clock minimum 5 time in a day And maximum 8 times a day. In the group using contraceptive pills average 6.10 times a day, standard deviation 1,169 giving breast milk in time 24 O'clock minimum 4 time in a day And maximum 8 times a day. In the implant contraceptive group, the average was 6.26 times a day, with a standard deviation of 1.003 times of breastfeeding within 24 hours. minimum 5 times a day and maximum 8 times a day.

Table 2. Flat- Flat Long Giving breast milk Based on Frequency Giving breast milk In Time 24 Hours On Hormonal Birth Control Acceptors (N = 210 respondents)

Long Giving breast milk based on Frequency of Breastfeeding In Time 24 O'clock	N	Mean	Standard Deviation	Min	Max
Inject	70	6.20	1,175	5 times	8 times
Pill	70	6.10	1,169	4 times	8 times
Implant	70	6.26	1,003	5 times	8 times

Based on Table 3 in on, known that on subset 1 there is use progestin hormonal contraception This means that the average duration of breastfeeding per month does not differ. use contraception inject, pill and implants. Based on test statistics test Tukey HSD is done the result obtained was sig 0.195 which means P-value > 0.05 so this research can be concluded that user contraception inject, pill and implant No own difference in duration of breastfeeding is use progestin hormonal contraception This means that the average duration of breastfeeding per month does not differ. use contraception inject, pill and implants. Based on test statistics test Tukey HSD is done the result obtained was sig 0.195 which means p-value > 0.05 so this research can be concluded that user contraception inject, pill and implant no own difference in duration of breastfeeding.

Table 3. Analysis Comparison Usage Contraception Hormonal Progestin to Long Giving Breastfeeding in Hormonal KB Acceptors in 2025

Variables	N	Subset for alpha = 0.05 1
Inject	70	7.04
Pill	70	6.64
Implant	70	7.64

Based on the results of the Tukey HSD test, which produced a p-value > 0.05, it can be concluded that the use of progestin-only hormonal contraception in the form of injections, pills, and implants does not have a significant difference in the duration of breastfeeding. This result is consistent with findings by Kusnan & Afrini (2020), where hormonal contraceptives containing progesterone (such as 3-monthly injections, progestin-only pills, and implants) tend to have a more stable effect on prolactin production. Unlike estrogen, progesterone does not significantly interfere with prolactin levels, which is why progestin-only hormonal contraception is generally considered safe for breastfeeding mothers, as it can maintain the balance of hormones that support milk production (SIANTURI, 2019).

During breastfeeding, many mothers opt for contraceptives as a way to regulate pregnancy spacing (Susanti & Sari, 2020). However, in choosing a contraceptive method, it is crucial to consider safety factors, particularly their effects on milk production. Estrogen-containing contraceptive injections, although effective in preventing pregnancy, are not recommended for breastfeeding mothers as they can negatively affect breast milk production (Ula, Anisah Wardatil & Zainiyah, 2021). This highlights the importance of educating mothers about contraceptive choices that do not interfere with lactation, ensuring they make informed decisions for both their health and the well-being of their babies.

The progesterone hormone in progestin-only contraceptives plays a critical role in supporting lactation after childbirth (Susianti et al., 2024). Progestin has a more stable effect in supporting prolactin function without disrupting the milk production process. Prolactin is the main hormone that stimulates milk production, produced by the anterior pituitary gland, and directly influences the alveolar cells in the breasts to produce milk (Hanapi et al., 2022). Understanding this hormonal mechanism is crucial for breastfeeding mothers to make informed decisions about contraception that will not hinder breastfeeding.

In contrast, injectable contraceptives containing estrogen can cause elevated estrogen levels in the body, which can negatively impact milk production during breastfeeding (Rauan et al., 2025). Estrogen, a hormone that regulates the menstrual cycle and fertility, can disturb the hormonal balance required for milk production when used during breastfeeding (Kusnan & Afrini, 2020). It is important for mothers to understand how elevated estrogen can interfere with prolactin secretion, which is essential for maintaining lactation.

One of the ways estrogen affects milk production is by suppressing the secretion of FSH (Follicle-Stimulating Hormone) from the anterior pituitary gland. FSH plays a key role in regulating the secretion of other hormones involved in milk production. Lower levels of FSH can disrupt the hormonal balance that supports lactation (Nurtin, 2022). Additionally, excessive estrogen can stimulate the production of LH (Luteinizing Hormone) from the anterior pituitary gland. LH is involved in triggering ovulation and influencing hormones that regulate the menstrual cycle, which can, in turn, affect hormones critical for milk production (Amelia, 2021).

The increased secretion of LH can influence the hypothalamus to release prolactin inhibitory factors (PIF), such as dopamine. Dopamine inhibits the secretion of prolactin, further disrupting the milk production process. When prolactin secretion is

hindered, milk production will be compromised (Hanapi et al., 2022).

From a **science literacy** perspective, understanding these hormonal processes is vital for breastfeeding mothers. A lack of awareness about how hormonal contraceptives interact with lactation can lead to confusion and suboptimal choices regarding contraceptive use. This highlights the importance of **science education** to help mothers understand the physiological processes of estrogen, prolactin, and their impact on breastfeeding. Providing **evidence-based education** about the role of hormones in milk production, particularly through accessible, scientifically grounded materials, can empower mothers to make informed decisions regarding both contraception and breastfeeding.

