

Review Article

The Relationship of Infant Attachment to the Incidence of Nipple Fissure in Breastfeeding: A Systematic Review

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Abstract: This study emphasizes that breast milk is the most optimal source of nutrition for infants during the first six months of life, and the success of exclusive breastfeeding is influenced by several key factors, one of which is the proper attachment of the baby's mouth during feeding. Correct attachment is crucial to ensure effective milk transfer and comfort for both mother and baby, while also preventing potential issues such as nipple abrasions or blisters that often arise from improper latching. To investigate this issue, the research was conducted using a systematic review method by identifying and analyzing relevant literature. The article search was carried out through several major databases, including Google Scholar, PubMed, and ScienceDirect, with keywords focusing on the relationship between attachment and nipple fissures, as well as attachment and cracked nipples. The initial search yielded 5,350 articles published between 2020 and 2024; however, after applying the inclusion criteria, only 15 articles were deemed relevant to the research objective. A further critical appraisal process was then conducted, resulting in 11 high-quality articles being included in the final analysis. The findings from these studies consistently highlight that poor attachment of the baby's mouth is significantly associated with the occurrence of nipple injuries among breastfeeding mothers. Consequently, ensuring proper latching techniques can reduce the risk of nipple trauma, support maternal comfort, and improve the overall success of exclusive breastfeeding practices, which are vital for infant growth and maternal health.

Keywords: Attachment; Breastfeeding; Infant nutrition; Maternal health; Nipple fissure.

1. Introduction

Breast milk is the best food for babies. Breast milk is given exclusively to babies aged 0-6 months, which means that babies are only given breast milk without additional food or other drinks. WHO recommends that mothers breastfeed exclusively and continue until the child is 2 years old. This is because exclusively breastfeeding can prevent nutritional and growth problems that arise (Kunang & Apri Sulistianingsih, 2023).

The success of exclusive breastfeeding is influenced by various factors, one of which is the proper attachment of the baby's mouth to the mother's breast during feeding. Correct attachment is essential not only to optimize milk production but also to ensure effective milk transfer, prevent nipple pain or damage, reduce the risk of breast engorgement and mastitis, and promote comfort for both mother and baby. Furthermore, proper latching supports the establishment of a good breastfeeding rhythm, encourages adequate nutritional intake for the infant, and strengthens the emotional bond between mother and child, thereby contributing to the overall success and sustainability of exclusive breastfeeding (Azizah & Rosyidah, 2019).

The right latch-on technique is very effective in optimizing milk production to the baby, so that the baby gets optimal nutritional intake. Proper attachment not only affects the amount of milk expelled, but also helps prevent breastfeeding problems such as nipple fissure, breast pain, or mastitis. Therefore, health education on correct attachment techniques during breastfeeding is needed, both for first-time mothers and experienced mothers, as an important strategy to increase the success of exclusive breastfeeding, support the growth and

Received: February 26, 2025

Revised: March 12, 2025

Accepted: March 28, 2025

Published: March 31, 2025

Curr. Ver.: March 31, 2025



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development of the baby, and strengthen the emotional bond between mother and child (Nurhidayah, 2023).

Good attachment between the baby and the mother during breastfeeding greatly affects the smooth production of breast milk. Breast milk contains balanced nutrients that are easily absorbed by the baby's body, and has fat content that helps in the formation of the baby's body and brain tissues. The breastfeeding process can also regulate the baby's metabolism, thus supporting healthy weight gain and in accordance with the stage of development (Sulfianti et al., 2021).

Indonesia is one of the countries with the highest prevalence of stunting cases in the ASEAN region, making it a significant public health concern. Stunting not only affects physical growth but also impacts cognitive development, productivity, and overall quality of life in the long term. Research conducted in Eastern Indonesia revealed that 60% of babies who are exclusively breastfed have a 20% lower risk of experiencing stunting compared to those who are not exclusively breastfed. This finding underscores the crucial role of exclusive breastfeeding as a cost-effective and sustainable intervention in stunting prevention efforts, highlighting the need for continued promotion, education, and support for breastfeeding practices at the community and national levels (Hadi et al., 2021).

