Levels of Oxytocin Hormone During Breastfeeding

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KEYWORDS

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ABSTRACT

Background: The rate of successful early breastfeeding in new mothers remains low. Various factors influence the lactation process, including the levels of prolactin and oxytocin hormones in the body. Prolactin and oxytocin are crucial for lactation, with oxytocin being released in response to nipple stimulation when the baby suckles, facilitating milk ejection. Purpose: It is the purpose of this research to determine the levels of the hormone oxytocin in postpartum moms who are nursing their infants entirely. Methods: A quantitative cross-sectional design was used for the research project. It involved measuring oxytocin hormone levels during the third day after birth in postpartum women by the collection of blood samples and the subsequent analysis of those samples using the ELISA technique. Researchers also assessed breastfeeding success using observation sheets. The participants included 30 postpartum mothers who had undergone uncomplicated cesarean deliveries. Statistical tests were used to analyze the data on oxytocin levels and breastfeeding success. Results: A total of 53% of postpartum mothers were able to breastfeed successfully without encountering significant issues. The average oxytocin level in these mothers on the third day postpartum was found to be 786.8 pg/ml. Conclusion: The significant factor was found to be 0.002 after the data analysis was performed, indicating a significant relationship between oxytocin hormone levels and breastfeeding.

1. Introduction

Water, alpha-lactalbumin, casein, lactose, amino acids, and antibodies that guard against bacteria, fungus, and viruses are all found in breast milk. (Hellen Febri Yanti, Eva Nurida, and Wike Sri Yohanna, 2018). Breastfeeding can be initiated as early as possible for newborns, a practice known as early initiation of breastfeeding (EIBF). This approach aims to increase the rates of exclusive breastfeeding for up to six months. However, several challenges may arise during implementation, such as the mother feeling exhausted after childbirth and needing time to recover, the absence of milk in the initial days, and experiencing labor pain or breast discomfort. According to the study, on the first day after labor, 6% of postoperative moms said their breast milk had not arrived, 13% complained of having a low milk supply, and 64% experienced difficulties with breastfeeding, leading them to opt for formula milk. Additionally, 17% of postpartum mothers experienced bleeding (Hadawiyah, Satra Yunola, and Helni Anggraini, 2021). In Indonesia, in 2021, although there were 2.3 million infants under the age of six months, only 52.5%, or almost half, were entirely breastfed. This represents a 12% decrease from 2019. Along with the decline in exclusive breastfeeding rates, also, the proportion of mothers who started nursing their babies at an early age (also known as EIBF) decreased from 58.2% in 2019 to 48.6% in 2021 (Kemenkes RI, 2019). Mothers often follow cultural and traditional practices for postpartum care, including breastfeeding. However, some mothers face challenges in breastfeeding due to being influenced by myths that undermine their confidence in their ability to provide breast milk. This lack of confidence can lead to a decrease in oxytocin levels, which in turn delays milk production after childbirth, prompting the mother to resort to formula feeding due to insufficient milk supply (Rohmah, M., Wulandari, A., and Sihotang, D. W., 2019). The production of breast milk starts with the initial stimulation that occurs when the baby latches onto the mother's nipple. Frequent breastfeeding enhances milk production (Rayhana and Sufriani, 2017). Two key hormones are crucial for breastfeeding: prolactin, milk production, and oxytocin, which makes milk ejection easier, both contribute to increased milk produce. In the same way that prolactin is activated by the nerve endings in the breast during the process of sucking, oxytocin is created by the posterior pituitary gland. The oxytocin reflex, often known as the milk ejection reflex, is the name given to this reaction. Oxytocin is that hormone that causes myoepithelial cells in the breast to expand, which in turn allows the breast to produce milk. Following this reaction, the newborn will only release milk when it is desperately required by the infant. It is impossible for milk to be evacuated from the alveoli even if they are full of

it if there is not enough oxytocin. Prolactin and oxytocin must combine their efforts to achieve optimal production of milk. A baby will not receive enough breast milk if only prolactin is present, as milk will not be ejected properly without adequate oxytocin, despite high levels of prolactin (Sherwood, LZ., 2014). Thus, to investigate the connection between oxytocin levels and nursing, the purpose of this research.

