

ABSTRACT

OBJECTIVE: To determine the incidence of ankyloglossia, examine anatomical and functional characteristics of lingual frenum and maxillary labial frenum attachments, and determine whether an association exists between these characteristics and breastfeeding problems. **MATERIALS AND METHODS:** Lingual frenum and maxillary labial frenums of healthy infants born to mothers who intended to breastfeed were examined and classified using modified HATLFF (LF) and Stanford Classification Systems (MF), respectively. Demographic data, experience feeding previous children, and family history of ankyloglossia were obtained. A 3-8 month follow-up questionnaire gathered information regarding feeding experience with examined infant, evaluations for ankyloglossia and frenotomy procedures. **RESULTS:** 64 mother-newborn dyads and 4 additional newborns were evaluated in this study, with 34 available for follow-up. Prolonged breastfeeding time per session was observed significantly with infants who had limited tongue lift and/or protrusion, attachment of the tongue tip to the inner alveolar ridge, and/or an overall low LF score ($P < 0.05$). Mothers of infants with a notched tongue tip were significantly more likely to report an ankyloglossia diagnosis at follow up ($P = 0.047$). Infants with a “present” murphy score were more likely to have borderline or low LF scores ($P = 0.0014$). Majority of newborns (77.2%) presented with Type 2 MF. **CONCLUSIONS:** Lingual frenum classification systems may help predict breastfeeding problems due to tongue-ties in newborns, but breastfeeding assessments should additionally be used to determine the need for frenotomies. Substantial maxillary labial frenum attachments are common in newborns and not significantly correlated with breastfeeding difficulties.

BACKGROUND

- Lingual (Figure 1A) and maxillary labial (Figure 1B) frenum restrictions can interfere with breastfeeding and cause early weaning.
- The American Academy of Pediatrics recommends treatment of symptomatic ankyloglossia as early as possible to reduce breastfeeding difficulties.
- Despite an increase in the research regarding this subject, the diagnosis and treatment of tongue and upper lip ties remains controversial.
- Additionally, studies evaluating lingual and maxillary labial frenum attachments shortly after birth are limited.
- Pediatric dentists often examine these frenum attachments and perform frenotomies. It will be beneficial to know the commonality of various features and their potential impact on breastfeeding.
- The goal of this project was to evaluate newborns and to determine if an association exists between frenum attachments and breastfeeding difficulties in the first six months of life.**



FIGURE 1. (A) Anterior Ankyloglossia: Attachment of tongue to inner aspect of alveolar ridge. (B) Maxillary labial frenum: Type 3

METHODS

- Study was approved by UTHealth Houston IRB.
- Study Flow Chart shown in Figure 2. Study visit 1 completed in the hospital prior to newborn discharge. Study visit 2 completed via telephone interview.
- Lingual frenum assessment completed via modified HATLFF Assessment.
 - 5 categories: protrusion, lateralization, lift, attachment to anterior ridge, and tongue tip appearance.
- Maxillary labial frenum assessment completed via modified Kotlow Assessment, (Stanford scale): 3 categories based on location of attachment.

