

# Toward a functional definition of ankyloglossia: validating current grading scales for lingual frenulum length and tongue mobility in 1052 subjects

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## Abstract

### Purpose

Alterations of the lingual frenulum may contribute to oromyofacial dysfunction, speech and swallowing impediments, underdevelopment of the maxillofacial skeleton, and even predispose to sleep breathing disorder. This study aims to assess the utility of existing instruments for evaluation of restricted tongue mobility, describe normal and abnormal ranges of tongue mobility, and provide evidence in support of a reliable and efficient measure of tongue mobility.

### Methods

A prospective cohort study of 1052 consecutive patients was evaluated during a 3-month period. Age, gender, ethnicity, height, weight, BMI, maximal interincisal mouth opening (MIO), mouth opening with tongue tip to maxillary incisive papillae at roof of mouth (MOTTIP), Kotlow's free-tongue measurement, and presence of severe tongue-tie were recorded. Secondary outcome measures include tongue range of motion deficit (TRMD, difference between MIO and MOTTIP) and tongue range of motion ratio (TRMR, ratio of MOTTIP to MIO).

### Results

Results indicate that MIO is dependent on age and height; MOTTIP and TRMD are dependent on MIO; Kotlow's free-tongue measurement is an independent measure of free-tongue length and tongue mobility. TRMR is the only independent measurement of tongue mobility that is directly associated with restrictions in tongue function.

## Conclusions

We propose the use of tongue range of motion ratio as an initial screening tool to assess for restrictions in tongue mobility. "Functional" ankyloglossia can thus be defined and treatment effects followed objectively by using the proposed grading scale: grade 1: tongue range of motion ratio is >80%, grade 2 50–80%, grade 3 < 50%, grade 4 < 25%.

## Keywords

Ankyloglossia Frenulum Tongue tie Oromyofacial dysfunction  
Classification of ankyloglossia Tongue tie grading scale  
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## Notes

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## Author contributions

All the authors met the four criteria for authorship established by the International Committee of Medical Journal Editors: Audrey Yoon, Soroush Zaghi, and Stanley Liu were responsible for the conception, design, analysis; drafting and revising the work; and reviewing the manuscript. Rachel Weitzman and Sandy Ha had substantial contributions to the acquisition of data for the work as well as in drafting and revising the work and reviewing the manuscript. Clarice S. Law and Christian Guilleminault had substantial contributions to data analysis, interpretation of data for the work, and revising the work critically for important intellectual content. Additionally, all authors provided final approval of the version to be published and agreed to be accountable for all aspects of the work including ensuring the accuracy and/or integrity of the work.

## Compliance with ethical standards

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# Conflict of interest

The authors declare that they have no conflict of interest.

# Comments

Otolaryngologists and pediatricians pay close attention to the frenulum status of newborns to enable breastfeeding. Dentists can evaluate for functional tongue tie and contribute to proper growth and development of the maxilla. This article gives us an easy way to make a judgment, but it mostly will help the dentist pay attention.

Steve Carstensen

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