The proper attachment between the baby and the mother's breast during breastfeeding is a fundamental aspect in ensuring the success of the exclusive breastfeeding process. The proper attachment of the baby is one of the important aspects of breastfeeding techniques that needs special attention. This is because poor breastfeeding techniques can cause cuts or nipples fissure (Wahyuningsih, 2018).

Research conducted by Asmaul et al (2024) states that the incidence of nipples is related to breastfeeding techniques. The wrong breastfeeding technique is in the form of inappropriate attachment of the baby so that the baby is wrong in sucking. When the baby's mouth moves to suck continuously, it will cause friction between the baby's tongue and the mother's nipple. This is what makes the nipple blister (Asmaul et al., 2024).

Nipple fissures experienced by breastfeeding mothers are often one of the main factors contributing to the decision to stop breastfeeding prematurely. These fissures, which may be accompanied by nipple abrasions and skin trauma, can cause significant pain and discomfort, making the breastfeeding process challenging. If left untreated, such injuries can serve as an entry point for bacteria, leading to localized or systemic infections. The presence of bacterial infections not only exacerbates the mother's discomfort but can also interfere with milk flow, reduce breastfeeding frequency, and ultimately disrupt the success of exclusive breastfeeding. Therefore, prompt identification, appropriate treatment, and preventive measures such as ensuring proper latch and breastfeeding techniques are essential to maintain maternal breast health and support the continuity of exclusive breastfeeding (Wahyuningsih, 2018).

Based on this explanation, the question that arises is whether the attachment of the baby's mouth during breastfeeding has the potential to be the cause of nipple fissure in breastfeeding mothers.

2. Preliminaries or Related Work or Literature Review

Nurhidayah (2023) stated that good attachment plays an important role in optimizing the process of breast milk production. The right attachment allows the baby to suck effectively, stimulating the let-down reflex and increasing milk production continuously. Optimal milk production not only meets the nutritional needs of babies, but also contributes to healthy growth and development through age-appropriate weight gain. Thus, the application of breastfeeding techniques with the correct attachment is an essential aspect in the success of the exclusive breastfeeding program, as well as a preventive effort against breastfeeding problems such as nipple blisters, mastitis, or lactation failure (Nurhidayah, 2023).

Simamora et al. (2022) stated that breastfeeding techniques are related to the occurrence of nipple injuries or what is often called nipple fissure. This condition is generally caused by errors in the application of breastfeeding techniques. One of the habits that has the potential to affect this is breastfeeding while walking or standing, which can change the position of the baby's head to be less appropriate. An im-ideal position of the head can lead to suboptimal suction, where the nipples and areolas do not fully fit into the baby's mouth. This situation risks causing nipple fissure, and can cause the baby to choke due to the position of the head that is not directly aligned with the mother's arm (Simamora et al., 2022).

Nipple fissure are not only caused by improper breastfeeding techniques, but can also occur due to improper breastfeeding techniques. Sulymbona et al. (2021) explained that the occurrence of nipple abrasions due to the use of breast pumps was triggered by improper squeezing techniques. Many breastfeeding mothers do not understand how to maintain cleanliness and sterilize breast pumps properly. In addition, the use of a breast pump without rubber pads can increase the risk of abrasions on the nipples during the milking process. Therefore, every breastfeeding mother needs to be educated about good and correct breastfeeding practices. This skill is important to master because expressing breast milk is not a reflex or instinctive act, but a skill that requires a learning process. This process is not only relevant for mothers who are breastfeeding for the first time, but also for all breastfeeding mothers to prevent injury and ensure successful breastfeeding (Sulymbona et al., 2021).

