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Determinants of Breast pain in Breastfeeding Mothers in the Area of Karang Anyar Community Health Center, South Lampung District, Indonesia

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ABSTRACT

Nipple pain during breastfeeding significantly impacts the emotional well-being, daily activities, and sleep patterns of mothers, increasing the risk of early breastfeeding cessation and postpartum depression. Previous studies have reported high prevalence rates of nipple pain among breastfeeding mothers in various countries. This study aims to identify the factors contributing to nipple pain, utilizing a cross-sectional design and Shomers's statistical test. Nipple pain severity was assessed using visual analog scores, with nipple lesions, latch-on techniques, nipple shape, and maternal parity as independent variables. The results demonstrate strong positive associations between nipple pain and nipple lesions (P value 0.000, r = 0.866), latch-on techniques (P value 0.000, r = 0.629), and nipple shape (P value 0.001, r = 0.341). However, there is no significant correlation (P value 0.132) between nipple pain and maternal parity (r = -0.182). To promote successful breastfeeding, healthcare facilities should prioritize the provision of education on proper breastfeeding techniques, pain prevention and management strategies, and solutions to address the unique challenges faced by breastfeeding mothers.

Introduction

Breast nipple pain has a negative impact on both the mother and the baby. This pain not only disrupts common activities, moods, and sleep but also leads to a long-term reduction in breast milk production. Nipple pain is a major cause of early weaning and is also associated with mastitis and maternal depression (Dauglas, 2022). Nipple pain can also cause anxiety disturbances that hinder the baby's nutritional needs. It can reduce the frequency of breastfeeding or in overfeeding on one breast, ultimately leading to an imbalance in breast milk production (Maria Pollard, 2015).

A study by Miranda *et al.* (2014) reported that out of 340 primiparous women in Australia, 79% of them experienced nipple pain, and after 8 weeks, 58% of mothers still had nipple skin damage, with 20% of them still experiencing pain. Similar situations were observed among breastfeeding mothers in the UK, where an online survey involving 1,084 breastfeeding mothers found that 76% had experienced nipple pain (Bourdillon, 2020). Another study of 58 mothers in Spain found that 97% experienced nipple pain within 48 hours after delivery (Gomez *et al.*, 2021). Despite the modern era's ease of access to breastfeeding health information, the reality remains that many breastfeeding mothers experience nipple pain in these three developed countries, as well as in Indonesia.

Wahyuni et al. (2020) reported that 77.6% of 98 breastfeeding mothers in their study experienced nipple lesions. Nurkhasanah (2022) also reported findings from 30 breastfeeding mothers, revealing that 62% experiencedpain within 2-4 days

postpartum. Other studies have indicated a similar condition (Risneni, 2017).

Given that nipple pain contributes to breastfeeding cessation, addressing nipple pain represents an initial step that can be taken to enhance breastfeeding success.

According to data from the Indonesian Central Statistics Agency in 2022, the percentage of infants under 6 months receiving exclusive breastfeeding was 72.04%, which marked an increase from the previous year, where the percentage was 71.58% in 2021.

According to the Health Profile of Lampung Province, the percentage of infants exclusively breastfed in Lampung in 2021 was 73.6%, showing an increase from the previous year's figure of 70.1%. In the South Lampung Regency, the percentage of infants aged 6 months who received exclusive breastfeeding in 2020 was 48.32%, which also marked an increase from the previous year's figure of 41.69%.

Despite the observed increase in exclusive breastfeeding rates, these figures remain significantly below the national target set by the Ministry of Health of the Republic of Indonesia (80%). The low provision of breastfeeding to infants is a multifactorial issue that requires ongoing investigation and solutions, one of which is addressing nipple pain experienced by mothers.

Nipple pain is commonly caused by improper positioning and attachment of the baby to the mother's breast. Other causes include flat or inverted nipple shape, friction from the baby's teeth during nursing, ankyloglossia in the baby, abnormalities in the baby's palate, the strength of the baby's suck, and infections. Infections may be caused by *Candida* sp., *Staphylococcus aureus*, and other conditions, such as, psoriasis, dermatitis, and Raynaud's phenomenon. Pain in the nipple can also occur due to trauma, such as wounds, or pathological changes in the nipple's skin, including abrasions, scratches, cracks, clefts, erosions, ecchymosis, or ulcers (Kent et al., 2015).

