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Comprehensive Review and Response Strategies for Nipple Confusion

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Abstract: The term "nipple confusion" accurately describes the confusion newborns experience between their mother's nipple and an artificial nipple during feeding. Specifically, it refers to the feeding habits infants develop based on their initial feeding experiences after birth. Infants accustomed to the maternal nipple often resist bottle-feeding; conversely, those accustomed to bottle-feeding may reject the maternal nipple. This confusion is particularly common among infants receiving mixed feeding.

Keywords: Nipple confusion; Newborn; Breastfeeding; Breast milk and bottle

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1. Introduction

Nipple confusion is a common issue in newborn feeding, referring to an infant's confusion between the mother's nipple and an artificial nipple due to early exposure to different feeding methods (breastfeeding and bottle-feeding). This confusion leads to a strong preference for or resistance to one method. This phenomenon is especially pronounced among mixed-fed infants, with approximately 30–50% of globally experiencing varying degrees of nipple confusion. Data from the Chinese Center for Disease Control and Prevention in 2021 indicates that mixed-feeding rates reach 42% in urban areas and 35% in rural areas, with about 60% of mixed-fed infants exhibiting breast milk refusal behavior. Breastfeeding is not only the optimal source of nutrition for infants but also a core pathway for emotional bonding between mother and child. However, nipple confusion may lead to breastfeeding discontinuation, impacting infant health and the mother-infant relationship. This paper systematically reviews research progress on nipple confusion from multiple perspectives, including physiological mechanisms, influencing factors, sociocultural contexts, and intervention strategies, aiming to provide scientific evidence for clinical practice and home care.

2. Advantages of breastfeeding

Nutritionally, breast milk is rich in multiple nutrients. Its balanced ratio of proteins, fats, and carbohydrates, along with essential vitamins, minerals, and immune-active substances, perfectly meets the nutritional needs of infants aged 0–6 months, supporting healthy growth [1]. In terms of enhancing infant immunity, components like immunoglobulins and lactoferrin in breast milk not only support growth and development during the first 4–6 months but also effectively defend against bacterial and viral infections, reducing the risk of respiratory infections, diarrhea, gastrointestinal infections, and otitis media [2].

For the infant's digestive system, breast milk is naturally gentle and easier to digest and absorb, reducing the occurrence of gastrointestinal discomfort. Emotionally, breastfeeding involves close mother-infant contact; eye contact and skin-to-skin interaction significantly enhance parent-child bonding, providing infants with ample security and benefiting their psychological development. From the mother's perspective, breastfeeding promotes postpartum uterine contraction and accelerates physical recovery, while also lowering her risk of developing diseases like breast cancer and ovarian cancer. Economically and environmentally, breastfeeding eliminates the need to purchase expensive formula and related products, saving household expenses. It also avoids the resource consumption and environmental pollution associated with formula production and packaging, making it both cost-effective and eco-friendly.

3. Physiological mechanisms and causes of nipple confusion

3.1. Data on infant "path dependency"

Research indicates that infants develop "path dependence" in their sucking patterns within the first 2–4 weeks after birth. Early exposure to either the mother's nipple or a bottle can solidify oral muscle memory. Babies accustomed to the mother's nipple may resist bottle feeding, while those accustomed to bottle feeding may reject the mother's nipple [3].

A 2022 study by the U.S. National Institutes of Health (NIH) found that 65% of infants introduced to bottles within the first week of life exhibited breast refusal after one month, significantly higher than the delayed introduction group (22%). A 2020 cohort study in Chinese cities like Beijing and Shanghai also showed that infants using bottles within three days postpartum had a nipple confusion rate as high as 58%. It is noteworthy that in countries like Norway and Sweden, where breastfeeding rates exceed 80%, nipple confusion occurs in less than 15% of cases. Conversely, in the Philippines and Mexico, where formula feeding is more prevalent, this rate exceeds 40%. China's situation is more complex: mixed feeding rates in first-tier cities are comparable to developed countries, but inadequate breastfeeding support in primary healthcare facilities means correction rates for nipple confusion in rural areas are only half those in urban areas.