2. Methodology

The technique of research used in this study was a qualitative longitudinal approach. The amount of the hormone oxytocin served as the independent variable, while nursing served as the objective that was dependent in this study. The participants consisted of 30 postpartum mothers on the third day after delivery, who had experienced uncomplicated labor and postpartum periods (Ramana & Ravisankar, 2024). On the third day after giving birth, the levels of oxytocin in postpartum women were measured, and in addition, the mothers' nursing activities were observed (Aruna et al., 2024). To measure oxytocin levels, blood samples were collected from the mothers on day 3. To qualify for blood sampling, postpartum mothers needed to satisfy the inclusion requirements listed below: Women who had cesarean deliveries that were routine and did not present any complications throughout the postpartum period. Postpartum mothers with healthy babies who did not experience complications during labor or the immediate postnatal period. The blood samples were then analyzed using the ELISA method (Chatterjee et al., 2024). Breastfeeding was assessed using an observation sheet. Initially, oxytocin levels were measured and analyzed with the ELISA method [21]. The processing of blood samples took place in the university laboratory. Data on breastfeeding was collected through observations made by researchers using the observation sheets. The next phase involves analyzing oxytocin hormone levels from the ELISA test in relation to breastfeeding observations. An analysis of the relationship between oxytocin levels and nursing was carried out with the use of statistical techniques. In the designation 093/010/VII/EC/KEP/LCBL/2023, this research has been granted ethical approval.

3. Results and discussion

T The breastfeeding process was evaluated on the third day after delivery in this research, and the participants were observed to examine it. During this time, many postpartum mothers face challenges with breastfeeding as they adapt to new roles and undergo recovery from childbirth.

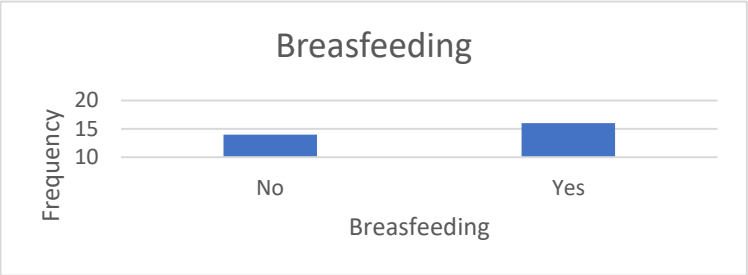

Figure 1. Table of Frequencies for Nursing Mothers

Based on the figure, it shows that as many as 53% of respondents succeeded in breastfeeding in the first 3 days postpartum, so the baby only got breast milk for the first 3 days of life. While there were 47% of respondents who were unable to breastfeed until the third day. There are many factors that influence this, so that up to day 3 the baby has received additional supplements besides breast milk.

Table 1. Oxytocin Hormone Levels in Postpartum Women on Day 3

Variable	Minimum	Maximum	Mean	Std. Deviation
Hormone oxytocin	478.3	920.3	786.893	134.8020

The results are shown in the table above, which of examining oxytocin levels for postpartum mothers

on day 3 have an average value of 786,893. Milk production begins after childbirth, with two key hormones essential for sustaining lactation: Prolactin stimulates the production of milk, whereas oxytocin causes the expulsion of milk. Letdown, or milk ejection, involves the milk ducts and is stimulated by neuroendocrine reflexes activated by sucking. Through sucking, oxytocin and prolactin are released. The synthesis of prolactin by the anterior pituitary gland is controlled by two hormones that are produced by the hypothalamus: prolactin-inhibiting hormone (PIH), now identified as dopamine, and prolactin-releasing hormone (PRI-1). The levels of prolactin in maternal serum during the early postpartum period can influence milk production. Oxytocin remains a crucial hormone for breastfeeding.