It is essential to identify and observe these factors to address and prevent breastfeeding problems accurately. These are the contributions expected from the outcomes of this research.

Method

This study employed a cross-sectional design, followed by Shomers's statistical test. The dependent variable in this research was the scale of nipple pain experienced by breastfeeding mothers, which was measured using a visual analog score. The pain scale was categorized as mild, moderate, and severe. The independent variables included the baby's attachment position during breastfeeding, nipple injuries, parity, and nipple shape, which were measured using observation sheets and recall questions. A total of 57 samples were calculated using the sample size formula for correlation tests (Sopiyudin, 2010) and selected through consecutive sampling.

The inclusion criteria for this study were mothers who were currently breastfeeding or had previously breastfed, experiencing or having experienced nipple pain, without severe pre-existing medical conditions, with children up to 12 months of age, and providing consent to participate in the study. The exclusion criteria included breastfeeding mothers who had never experienced breast pain, mothers with severe breast infections, or mothers experiencing other severe illnesses. After data collection, the data were analyzed using the SPSS 19 software.

The research was conducted between June and September 2023 in the working area of the Karang Anyar Community Health Center in the Jati Agung sub-district of South Lampung Regency, Indonesia. Ethical clearance for the research was obtained from the ethics committee of Poltekkes Tanjung Karang under the reference number 177/KEPK-TJK/III/2023

Results and discussion

Respondents in this study were predominantly breastfeeding mothers aged between 20 and 35 years, comprising 87.7% of the sample. The majority of respondents had completed high school education, with 61.4% having obtained a diploma from either a general or vocational high school. Nearly all of the respondents were stay-at-home mothers, accounting for 96.5% of the

sample. The distribution of primiparous (first-time mothers) and multiparous almost balanced, with 50.9% and 49.1%, respectively. For a more comprehensive overview of respondent characteristics, please refer to Table 1 below.

Table 1 reveals that the majority of mothers are in their productive and healthy age range, possess adequate education, and engage in household activities that should allow for significant interaction with their children, especially during the breastfeeding process. However, all respondents experienced nipple pain, ranging from mild to severe. The most severe nipple pain was reported by 42.1% of the mothers.

Table 1. Respondents' Characteristic

		Frequency	Percent	Cumulative Percent
Age	>20 <35	50	87.7	87.7
	>35	6	10.5	98.2
	<20	1	1.8	100.0
	Total	57	100.0	
Education	Elementary	4	7.0	7.0
	Junior High	15	26.3	33.3
	Senior High	35	61.4	94.7
	College/Uni	3	5.3	100.0
	Total	57	100.0	
Occupation	Stay-at-home	55	96.5	96.5
	Others	2	3.5	100.0
	Total	57	100.0	
Parity	Multiparous	29	50.9	50.9
	Primiparous	28	49.1	100.0
	Total	57	100.0	
Nipple sore	Mild	15	26,3	26,3
	Moderate	18	31,6	57,9
	Severe	24	42,1	100,0
	Total	57	100,0	100,0

Breast pain in mothers often occurs during the initial stages of breastfeeding. The baby's suckling action causes the nipple and breast to elongate and enter deeply into the baby's mouth. During breastfeeding, the epidermis of the nipple, dermis, stromal core, and other intraoral breast tissues stretch in response to the mechanical vacuum/suction force of the baby. During the first 2-4 days, the mother's nipple remains soft and highly sensitive due to the abundance of nerve endings. It is the combination of skin condition and suction strength that leads to this pain, which is temporary and diminishes once breast milk is expressed (Dauglas, 2022).