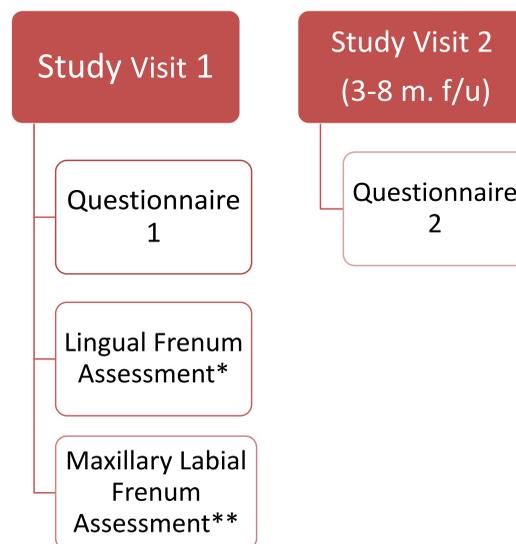


FIGURE 2. Diagram of study

RESULTS

- Sixty-seven parent-child dyads participated in this study.
- Majority of infants (59.7%, 40/67) presented with borderline or mild impairment and 11.9% (8) presented with moderate to severe impairment (Table 1).
- Majority of infants (77%, 51/66) presented with a Type 2 MF. Type 1 was the least common with only 3% (2) of infants presenting with this type. Females were more likely to have type 3 MF with marginal significance (Table 2).
- Prolonged breastfeeding time per session was observed significantly more with infants who had limited tongue lift (score: 1) and/or protrusion (score: 1), attachment of the tongue tip to the inner aspect of the alveolar ridge and/or an overall low LF score (6 or below; moderate to severe impairment) ($P < 0.05$) (Table 3).
- Having a notched tongue-tip appearance was significantly associated with receiving a diagnosis of ankyloglossia ($P = 0.044$), but not with breastfeeding problems.
- Family history was reported by 11% of mothers, but was not significant with subsequent diagnosis of ankyloglossia in the studied newborns.

TABLE 1 Lingual Frenum Assessment

LF score range	Category	% Study Population	Female:Male
10	Normal	28. % (19)	1.5 7:1
7-9	Borderline/Mild Impairment	59.7% (40)	1.47:1
6 or below	Moderate to Severe Impairment	11.9% (8)	1.33:1

TABLE 2 Maxillary Labial Frenum Assessment

MF Type	Description	% Study Population	Female:Male
Type 1	Insertion of frenulum near mucogingival junction	3.0% (2)	2.0:0
Type 2	Insertion along the mid attached gingiva	77.2% (51)	1.09:1
Type 3	Insertion along inferior margin of alveolar papilla and may continue onto hard palate	19.6% (13)	5:1 ($P = 0.062$)

TABLE 3 Lingual Frenum Assessment and Breastfeeding Problems

LF assessment	Breastfeeding problem	P
Limited Tongue Lift	Feeding time >30 minutes	0.047
Limited protrusion	Prolonged feeding time	0.025
Attachment of tongue tip to inner aspect of alveolar ridge	Feeding time >30 minutes	0.027
Moderate to severe tongue impairment	Prolonged feeding time	0.011

DISCUSSION

- The modified Hazelbaker Assessment Tool for Lingual Frenulum Function and the Murphy Maneuver may help predict breastfeeding difficulties, specifically prolonged breastfeeding sessions, within the first six months post-birth.
- Our study builds on current evidence that a possible tongue-tie or maxillary lip-tie in a newborn does not always necessitate a frenum release to facilitate proper breastfeeding.¹⁻³
- This study provides confirmation that the presence of a significant maxillary labial frenum is common and may not be significantly associated with breastfeeding difficulties.⁴
- Limitations include small sample size, loss to follow-up, family history evaluation/diagnosis of maxillary frenum not obtained, and wide time-frame for completion of questionnaire two (3-8 months).

Future studies should correct above limitations and include a breastfeeding assessment, such as the LATCH Assessment Tool or the Frenotomy Decision Rule for Breastfeeding Infants, into the study protocol.

ACKNOWLEDGEMENTS

This research was supported by Department of Pediatric Dentistry, University of Texas Health Science Center at Houston and Children’s Memorial Hermann Hospital, Houston, Texas. We would like to thank Angela Suryakusuma and Kayla Rankin for helping with data collection and Dr. Holland for running the statistical analysis.

REFERENCES

- Hogan, M., Westcott, C., & Griffiths, M. (2005). Randomized, controlled trial of division of tongue-tie in infants with feeding problems. *J Paediatr Child Health*, 41(5-6), 246-250. <https://doi.org/10.1111/j.1440-1754.2005.00604.x>
- Kumar, R. K., Nayana Prabha, P. C., Kumar, P., Patterson, R., & Nagar, N. (2017). Ankyloglossia in Infancy: An Indian Experience. *Indian Pediatr*, 54(2), 125-127. <https://doi.org/10.1007/s13312-017-1014-5>
- Ricke, L. A., Baker, N. J., Madlon-Kay, D. J., & DeFor, T. A. (2005). Newborn tongue-tie: prevalence and effect on breast-feeding. *J Am Board Fam Pract*, 18(1), 1-7. <https://doi.org/10.3122/jabfm.18.1.1>
- Santa Maria, C., Aby, J., Truong, M. T., Thakur, Y., Rea, S., & Messner, A. (2017). The Superior Labial Frenulum in Newborns: What Is Normal? *Glob Pediatr Health*, 4, 2333794X17718896. <https://doi.org/10.1177/2333794X17718896>