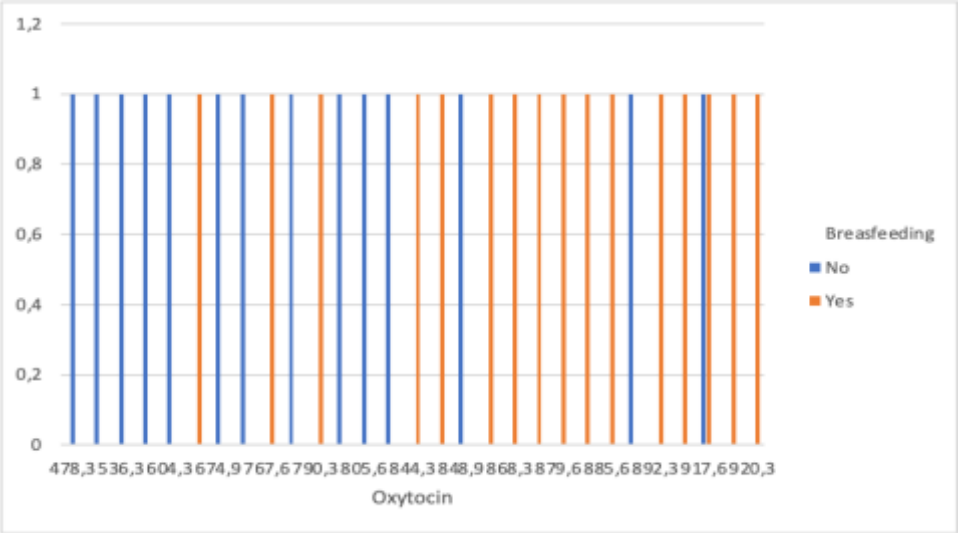

Figure 2. In nursing postpartum moms, the hormone oxytocin

At a significance value of 0.002, the statistical test results that are presented above indicate that there is a substantial association between the levels of the hormone oxytocin in postpartum moms and the amount of nursing that occurs in babies. In Figure 1, the research results show that as many as 53% of respondents succeeded in breastfeeding in the first 3 days postpartum, so the baby only got breast milk for the first 3 days of life. While there were 47% of respondents who were unable to breastfeed until the third day. Milk production in the initial three days after childbirth can differ widely among individuals. Various factors impact the success of early milk expression. The delivery process can also influence breastfeeding in the early postpartum days. A study investigating breastfeeding patterns throughout the first three days, such as the commencement of nursing, as well as the frequency and length of breastfeeding sessions, and infant suckling has indicated that cesarean sections can negatively affect early breastfeeding practices and long-term breastfeeding outcomes. While cesarean sections are not inherently detrimental, they can contribute to difficulties in feeding during the postpartum period. (Feng Zhang *et al.*, 2019) Moreover, the early postpartum breastfeeding process is affected by various concerns that mothers experience. Worries about breastfeeding are common and often lead to the decision to stop breastfeeding. The findings indicated that ninety-two percent of participants reported at least one concern on the third day, the most prevalent problems being trouble feeding the baby (52%), pain during breastfeeding (44%), and other concerns, and concerns about milk supply (40%).(Erin A Wagner *et al.*, 2013). Other data reveals that approximately 70.3% of mother's face challenges with breastfeeding, including cracked nipples, concerns about insufficient milk, pain, and fatigue. These difficulties are most common during the first month. Fifty percent of women who are having difficulties maintaining breastfeeding report receiving adequate support from healthcare professionals. Associations have been shown between views on insufficient milk production, poor infant growth, mastitis, the decision to return to work, and a higher probability of not completely breastfeeding at three months. Conversely, engaging in vaginal birth and obtaining post-hospital discharge breastfeeding assistance are linked to a reduced risk(Maria Lorella Gianni *et al.*, 2019) Breastfeeding

issues frequently occur in the immediate time after birth. The most major issue is that the newborn has trouble nursing (for 40% of the cases), followed by moms who have painful and cracked nipples (for 38% of the cases). Pain is commonly reported in cases of breastfeeding difficulties. Contributing factors to these issues include being a first-time mother, low self-efficacy, and poor self-perception regarding breastfeeding. Additionally, breastfeeding problems are less common among mothers with higher education levels. Inadequate milk production is a leading cause of breastfeeding difficulties. Consequently, postpartum breastfeeding challenges create a significant burden for mothers. Health professionals are perceived as highly supportive, often offering practical advice and emotional support to help address these issues.(Whitley J *et al.*, 2020)