Respondents with injuries such as abrasions and peeling experienced severe levels of pain, with the highest number of cases, totaling 20 respondents (Table 2). (mothers with more than one child) was

The significance value in Shomers's test, with a confidence level of 5%, is 0.000, indicating a significant relationship between the severity of injuries and pain levels. The strength of the relationship (r = 0.866) suggests a strong association, as it exceeds the standard threshold of 0.64, and indicates that the greater the injury severity, the higher the level of pain. This relationship demonstrates a positive direction.

Trauma to the nipple can be a significant cause of nipple pain and exacerbate the condition. Excoriation (abrasions) involves damage to the skin up to the tips of the papillary stratum, resulting in redness and pinpoint bleeding. This type of injury typically leads to higher levels of pain than tears, as it is often located at the nerve-rich endpoints of the skin surrounding the nipple.

Nipple injuries are closely related to pain. The body responds to pain by increasing the production of adrenaline or epinephrine, which can block the letdown reflex. Epinephrine causes vasoconstriction of blood vessels, including alveolar blood vessels in the breast, inhibiting the flow of oxytocin to reach the myoepithelium, and thereby impeding the effects of oxytocin. Without oxytocin stimulation, the myoepithelial cells of the alveoli cannot contract to expel breast milk or direct it into the ductal system. As a result, breast milk accumulates in the alveoli, causing breast engorgement and discomfort (Dauglas, 2022).

Infant attachment positioning emerges as a critical factor in averting nipple pain and injury, as demonstrated by the results in Table 2. Among the respondents in Table 2, those exhibiting suboptimal attachment also reported the most intense pain (24 respondents). Attachment exhibits a statistically significant positive correlation with pain, as evidenced by a P-value of 0.000 and an r-value of 0.63. This signifies that deficient attachment leads to the most pronounced pain, while robust attachment correlates with milder discomfort. The r-value implies a moderately robust relationship, consistent

with the standardized range of moderately strong associations falling between 0.43 and 0.63 and sharing a positive direction.

response, potentially culminating in nipple abrasions or injuries.

Table 2. Relation between Nipple Pain and Various Causative Factors

(N=57)

		Pain scale					
		Mild	Moderate	Severe	Total	p value	r-sign
Nipple sore	Non exist	9	1	0	10	0.000	0.866
	Redness, swollen,	5	11	4	20		
	abrasion, chapped skin, bleeding, etc.	1	6	**20**	27		
	Total	15	18	24	57		
Baby attachment	Proper	12	0	0	12	0.000	0.629
	Improper	3	18	**24**	45		
	Total	15	18	24	57		
Nipple shape	Normal	15	14	14	43	0.001	0.341
	Flat	0	3	**9**	12		
	Inverted	0	1	1	2		
	Total	15	18	24	57		
Parity	Multiparous	6	8	**15**	29	0.132	-0.182
	Primiparous	9	10	9	28		
	Total	15	18	24			

To facilitate effective breastfeeding, infants must accurately position their mouths on the areola. A positive attachment is characterized by the mother's nipple and areola being entirely enveloped within the infant's oral cavity. The infant should open its mouth widely, aligning its nasal plane with the nipple. As the infant's mandible descends, the mother should gently guide the infant toward the breast, directing the infant's lower lip toward the outer edge of the areola. This maneuver engenders an asymmetric latch, rather than a centralized one. The breast should entirely fill the infant's oral cavity. The infant employs its lips, tongue, oral cavity, jaw, facial musculature, and buccal fat pad to generate alternating negative and positive pressures, facilitating milk extraction. Should the infant exclusively suck on the nipple, their mandibular motion primarily compresses the nipple, resulting in minimal milk outflow. The infant may increase their sucking reflex in response, potentially culminating in nipple abrasions or injuries. Repeatedly tugging on the nipple to attain the correct attachment can provoke frustration in the infant and inflict discomfort. Furthermore, the practice of disengaging the nipple following breastfeeding can also yield trauma if the nipple is promptly withdrawn, prompting the infant to reflexively clench or bite the nipple. Mothers are counseled to gently disengage the nipple by first using the pinky or a finger to gently part the infant's mouth, mitigating the risk of trauma (Dauglas, 2022; Lisa, 2015).

