News Release

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Pigeon Corporation

Original Research Paper “Estimation of Nutritive Sucking During Breast-Feeding by Receiver Operating Characteristic Analysis of Sucking Interval” Receives 2025 Academic Award from The Society for Nursing Science and Engineering

Pigeon Corporation (Headquarters: Tokyo; President and CEO: Ryo Yano) has received the 2025 Academic Award from the Society for Nursing Science and Engineering for the original paper “Estimation of nutritive sucking during breast-feeding by receiver operating characteristic analysis of sucking interval,” which suggested the possibility of objectively estimating whether infants are swallowing breast milk based on analysis of how frequently they suck.

At the awards ceremony

Overview of Award-Winning Paper

Background

During breastfeeding, determining whether an infant is actually swallowing breast milk is important for providing appropriate breastfeeding support. However, existing methods based on swallowing sounds were problematic in that they were easily influenced by other noise nearby.

Infant sucking is divided into two types: “nutritive sucking,” when breast milk or formula flows into the mouth, and “non-nutritive sucking,” when it does not. It is a known characteristic of nutritive sucking that it happens at more widely spaced intervals than non-nutritive sucking. This research used this characteristic to develop and validate a new method for estimating from the sucking interval whether sucking was nutritive or not—in other words, whether the infant was swallowing breast milk or not.

Method

Sucking pressure and swallowing sounds were recorded during the mixed feeding of infants aged 1 to 2 months old. Using a modified nursing bottle, researchers measured the sucking intervals for nutritive and non-nutritive sucking based on changes in sucking pressure. Next, using a method known as Receiver Operating Characteristic (ROC) analysis, they calculated cut-off sucking interval values for categorizing sucking into the two types, and then categorized sucking during breastfeeding based on this.

Results/Discussion

The researchers confirmed that when the sucking interval was above the cut-off value, swallowing incidence was significantly higher. This suggests that it could be possible to estimate whether sucking is associated with swallowing by observing the sucking interval during breastfeeding.

Comment from Pigeon

This research showed the possibility of determining whether babies are drinking breast milk by observing their sucking rhythms as they feed. Knowing whether a baby is drinking breast milk or not is an extremely important point in breastfeeding. We will further deepen our research on nursing, not only applying the insight we gain into our nursing bottle research and development but also using it to support mothers raising their children on breast milk.

Bibliographical Information

Title: Estimation of nutritive sucking during breast-feeding by receiver operating characteristic analysis of sucking interval

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