3.2. Differences in sucking patterns

Clinically, the primary concern involves infants who first encounter and become accustomed to bottle-feeding during the neonatal period. Due to premature exposure to bottle-feeding or frequent bottle use for various reasons, these infants may exhibit weak or uncoordinated sucking and swallowing, disrupted sucking rhythms, and abnormal sucking responses when transitioning to breastfeeding [4]. This phenomenon arises from significant differences in the mechanical mechanisms between breastfeeding and bottle feeding.

3.2.1. Breastfeeding

The infant must envelop the areola with the tongue, using peristaltic waves to compress milk ducts and stimulate the let-down reflex. This process requires coordinated breathing, swallowing, and jaw movements, with an average suckling frequency of 40–60 times per minute, consuming considerable energy. Breast milk flow depends on let-down (average flow rate 5–10 mL/min) and is intermittent; bottle flow is constant and can be artificially adjusted by tilting the bottle, leading infants to develop a dependency on "instant gratification."

3.2.2. Bottle feeding

The fixed shape of the nipple and gravitational force create a fast, steady milk flow (approximately 20–30 mL/min). Infants only need to swallow passively, reducing sucking frequency to 10–20 times per minute without exerting force.

The sensations of a bottle and a nipple in the baby's mouth differ significantly. This encompasses multiple aspects including length, firmness, milk flow rate, and the effort required for sucking. For instance, when suckling the mother's nipple, the baby must engage muscle strength, balance breathing, and trigger the let-down reflex through sucking to achieve a substantial milk flow. In bottle feeding, however, the nipple creates a completely sealed space, allowing the baby to obtain milk effortlessly through simple swallowing without exerting significant force. Therefore, after becoming accustomed to bottle-feeding, babies may react differently when encountering nipples of varying textures and lengths, or when faced with milk flow that fluctuates in volume and speed. Some babies may show patience and persist until the milk let-down occurs, while others may resist strongly, crying incessantly after just a few sucks. while others may start crying the moment they are brought to their mother. These reactions all reflect how nipple confusion impacts a baby's feeding habits. When faced with their mother, the child may exhibit a more sensitive and reluctant attitude, which is actually not surprising. The child needs time to adapt and transition. When encountering such resistance, the mother should be fully patient and understanding.

3.2.3. Neurological reflexes and behavioral learning

While the sucking reflex is controlled by the brainstem, feeding method selection involves higher-level cortical learning mechanisms. Frequent switching between feeding tools may lead infants to develop an "operant conditioning response", associating bottles with effortless feeding and breastfeeding with strenuous sucking, resulting in behavioral avoidance.

4. Multidimensional impacts of nipple confusion

4.1. Direct impact on breastfeeding

The direct impact on breastfeeding would be a reduction in milk production. As the most natural lactation stimulator, the infant's suckling action significantly promotes milk secretion. When nipple confusion occurs, the lack of direct breastfeeding stimulation may gradually decrease a mother's milk production. Data indicates that mothers experiencing nipple confusion produce 30–40% less milk daily compared to those exclusively breastfeeding. A 2022 report by the Chinese Maternal and Child Health Association indicates that insufficient milk supply due to nipple confusion accounts for 47% of weaning cases within the first six months postpartum. Although breast pumps can partially serve a similar function, and some mothers successfully increase milk production through pumping, prolonged pump use may lead to poor milk removal, recurrent milk stasis, and even

irreversible breast damage, further reducing milk supply. It also increases risks to breast health. Improper pump use can cause duct blockages or damage, raising the risk of mastitis (by 2–3 times). A 2021 multicenter study in China found that 35% of mothers experiencing nipple confusion had experienced mastitis episodes, significantly higher than the 12% rate in the exclusive breastfeeding group.

4.2. Infant health and development

4.2.1. Nutritional intake differences

Immunoglobulins (e.g., sIgA), oligosaccharides, and active enzymes in breast milk cannot be fully preserved in bottles. Mixed-fed infants have an 18% higher risk of respiratory infections compared to exclusively breastfed infants. Chinese CDC data shows mixed-fed infants have a significantly higher diarrhea incidence (21.3%) than exclusively breastfed infants (9.8%) [5].