The third day postpartum, the average oxytocin hormone level in mothers was found to be 786.893. Oxytocin, a crucial hormone for lactation, is released during breastfeeding to facilitate milk ejection and may also have a calming effect on the mother (‘Drugs and Lactation Database (LactMed®)’, 2023). Exogenous oxytocin is not effective in improving the success of breastfeeding or in treating breast infections in moms who are having difficulty nursing their children. However, the neurological link that formerly existed between the breast and the hypothalamus may be restored in women who have lost. It is quite unlikely that the infant would have any adverse consequences when oxytocin is delivered during nursing. Oxytocin release is affected by the administration technique that is administered. Cesarean sections can result in a reduction in the release of oxytocin and prolactin in preparation for nursing, as well as affect the mother’s psychological adjustment. Epidural analgesia also reduces prolactin levels and affects mental adaptation (Monks DT and Palanisamy A., 2021). Administering oxytocin electively at the beginning of the third stage of labor (after the baby's birth) may impact the quality and duration of breastfeeding (Buckley S *et al.*, 2023)

According to the theory, excessive doses of oxytocin may lead to insensitivity of breast receptors to stimulation, thereby impairing the milk ejection reflex (‘Drugs and Lactation Database (LactMed®)’, 2023). The administration of synthetic oxytocin during labor has the potential to increase the levels of oxytocin in the maternal plasma by two to three times at the highest doses without increasing neonatal plasma oxytocin levels. Thus, it is unlikely that synthetic oxytocin directly affects the maternal or fetal brain. However, uterine contraction patterns are altered when synthetic oxytocin is administered during labor. This may affect the flow of blood through the uterus as well as the mother's autonomic nervous system, which may result in injury to the fetus as well as an increase in the mother's level of discomfort and stress (Feenstra MM *et al.*, 2018). According to the findings of several studies, the administration of oxytocin during birth may reduce the likelihood of breastfeeding being successful. Even though study methodologies and findings are varied, this might be the consequence of a drop in postpartum oxytocin release or a decline in the behavior of newborns sucking in a dose-dependent way. During the first stages of nursing, these benefits are often at their peak, although they may not remain after the breastfeeding relationship has been established. Oxytocin alone did not impair breastfeeding achievement, but epidural analgesia. Another study reported that intrapartum oxytocin administration inhibited all rhythmic, antigravity, and primitive neonatal reflexes, regardless of dose, which could potentially hinder breastfeeding. Additionally, there is some evidence suggesting that administering oxytocin around the time of birth may increase the risk of postpartum depression.(‘Drugs and Lactation Database (LactMed®)’, 2023) The statistical analysis revealed a significance value of 0.002 for the relationship between oxytocin levels and breastfeeding success, indicating a significant correlation between the two. The relationship value of 0.537 suggests that postpartum moms' oxytocin levels are strongly associated with breastfeeding effectiveness. Some participants experienced difficulties with early breastfeeding due to ongoing pain after childbirth, psychological factors, and other adaptation challenges. Peripartum oxytocin treatment can adversely impact breastfeeding success (Buckley S et al., 2023). At the 2-month visit, nursing mothers had greater average oxytocin levels than formula mothers. Postpartum sadness and anxiety symptoms did not affect oxytocin levels while nursing, although depressed symptoms. A study conducted at the Lawanga Health Center in Poso Regency found that oxytocin massage and breast care may effectively boost milk production. This was shown by an increase in breastfeeding frequency and length, as well as better infant weight. (Lara-Cinisomo

S et al., 2017). An important medical concern for new moms is postpartum depression (PPD), which is sometimes accompanied by anxiety. PPD is more common among Latinos and is associated with an early cessation of breastfeeding. In addition, in non-Latino ethnicities, reduced plasma oxytocin (OT) levels have been linked to PPD. Oxytocin levels eight weeks after delivery showed a substantial interaction ($p < 0.05$) between the early discontinuation of breastfeeding and a depressive state (Uvnäs Moberg K et al., 2020). Oxytocin levels are generally higher in women who have had multiple pregnancies compared to first-time mothers. Higher oxytocin levels during early breastfeeding are linked to increased milk production, longer breastfeeding duration, and reduced stress levels.(riansyah A *et al.*, 2021).

4. Conclusion and future scope

Mothers with elevated oxytocin levels on the third day postpartum are more likely to successfully provide breast milk to their babies.

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Conflict of Interest (Times New Roman 11)

The authors of this paper disclose that they have no competing interests.

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