Education related to breastfeeding techniques has an important role in efforts to prevent nipple blisters in breastfeeding mothers. Research conducted by Henniwati et al. (2024) shows that providing breastfeeding technique counseling to postpartum mothers can significantly reduce the incidence of nipple fissure. These findings indicate that structured and continuous educational interventions from pregnancy to postpartum can improve mothers' skills in proper attachment, while minimizing the risk of nipple fissure. Therefore, health workers, especially midwives, are expected to be able to integrate breastfeeding counseling into every antenatal care (ANC) and postnatal care (PNC) service. The application of this strategy is not only beneficial in reducing complaints of fissure, but also contributes to the success of exclusive breastfeeding as well as the improvement of the quality of maternal and infant health (Henniwati et al., 2024).

Postpartum mothers are prone to experiencing breastfeeding posture errors that can cause nipple damage. Therefore, family involvement and skills are also needed to support the smooth breastfeeding process. Gao H. et al. (2022) stated that professional breastfeeding education in the prenatal period provided to families can improve the mother's mastery of breastfeeding attachment skills and reduce the risk of nipple damage (Gao et al., 2022).

3. Proposed Method

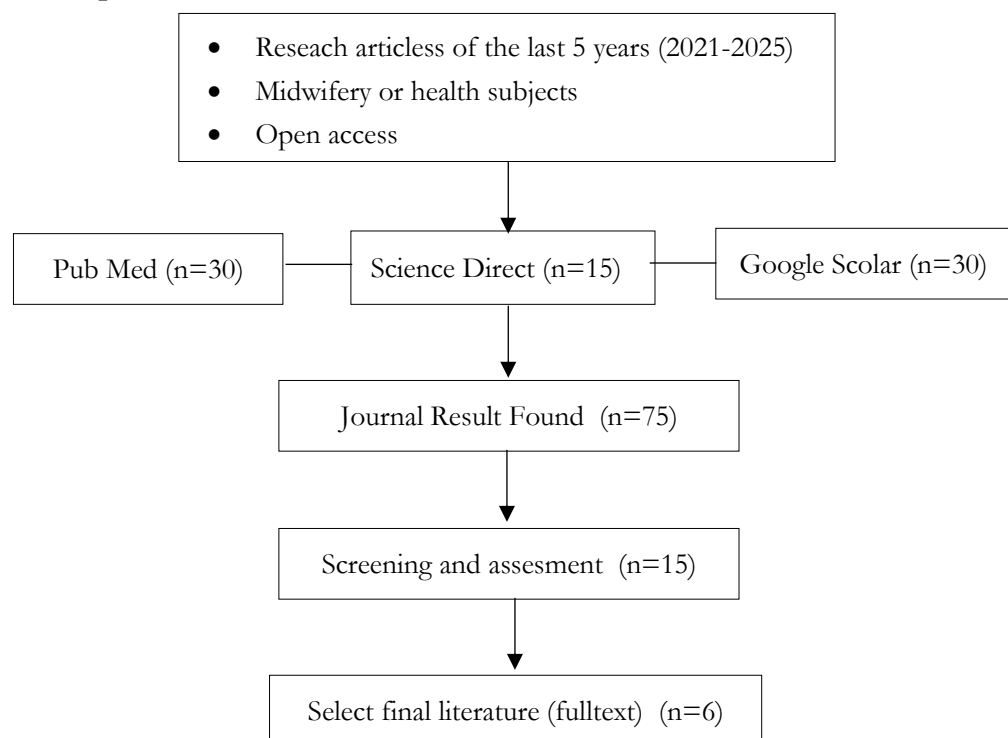


Figure 1. Literature Search.

The research method used is literature review. In this study, secondary data was obtained from the results of previous research. The data that has been obtained is then explained in detail so that it is easy for readers to understand later. The search for articles in this study uses google scholar, pubmed, and science direct. The keywords used are the attachment relationship with the blistered nipple, your attachment cracked nipple was obtained from

5,350 articles from 2020 to 2024, but only 15 relevant research articles were included in the inclusion criteria, then a critical appraisal process was carried out to obtain 11 research articles. This literature review is analyzed using the literature method, namely by sorting and classifying the data obtained from the results obtained according to the inclusion criteria, and then described one by one and given a conclusion for each source related to what is written in it. The research article will answer the research objectives and then include theories related to the research article as well as the assumptions of the researcher.