4.2.2. Oral development abnormalities

Prolonged bottle feeding may affect mandibular development, increasing the likelihood of dental caries and malocclusion. A 2023 study by Peking University School of Stomatology indicated that 45% of children who used bottles extensively before age 3 exhibited anterior crossbite issues.

4.3. Psychological and social consequences

Skin-to-skin contact during breastfeeding stimulates oxytocin release, which enhances the emotional bond between mother and child. However, weakened mother–infant bonding may occur when nipple confusion disrupts these interactions, potentially leading to greater infant separation anxiety. A 2022 survey by the Chinese Academy of Social Sciences found that parent–child interaction scores among infants with nipple confusion were 23% lower than those of exclusively breastfed infants. Moreover, maternal psychological stress tends to rise around 70% of affected mothers reported feelings of anxiety or self-blame, and 15% discontinued breastfeeding prematurely. According to a 2023 study by the Chinese Association of Maternal and Child Health Psychology, nipple confusion is also a major contributor to postpartum depression, accounting for approximately 31% of outpatient cases.

5. Regional variations and impacts of nipple confusion

In high-income countries, medicalized childbirth practices such as increasing cesarean section rates are often accompanied by early bottle feeding. Data indicate that in the United States, the mixed feeding rate reaches 58%, with a nipple confusion rate of 38%. In contrast, European countries benefit from strong policy support; for instance, Sweden's 18-month paid parental leave helps maintain breastfeeding rates above 80%, while nipple confusion occurs in only 12–18% of cases. In low-income countries, a strong traditional breastfeeding culture has historically kept nipple confusion below 10%, though aggressive formula marketing is beginning to challenge this trend [6].

According to the China Child Development Report (2022), the Chinese exclusive breastfeeding rate within the first six months is 29.2%, far below the WHO's recommended target of 50%. In first-tier cities such as Beijing and Shanghai, mixed feeding exceeds 40%, with nipple confusion occurring in 52% of cases. Rural areas retain more traditional breastfeeding practices, showing a mixed feeding rate of 35%. However, scarce medical resources for correcting nipple confusion mean only 28% of mothers receive professional guidance. China's infant formula

market grew at an average annual rate of 12%, reaching RMB 50 billion in 2022. Excessive advertising led 30% of mothers to mistakenly believe "formula is nutritionally equivalent to breast milk," indirectly exacerbating nipple confusion. Some medical staff prematurely recommended formula supplementation due to concerns about neonatal hypoglycemia, indirectly contributing to nipple confusion.

6. Comprehensive intervention strategies for nipple confusion

6.1. Golden window period management

Implementing immediate postpartum interventions is crucial to promote successful breastfeeding. One effective approach is biological nurturing, which encourages mothers to breastfeed in a semi-reclined position while allowing infants to use their innate crawling reflex to self-attach [7]. In Norway, the introduction of a "no bottle policy" in hospitals, which prohibits the use of artificial nipples within the first 72 hours after birth has increased breastfeeding rates to 90%. China can draw from this experience by strengthening the enforcement of its Breastfeeding Promotion Regulations to provide stronger institutional support for early breastfeeding practices.

6.2. Breastfeeding recommendations

To address nipple confusion, mothers should adopt proactive and effective measures.

(1) Increase skin-to-skin contact with the infant

During daily interactions, try gentle face-to-face conversations with the baby, accompanied by soft touch massage, or natural skin-to-skin contact during bath time [8]. As these interactions increase, breastfeeding can naturally progress to the intimate chest-to-chest position. This gradual approach provides the baby with a sense of security while helping mothers adapt to close parenting, ultimately achieving seamless intimacy during feeding.