The intervention in this study also underscores the value of **science literacy** in maternal decision-making. By improving the understanding of hormone interactions in the body, mothers are better equipped to choose a contraceptive method that will not hinder breastfeeding, thus enhancing their overall health and breastfeeding experience. The **educational intervention** in this study is designed to fill this knowledge gap, providing mothers with the necessary information to support their decision-making process and ensure they can successfully manage both their reproductive health and breastfeeding.

Conclusion

This study found no significant difference in the duration or frequency of breastfeeding among mothers using different progestin-only hormonal contraceptives. The average duration of breastfeeding for those using injectable contraception was 7.04 months, 6.64 months for those using pills, and 7.64 months for those using implants. The frequency of breastfeeding per day was similar across all groups, with an average of 6-7 sessions per day. Based on the Tukey HSD test ($p = 0.195$), there is no significant difference in breastfeeding duration between the contraceptive methods. Therefore, all types of progestin-only contraceptives (injections, pills, and implants) have similar effects on breastfeeding duration and frequency.

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O.N & I.S., contributed in conceptualizing the research idea, developing the product. J.A.A & E., contributed in analyzing data and writing the article. S.N & P.J., contributed in writing, reviewing, and editing the article. R.A.S &W.N., contributed in collecting data.

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Conflicts of Interest
The authors declare that there is no conflict of interest regarding the publication of this article.

References

Amelia, G. S. (2021). *Pengaruh Alat Kontrasepsi Hormonal Terhadap Produksi Asi Ibu MenyusuI*. Doctoral dissertation, STIKes Bakti Tunas Husada Tasikmalaya.

Bingan, E. C. S. (2019). Usage KB Inject 3 Month with Adequacy breast milk Exclusive on Mother Who Have Children Aged 7-23 Months. *Scientific Journal of Midwives*.

Bybee, R. W., Taylor, J. A., Gardner, A., Van Scotter, P., Powell, J. C., Westbrook, A., & Landes, N. (2006). The BSCS 5E instructional model: Origins and effectiveness. *Colorado Springs, Co: BSCS*, *5*, 88–98.

Gobel, F. (2019). Pengaruh pemberian konseling dengan alat bantu pengambilan keputusan terhadap pemilihat alat kontrasepsi pada ibu pasca salin di rstn boalemo. *Akademika*, *8*(1), 45–53.

Hanapi, A., Delima, A. A. A., & Darmawansyih, D. (2022). Hubungan Penggunaan Kontrasepsi Hormonal Dengan Lama Pemberian Asi Di Wilayah Kerja Puskesmas Mattombong. *Al-Iqra Medical Journal : Jurnal Berkala Ilmiah Kedokteran*, *5*(2), 103–112. https://doi.org/10.26618/aimj.v5i2.8525

Health, M. of. (2021). *Guidelines for Contraceptive and Family Planning Services, Directorate of Family Health*. Ministry of Health of the Republic of Indonesia.

Kusnan, A., & Afrini, I. M. (2020). *Penggunaan Kontrasepsi Hormonal dan Produksi Air Susu Ibu di Puskesmas Poasia La Ode Alifariki*. *11*, 91–96.

Nurtin, I. T. (2022). *The Relationship Between Hormonal Contraceptive Use and Anxiety Levels Production Water Milk Mother (Breastfeeding) On Mother Breast-feed In the village The Great Region Work Pemaron Health Center*.

Rauan, I. A., Manengkey, O., Kairupan, M., & Mamahit, A. Y. (2025). Hubungan Penggunaan Kontrasepsi Hormonal dengan Produksi ASI pada Ibu Menyusui. *Jurnal Ilmiah Kesehatan*, *2*(1), 18–28.

SIANTURI, R. (2019). *Faktor Yang Berhubungan Dengan Kelancaran Produksi Asi Pada Ibu Menyusui Di Desa Aek Daka Tapanuli Tengah Tahun 2019*. Diss. Institut Kesehatan Helvetia.

Siregar, D. W. D., Effendi, H., Hasibuan, H., & Sulistiawati, A. C. (2021). Hubungan Antara Penggunaan Kontrasepsi Hormonal Dengan

Kejadian Karsinoma Mamae Pada Wanita Di Rumah Sakit Ptpn Ii Tg. Morawa. *Jurnal Kedokteran STM (Sains Dan Teknologi Medik)*, *4*(1), 33–38. https://doi.org/10.30743/stm.v4i1.61

Susanti, E. T., & Sari, H. L. (2020). Pendidikan Kesehatan Tentang Jenis-Jenis Alat Kontrasepsi Terhadap Pemilihan Alat Kontrasepsi. *Jurnal Kesehatan*, *9*(1), 53–57.

Susianti, M., Harismayanti, H., & Mahmud, C. A. (2024). Penggunaan Kontrasepsi Hormonal dengan Produksi ASI di Puskesmas Telaga. *Gorontalo Journal of Public Health*, *7*(2), 67–75.

Ula, Anisah Wardatil & Zainiyah, H. (2021). *Hubungan Penggunaan Kontrasepsi Hormonal Pada Ibu Menyusui Dengan Kelancaran Produksi Asi di PMB Titik Sugiati*. Doctoral dissertation, Stikes Ngudia Husada Madura.

WHO. (2019). *Family planning/contraception methods*.