

Tongue movement during breast-feeding



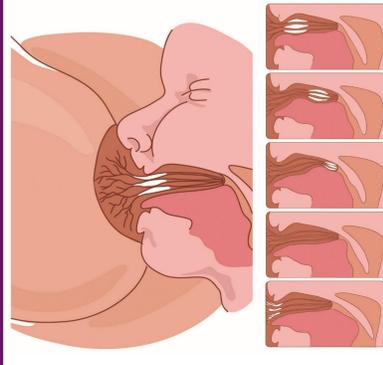
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Introduction

Historically, two main theories regarding the removal of milk from the breast by the infant have evolved and remained a controversy¹. The main reason behind this ongoing controversy is due to the lack of objective and quantified analysis.

The stripping theory³

- A stripping action by upward movement of the tongue (or peristaltic movement)
- The application of vacuum to create a pressure gradient



The intra-oral vacuum theory^{2,3}

- Negative pressure created, inside the oral cavity, by the infants
- Absence of peristaltic tongue movements⁴.

We investigated the tongue motion of infant during breast-feeding by objective analysis of submental ultrasound videos using image processing tools.

Methods & Results

Methods

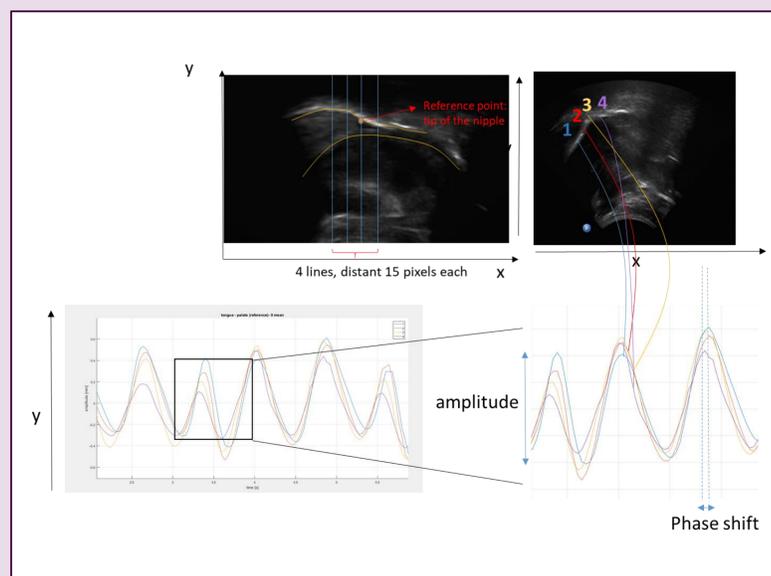
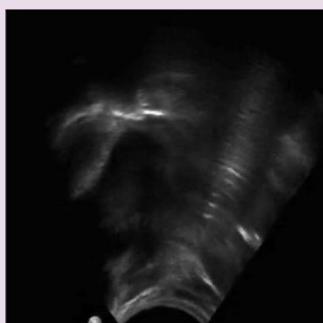
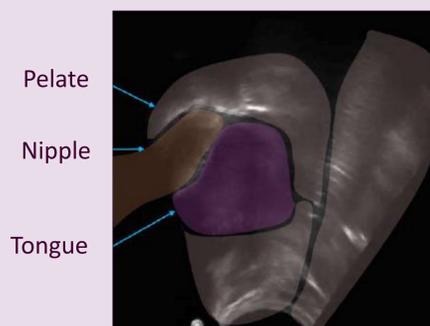
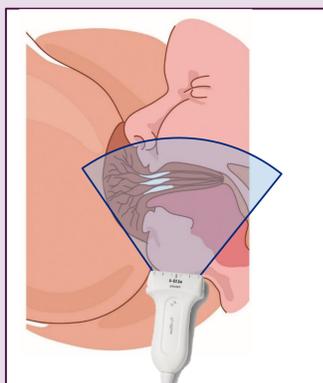
Sub-mental ultrasound video clips of 18 babies were analyzed. The image processing approach was to directly track moving interfaces around the tongue/nipple and nipple/palate interfaces over time at several position along the nipple.

Oscillating curves corresponding to the movement of the tongue at each position can be extracted.

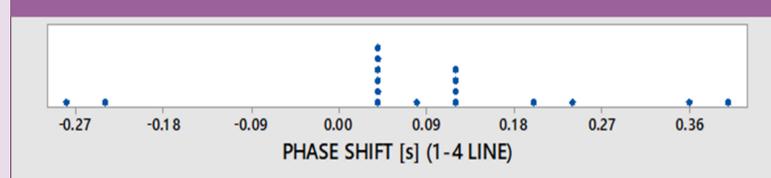
The extent of the phase shift between the curves give a direct indication on the presence of a peristaltic movement.

Results

Out of the 18 babies, 15 showed a positive phase shift. According to these results, the tongue of the babies applies a peristalsis-like action while sucking the milk from the breast.



Dotplot of PHASE SHIFT [s] (1-4 LINE)



Conclusions

The results obtained from this study indicate that the tongue of the babies is moving with a **peristaltic-like action**. However, our study does not tell about the actual effect of the peristaltic motion on the milk extraction. To our knowledge, **this study is the first objective analysis made on the tongue movement showing a peristaltic-like motion**. The simple method used to extract the curves has shown to be effective and it is a good method for future studies on the tongue movement. The quality of the US videos are however still very critical as the algorithm is not able yet to compensate for horizontal motion and may not work with low contrast images.

- References
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