4. Results and Discussion

4.1 Result

Table 1. Attachment with Nipple Trauma.

Research Title	Researcher Name	Research purposes	Population	Research methods	Interventions Used	Research results
Assessment of breastfeeding position and attachment (ABPA) in a tertiary care centre in Chennai	Aswatha man, N. <i>et al.</i>	Hence our study aimed to assess the percentage of mother infant dyads with correct breastfeeding position and attachment along with factors influencing them in a Tertiary care Hospital.	101 dyads were observed for correct position, attachment and effective suckling using WHO B-R-E-A-S-T	A descriptive cross sectional	Observed for correct position, attachment and effective suckling using WHO B-R-E-A-S-T feed observation form and were scored	Among the 101 dyads, only 30.7% of them had good or average position, 52.47% had good or average attachment and 62.3% had effective suckling at breast.
Breastfeeding Positioning and Attachment among Postnatal Mothers: A Mixed Methods Study in a Tertiary Care Hospital in Puducherry, South India S.	S. Nancy, R. Sindhuri, Arulkumaran, Arunagirinathan, Amol R. Dongre	To assess the breastfeeding technique among postnatal mothers and to identify the factors associated with improper positioning and poor attachment.	99 postnatal mothers were interviewed consecutively and breastfeeding techniques	mixed-methods study was carried out in Puducherry for 6 months.	In quantitative phase, 99 postnatal mothers were interviewed consecutively and breastfeeding techniques were observed based on Baby Friendly Hospital Initiative and Integrated Management of	About 28.3% and 27.3% of mothers demonstrated improper positioning and poor attachment, respectively. Young mothers, housewives, <10 days old infants, and failure to receive breastfeeding counseling

					Neonatal and Childhood Illness guidelines . In qualitative phase, 45 staff nurses ranked the action points to improve the poor breastfeeding practices.	g were associated with poor breastfeeding techniques. Poster displays, healthcare workers' training, targeted counseling, and assistance were the priority action points suggested by the staff nurses. The proportion (95% confidence interval) of mothers having correct breastfeeding position was 45.2% (35.2–55.3%), good attachment 73.8% (67.2–80.4%) and effective suckling 73.3% (67.8–78.8%). 128 (61%) mothers reported having been taught the technique of breastfeeding by someone, the most common
Breastfeeding position and attachment practices among lactating mothers: An urban community-based cross-sectional study from Vadodara city in western India	Kajal Davra, Paragkumar Chavda, Chandresh Pandya, Divya Dave, Kedar Mehta	This study assessed the breastfeeding techniques as practiced by mothers having child under 6 months of age residing in urban slum areas of a city in western India.	We selected 210 mothers through population proportionate to size cluster sampling with 30 as clusters and 7 mothers from each cluster.	This community-based cross-sectional study was conducted after ethics committee approval.	Breastfeeding technique was observed by a trained female investigator through a checklist based on Integrated Management of Neonatal and Childhood Illness guidelines .	