(2) Experiment with feeding positions

During bottle-feeding, infants typically lie flat with the bottle held upright. Milk flows rapidly due to gravity, prompting fast swallowing and quicker feeding completion. However, when transitioning to breastfeeding, milk flow is relatively slower. Infants may not receive sufficient milk within the same timeframe, leading to frustration and restlessness. Therefore, during bottle-feeding, try positioning the baby in a seated posture with adequate back support, keeping the bottle nearly parallel to the ground. This slows the milk flow rate, mimicking breastfeeding conditions [9]. During bottle-feeding, incorporate brief pauses between sucking and swallowing to allow the baby to rest. Gradually, the baby will learn this is the normal feeding rhythm.

(3) Stimulate the let-down reflex before feeding

Since bottle-feeding requires less effort, some babies may resist breastfeeding, which demands more vigorous sucking. To prevent nipple confusion, the key is to help the baby re-experience the ease of breastfeeding. Mothers can stimulate the let-down reflex before nursing to ensure the baby receives sufficient milk immediately upon latching. For the technique, choose a quiet, comfortable environment and relax through deep breathing. Before feeding, apply a warm towel to the breasts for a moment. Then gently roll the nipples with fingertips, mimicking the rhythm of a baby's suckling. Simultaneously, visualize milk flowing or recall the sound of your baby swallowing contentedly. This mental imagery can stimulate oxytocin release [10]. When you feel slight breast engorgement, notice nipple leakage, or observe

milk ejecting in a spray-like pattern, this indicates the let-down reflex has been successfully triggered. Immediately position your baby to latch at this moment to more easily establish a successful feeding experience.

(4) Try feeding with the bottle tucked under your arm

First, position the baby close to your body. Then place the bottle under your arm, adjusting its height and angle to mimic the natural breast position. It is recommended to attempt this during periods when the baby is not fully awake, such as just before sleep or upon waking. Initially, allow the baby to suckle a small amount of milk from the bottle. Family members can then discreetly remove the bottle from behind and swiftly replace it with the breast. Note that this method requires multiple attempts and consistent patience; rushing the process is counterproductive.

7. Conclusion

In summary, nipple confusion is a complex issue intertwining biological behavior, sociocultural factors, and medical practices. While its challenges are significant, multidisciplinary collaboration between pediatricians and families, coupled with social support, can drive policy innovation and foster a breastfeeding-friendly society. As breastfeeding advocate Jack Newman stated: "Babies are not machines, and feeding is not a task, it is a two-way conversation requiring patience and wisdom."

Disclosure statement

The authors declare no conflict of interest.

References

[1] Zhao Y, Wang X, 2024, Research Progress on Breastfeeding in Preterm Infants. Chinese Community Physician, 40(4): 4–6.

[2] Wang Z, Wang H, Xiao M, et al., 2018, Analysis of Breastfeeding Status and Nursing Strategies in China. Chinese Journal of Reproductive Health, 29(2): 200–202.

[3] Zhang Y, Ma H, Ren M, et al., 2025, Research Progress on Scenario Simulation in Breastfeeding Health Education. Medical Frontiers, 15(9): 31–34.

[4] Shao M, Luo P, Qin X, et al., 2022, Research Progress on Newborn Sucking Function Assessment Tools. Military Nursing, 39(7): 17–20.

[5] Chen D, 2023, Impact of Infant Health Care on Growth and Development, Nutritional Diseases, and Health Status. Women and Children's Health Guide, 2(13): 73–75.

[6] Hu H, 2017, Clinical Observation on Combining Finger Training with Bio-Nourishment Method to Improve Nipple Confusion Rate After Maternal–Infant Separation. Everyone's Health (Late Edition), 11(8): 190–191.

[7] Fang X, Zhang J, 2009, Nutritional Needs and Supply for Mothers and Infants During the Critical Period. Proceedings of the 12th Academic Annual Meeting of the Danone Nutrition Center, 177–180.

[8] What to Do About Nipple Confusion, 2021. Jiangsu Health Care, 2021(11): 32–33.

[9] Deng H, 2020, How to Master Correct Breastfeeding Positions. Proceedings of the 12th Guangzhou Health Education and Health Promotion Academic Exchange. Guangzhou Health Education and Promotion Center, 1.

[10] Bao X, 2019, Baby's Refusal of the Nipple Is Not the Mother's Fault. Jiangsu Health Care, 2019(6): 36.