CLINICAL ANALYSIS OF PROPOSED CLASSIFICATION OF THE LINGUAL FRENULUM BY INDEX AND PERCENTAGE

Análise clínica das propostas de classificação do frênulo da língua por índice e porcentagem

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ABSTRACT

Purpose: to determine the clinical applicability of the proposed classification of the lingual frenulum by index and percentage. **Methods:** the sample of this study consisted of 287 subjects of both sexes aged between 23 and 28 years. The lingual frenulums were classified based on two measures defined with aid of a compass and a digital caliper and it were analyzed in the formulas and proposed pattern from a research of corpses which resulted in formulas for index and percentage calculations. **Results:** it was observed that the pattern established in the classification of lingual frenulum by the proposal is reliable by percentage. At the index classification a new pattern was found in the studied population. **Conclusion:** after clinical application, it is suggested that the new pattern proposed by the index be adopted. In percentage proposal, the initial pattern should be maintained, providing effectiveness to both ways of classification of the lingual frenulum in speech-language practice.

KEYWORDS: Lingual Frenum; Tongue; Classification

INTRODUCTION

The lingual frenulum is a structure that connects the tongue to the floor of the mouth, allowing the handling of this. This is not muscle[1] tissue, but a median fold of mucous membrane passing from the gums to the *posteroinferior* surface of the tongue and covers the lingual aspect of the anterior alveolar ridge[1-3].

Among the alteration the lingual frenulum are ankyloglossia or lisp, which can be characterized with the fold of the tongue tip down to protrude out of the mouth, forming a heart at its apex, the diastema between the mandibular central incisors, abrasion or cut on the underside of the tongue and swallowing disorders and their consequences on feeding, especially during breastfeeding[4], because the baby who has alteration in the frenulum of the tongue may have problems in the handle, unable to suck the mother's breast, interfering even in weight gain[4,5].

It is worth mentioning that there are in the speech therapy literature different terms used to classify the lingual frenulum as altered: frenulum with anterior insertion, defined as one that has insertion anywhere on the underside of the tongue, half forward, or even near the apex impeding or preventing the elevation of the anterior third of this; short frenulum of the tongue, though inserted in the correct place, is small in size, preventing or hindering isolated movements of the tongue and / or the performance of orofacial functions, and there is another alteration of the frenulum of the tongue called short frenulum with anterior insertion, which is smaller compared to normal frenulum and with insertion into the forward half of the lower surface of the tongue [2,6-8].

The lingual frenulum when altered, interferes with the functions of the stomatognathic system, and the major interferences may be related to speech [1-4,8-16], swallowing [4,11], chewing [5,16], the patient may present difficulties to make moves with tongue [1,5], alterations in the development of the structures of the bones of the face[17], difficulty of playing wind instruments and in adulthood may occur instability

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Conflict of interest: non-existent

of dental prosthesis and also, prejudice in some social activities[18].

Once the frenulum of the tongue is altered, shortened or their anteriorized origin, the speaker may have a loss on the accuracy of isolated movements of the tongue, or the articulatory movements necessary for the production of certain speech sounds, such as: elevation of the tip of the tongue characteristic of the production of alveolar consonants[12].

The literature points to the existence of controversies between health professionals in the assessment and classification of the lingual frenulum. These controversies also extend as to the action to be taken, making evident the difficulty in diagnosis, noting the uncertainty of patients and their families when they receive conflicting opinions on the same issue from different professionals [2-4].

Considering the differences between the professionals who evaluate and treat the frenulum of the tongue, as well as the insecurity of patients before diverging opinions on the same clinical picture, this research came from two proposed classification of the frenulum of the tongue raised in a study of 40 cadavers, which the authors suggest to verify the clinical application and efficacy results in clinical practice[19].

Thus, the purpose of this research was to verify the applicability of the classifications by index and percentage, proposed in the study by Oliveira, Lindoso, Coelho (2010)[19], in order to establish a quantitative and standardized method, generating a greater reliability on diagnostic, for both the evaluator as to the evaluated in the classification of normal and abnormal frenulum.

■ **METHODS**

This study was approved by the Ethics Committee of the home institution by opinion nº 492/10ª.