						source being nurse at health facility.
The Relationship Between Breastfeeding Techniques And The Incidence Of Sored Nipples In Post-Partum Mothers At Rsd Dr. H. Soemarno Sosroatmodjotanjung Selor	Mujenah, Endah Wahyutri, Nilam Noorma	The aim of this study was to determine the relationship between breastfeeding technique s and the incidence of sore nipples in postpartum mothers at Dr. H. Soemarno Sosroatmodjotanjung Regional Hospital, Tanjung Selor.	Sampling was done using purposive sampling technique with a sample size of 35 postpartum mothers.	analytical with a cross-sectional approach.	The instrumen t uses a breastfeeding technique observation sheet and a sore nipple observation sheet.	It was found that most respondents had incorrect breastfeeding technique s (26 people (68.4%) and correct breastfeeding technique s (12 people (31.6%). It was found that most respondents stated that there were incidents of sore nipples (22 people (57.9%) and there were no sore nipples (16 people (42.1%). LRNP was the most common issue as experienced by 52% of mothers surveyed. Various solutions were utilised to try to manage LRNP. Use of Highly Purified
Latch-related nipple pain in breastfeeding women: the impact on breastfeeding outcomes	Katie Bourdillon katie, Tom McCausland , and Stephanie Jones	To investigate mothers experience s of nipple pain, the solutions used to manage their issues, and the perceived impact on breastfeeding outcomes with particular focus on	Participant s had all given birth to their youngest child within the last 24 months, initiated breastfeeding and had completed their breastfeeding journey (n=1084).	The project utilised quantitative online market research methodologies to ensure that a large enough representative sample could be obtained.	The survey questions, survey structure and subsequent data analysis and interpretation were derived and performed by the authors. The online survey	

		latch-related nipple pain with no clear underlying cause (LRNP).			was hosted by a specialist research agency.	Anhydrous (HPA) Lanolin to manage LRNP was associated with a substantial increase in breastfeeding duration (average 33.2 weeks compared to 26.5 weeks for those who didn't report using HPA Lanolin).
Determinants of Breast pain in Breastfeeding Mothers in the Area of Karang Anyar Community Health Center, South Lampung District, Indonesia	Yulida Fithri, Ika Oktaviani, Indah Trianingsih	to identify factors contributing to nipple pain, using a cross-sectional design and Shomers' statistical test	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	This study employed a cross-sectional design, followed by Shomers's statistical test.	Nipple pain severity was assessed using visual analog scores, with nipple lesions, latch-on technique, 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 between nipple pain and maternal parity ($r = -0.182$).

4.2 Discussion

Based on the results of a literature search using the search system on Google Scholar and Pubmed using the keywords the effect of lavender aromatherapy on sleep quality, the effect of white noise on sleep quality and sleep quality in infants, there were 75 research articles in screening based on inclusion criteria, namely the last 5 years of journal time (2020-2024), the type of original journal in fulltext. Journals in Indonesian and English, and journals on the theme of attachment, and nipple abrasions. From the results of the screening, there are 5 research articles obtained from Google Scholar and 5 articles from Pubmed, so the total obtained through screening is 10 articles.

The correct breastfeeding technique is a way of breastfeeding by paying attention to the position and attachment of the baby and mother correctly. There are signs of proper attachment, namely the body is attached to the mother's body, most of the areola goes into the baby's mouth, the baby's chin is in contact with the mother's breast, the baby's mouth appears to be wide open, the baby's nose is approaching or touching the mother's breast, the baby's lower lip is rotated outwards, the baby's suction is strong and deep slowly, the baby is calm at the end of breastfeeding or not fussy, and the mother can hear the baby's voice when swallowing breast milk (Sulfianti et al., 2021).

Improper attachment will cause problems in the mother's breasts. Previous research has obtained results from 101 couples, only 30.7% breastfeed in the correct position, and it was recorded that 52.47% had good attachment (Aswathaman et al., 2018). So it can be concluded that there is a significant correlation between breast problems in mothers with wrong position and poor attachment.

Good attachment is one of the determinants of success in exclusive breastfeeding. Where in previous research, breastfeeding mothers were still found with improper attachment (Putri Kencana Jafrizal et al., 2024). According to the assumption of health education researchers, it is very necessary to increase maternal knowledge and prevent problems during the breastfeeding process. This is supported by the research Rosa Estiani (2024) which states that breastfeeding technique education, which is carried out 3 times, can increase mothers' knowledge and skills in breastfeeding their babies (Rosa et al., 2024).