In addition to these factors, the shape of the breast nipple, particularly when it does not protrude outward, can also lead to pain during breastfeeding. Breast nipples exhibit various shapes; some women have flat or naturally inverted nipples. Research has demonstrated a significant contribution of flat and inverted nipple shapes to the perception of pain, with a P value of 0.001. Table 2 presents an

r value of 0.341, indicating that nipple shape exhibits a relatively weaker correlation compared to nipple injuries and infant attachment in relation to nipple pain during breastfeeding. The correlation strength category between nipple shape and nipple pain is moderate (standard moderate range = 0.31-0.42). The correlation between nipple shape and nipple pain is positive, signifying that flatter or more inverted nipple shapes are

associated with increased pain levels. Healthcare professionals should address this issue to motivate and reassure mothers that nipple shape is not an impediment to successful breastfeeding. Mothers with such inherent nipple shapes require breastfeeding support to minimize discomfort.

Mothers experiencing nipple pain often have nipple shapes that are flat, very short, or wide. Another shape-related factor contributing to nipple pain is nipples that are too large for a small baby's mouth, inverted or flat nipples due to obesity/overweight, or mechanical mishaps when using breastfeeding aids like breast pumps that are not suitable. These nipple shapes can occasionally pose challenges because, during breastfeeding, the nipple needs to be sufficiently elastic to be placed deep within the baby's mouth. When the baby is positioned correctly against the breast, the breast nipple is placed far inside the baby's oral cavity, and the mother may feel as though the baby's tongue and jaw are drawing on it. In this normal scenario, the nipple is not distorted after feeding, and the nipple skin remains undamaged. However, in cases of flat nipples, poor infant attachment can result in compression of the nipple, potentially leading to skin damage (Jacquilint Kent, 2015).

The final influential factor on nipple pain is parity. Interestingly, it has been determined that there is no correlation between parity and nipple pain (P-value = 0.132, greater than P 0.05). The correlation value also shows a negative sign (r -0.182), indicating that the prediction that primiparous women would experience more pain than multiparous women is not substantiated.

Perreira *et al.* (2009) reported that primiparous mothers or those breastfeeding for the first time are more likely to experience nipple injuries than women with more than one child. This finding is related to the experience of breastfeeding. Inexperienced breastfeeding mothers tend to face challenges in breastfeeding their infants as part of their adaptation process.

Interestingly, this study's results contradict the aforementioned report. An intriguing phenomenon in this research is why fewer new mothers experience nipple pain. In this study, the proportion of primiparous (49.1%) and multiparous (50.1%) mothers is nearly balanced. Considering the characteristics of these mothers, most of whom have at least a high school education and even higher education (66.7%), it can be explained that these mothers may possess better knowledge. Education is one of the factors expected to enhance a mother's ability to seek information and increase their knowledge about breastfeeding. Over the past decade, there has been an increase in the number of mothers choosing to exclusively breastfeed their infants, with a more significant increase occurring in the middle-class and educated segments of society. Maternal education levels have a positive impact on both maternal and infant health.

Another noteworthy characteristic to discuss is the age of the mothers. The majority of the respondents fall within the productive age range and healthy reproductive span (87.7%). Breastfeeding is a process that involves both physical and mental aspects. Mothers of mature age may exhibit greater responsibility and the ability to address external challenges that arise during breastfeeding, as well as a higher commitment to providing exclusive

breastfeeding. Mothers over the age of 20 are more likely to provide exclusive breastfeeding.

The ease of access to information and the increasing influence of social media enable primiparous mothers to acquire information about breastfeeding. Family support and community support, including online communities, empower new mothers with insights and self-confidence

nipple pain is not influenced by the maternal parity status (P 0.132 r = -0.182). Providing education related to knowledge and proper breastfeeding techniques can enhance breastfeeding success for both mothers and infants.

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Conclusion

This study reports that nipple pain is significantly caused by skin injuries to the nipple, improper infant attachment, and nipple shape (P 0.000 r = 0.866; P 0.000 r = 0.629; P 0.001 r = 0.341; respectively). Furthermore,

to fulfill their adaptive role as caregivers, including the task of breastfeeding their infants.

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