Research conducted by Nancy et al (2022) found that 28.3% and 27.3% of mothers showed improper positions and poor attachment. This is caused by several factors including maternal age, maternal work, baby age, and breastfeeding counseling. According to the assumption of breastfeeding researchers, breastfeeding counseling is useful for motivating mothers to breastfeed with the right techniques and attachments so that mothers can breastfeed comfortably (S. Nancy, R. Sindhuri, Arulkumaran Arunagirinathan, 2022).

Previous research that has been conducted revealed that mothers who have the correct breastfeeding position are 45.2% (35.2–55.3%), good attachment 73.8% (67.2–80.4%) and effective breastfeeding 73.3% (67.8–78.8%). A total of 128 (61%) mothers have been taught breastfeeding techniques. It was recorded that 38 (29.7%) were taught by doctors, 63 (49.2%) by nurses, 21 (16.4%) by anganwadi workers and 6 (4.7%) were taught by family members. The highest percentage of these data were nurses in health facilities (Davra et al., 2022). In this case, according to the researcher's assumption, nurses have an important role in providing health education to breastfeeding mothers after childbirth.

According to the researcher's assumption based on a review of 3 different research articles, it was found that there are still many breastfeeding mothers with improper attachment. Incorrect attachment if not corrected will cause problems in the mother's breasts causing the breastfeeding process to be uncomfortable. One of the problems caused by improper attachment is nipple abrasions.

Improper attachment can cause injuries to the nipples so that breast milk production is not optimal. According to the researcher's assumption, this is due to the sensation of pain experienced by the mother. According to research conducted by Nurhidayah (2023), baby attachment is effective in helping optimal breast milk production. According to the researcher's assumption, this is because part of the areola enters the baby's mouth, so that there is no friction between the baby's tongue and the mother's nipple. A rough baby's tongue when rubbing against the sensitive skin of the nipple repeatedly can cause wounds so that the breastfeeding process becomes uncomfortable (Nurhidayah, 2023).

According to the literature, the main cause of nipple trauma and damage is attachment problems. Wounds on the nipples can also be caused by the friction of the baby's tongue when sucking on the nipple. Breastfeeding has benefits both physically and psychologically for the mother and her baby. Early detection, and treatment of nipple trauma that occurs

during breastfeeding is the key to successful breastfeeding without pain (Koberling et al., 2023).

Research conducted by Mohsen et al (2024) found that nearly three-quarters of postpartum women experience cracked nipples, more than a third of women experience cracked nipples of the 2nd and 3rd degree, almost two-thirds of women experience improper nipple attachment, and most women do improper breastfeeding techniques (Mohsen et al., 2024). Based on the results of the study, it can be concluded that improper attachment and breastfeeding techniques can cause injuries to the nipples.

Research conducted by Pratiwi and Apidianti (2020) states that there is a relationship between nipple blisters and breastfeeding techniques. Where one of the factors causing this is the baby's tongue is short so that the baby's mouth cannot attach to the mother's breast properly (Pratiwi & Apidianti, 2020). Supported by research conducted by Mujenah, Wahyutri and Noorma (2023) which states that there is a relationship between breastfeeding techniques and nipple abrasions. It was found that most respondents had incorrect breastfeeding techniques (26 people (68.4%) and correct breastfeeding techniques (12 people (31.6%). It was found that most respondents stated that there were incidents of sore nipples (22 people (57.9%) and there were no sore nipples (16 people (42.1%) (Mujenah et al., 2023). This is caused by incorrect breastfeeding techniques in the form of improper attachment of the baby.

Research conducted by Katie Bourdillon, Tom McCausland and Stephanie Jones (2020) Of the 1084 women included in the study, 68% reported that they experienced physical problems related to breastfeeding itself. Of these, 76% experienced nipple trauma (n=537), 38% experienced breast swelling (n=279), 21% experienced mastitis (n=157) and 19% suffered from blocked ducts (n=143) (Bourdillon et al., 2020). Other problems, namely canker spleen, inverted nipples, milk blisters and breast abscesses are much rarer and are experienced by 10% or less of those surveyed.

Blistered nipples can cause mothers to feel pain while breastfeeding. So that it makes the mother feel uncomfortable when breastfeeding. This is in accordance with a study conducted by (Camargo et al., 2024) which states that nipple pain scores in breastfeeding mothers who experience nipple damage are quite high on the first day after childbirth, regardless of the size of the nipple and the degree of damage. Professionals who assist postpartum mothers during the baby's first exposure to breastfeeding should understand the need to monitor this breastfeeding regularly, directing their attention to prevent nipple damage and worsening of the condition (Camargo et al., 2024).

The study conducted by (Fithri, Oktaviani and Trianingsih, 2023) reported that nipple pain was significantly caused by skin injury to the nipple, improper attachment of the baby, and the shape of the nipple ($P = 0.000$ $r = 0.866$; $P = 0.000$ $r = 0.629$; $P = 0.001$ $r = 0.341$) (Fithri et al., 2023). According to researchers' assumptions, improper attachment is the initial cause of pain in the mother's nipples during breastfeeding.

If the mother has experienced putting trauma, one of the therapies that can be done is to keep the putting moist. Based on research conducted by Nayeri, Kheirkhah and Janani (2019) stated that oil from chamomille flowers is effective in treating putting trauma (Nayeri et al., 2019).

The use of expressed breast milk can also be done as therapy to treat putting blisters. This is supported by research conducted by Ibrahim et al (2022) stating that breast milk is more effective than peppermint water because it can relieve blistered nipples (Ibrahim et al., 2019).

Based on a review of 6 different research articles, it can be concluded that the wrong breastfeeding technique is found in the improper attachment of the baby's mouth, causing nipple blisters. Therefore, the role of health workers in providing breastfeeding technique counseling to mothers after childbirth to increase knowledge. This is in line with the review of 3 different articles.

Based on the articles that have been reviewed, it can be concluded that breastfeeding techniques, especially baby attachment, have an effect on the incidence of nipple blisters.

5. Conclusions

Based on the results of a literature review from 6 selected research articles (2020–2024), it can be concluded that correct breastfeeding techniques, particularly proper baby attachment, play a crucial role in the success of breastfeeding and the prevention of nipple trauma. Improper attachment such as failure of the areola to enter the baby's mouth, poor positioning of the baby and mother, or incorrect suction has consistently been associated with

nipple abrasions, cracked nipples, nipple pain, and other breastfeeding complications. These conditions not only cause discomfort for mothers but also negatively affect milk production and breastfeeding continuity.

Evidence from several studies shows that a significant proportion of mothers still practice improper breastfeeding techniques, influenced by factors such as maternal age, work status, baby's age, counseling exposure, and anatomical limitations (e.g., short baby tongue or nipple shape). Education and counseling interventions have been proven effective in improving maternal knowledge, positioning, and attachment during breastfeeding, thereby reducing nipple trauma. Nurses and other health professionals hold a strategic role in providing continuous breastfeeding counseling and early detection of nipple trauma to ensure comfortable and sustainable breastfeeding.

Therefore, it can be concluded that improper breastfeeding techniques especially poor baby attachment are the main contributing factors to nipple abrasions. Strengthening breastfeeding education, counseling, and professional assistance in the early postpartum period is essential to support exclusive breastfeeding and to minimize maternal breast problems.

Author Contributions: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data Curation, Writing Original Draft Preparation, Writing Review & Editing, Visualization, and Project Administration were carried out solely by the author.

Funding: None

Data Availability Statement: None

Acknowledgments: The author would like to express sincere gratitude to Universitas Bhakti Asih Tangerang for the academic support and access to resources that made this study possible. Appreciation is also extended to colleagues and lecturers at the Faculty of Health Sciences and Sciences for their valuable insights and encouragement during the completion of this work. Finally, deepest thanks go to the author's family for their endless support and motivation.

Conflicts of Interest: None declared

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