This is a quantitative descriptive research conducted in the home institution that aimed to apply the proposed classification of the lingual frenulum de Oliveira, Lindoso and Coelho (2010)[19] in students of the Center for Health Sciences of the home institution. The courses involved were Psychology, Physical Education and Speech Therapy and Audiology, all them of the nighttime. This study was authorized by the director of the Centre for Health Sciences (CHS) of the home institution, as well as by the coordinators of these courses.

For the inclusion of students as research subjects, the following criteria were used: students enrolled in courses in Psychology, Speech Therapy and Audiology and Physical Education at the Center for Health Sciences at nighttime the institution of origin, of both sexes and of different ages, who agreed to participate. It were excluded all the participants who did not fit the criteria as: be performed surgeries on the tongue (lingual frenectomy), students who wore piercing in the oral cavity and those which had limitations in mouth opening.

The population studied was composed of 574 students, of which 287 was sampled. This number was divided proportionately between the three courses, so that everyone could have the opportunity to participate. Thus, the division resulted in: 96 students of the course in Speech Therapy and Audiology, 96 of the course of Psychology and 95 students of the course of Physical Education. The sample size was calculated using the software Epi Info 3.4 with the following calculation parameters: population of 574 students; expectation of change and deletion of the 5% sample, sampling error of 1% and a confidence level of 99.99%. This calculation resulted in a minimum value of 252, but the final sample established was 287 participants.

The data collection started from brief explanation to students of the purpose of the research and methodology, as well as information regarding ethical and professional secrecy of the data collected by the researchers who carried out the approach in the classroom, in groups or individually in hallways of the Institution. Students who agreed to participate were asked to leave their classroom after consent of the professors, two by two, for an average of 5 (five) minutes, and were taken to an empty classroom provided by the coordinator of each course. There, the students received more details about the survey and clarified other questions. The participants who agreed, signed the Form of Free Consent and Informed in which allow the use of your data for purposes of study.

After the acceptance and signatures, the data collection consisted of two measures, through the use of digital caliper and a compass. It were used for the measurement, examination gloves, disposable masks, alcohol, gauze and wooden spatula to accord the biosecurity rules. The compass used underwent adaptation of the researchers who withdrew from the first rod the pointed metal tip and it was inserted unlike, getting a cylindrical surface. On the contrary stem, just was removed the graffiti. The two modifications aimed at preventing damage to the mucosa of the participants of the research.

The first measure (M1) consisted of the distance between the origin and insertion of the frenulum and the second measure (M2) in measuring the distance between the insertion of the frenulum and the apex of the tongue. These two measurements were performed three times each, and the measure adopted was averaged between the

values. Measurements were performed by a single researcher who had less variation between the results of three equal measures, so that the result did not suffer alteration. The annotation of the results and the achievement of the objective questions were conducted by another researcher.

The measurements were taken with the assessed student sitting, and the researcher positioned right next to the participant. The order for the participant was to open the mouth as wide as he could and put the apex of the tongue on the lingual papillae. It is noteworthy, that the method used (tongue supported by the incisive papilla) was based on a study done earlier, where measurement with the language in the incisive papilla showed up as the best form of measurement[2].

The explanation was followed by the statement made by the researcher who conducted the measurements and, when appropriate, the apex of the tongue and palate papillae were sensitized with wooden spatula. If the lingual frenulum was not visible, the student was asked to perform the suction of the tongue against the palate, to make it visible. In the research with cadavers, opened the compass until their tips coincides with the origin and insertion of the lingual frenulum.

After the bar set this angle, the digital caliper that was closed, was open and their tips positioned along the edges of the bar, thus obtaining the measurement. After the compass set this angle, the digital caliper that was closed, was open and their tips were positioned along the edges of the compass, thus obtaining the measurement.

The second measure consisted in obtaining the length between the insert of the frenulum and the apex of the tongue. The participant received the same order, to open the mouth as wide as he could with the apex of the tongue supported on the papillae and the researcher performed the measurement of the length of insertion of the frenulum and the apex of the tongue.

Remember that the apex of the tongue was supported in the incisive papilla, so it was necessary to introduce the measure behind the incisor teeth to get to the correct spot. At this time, to prove that the measurement was being held in the proper place, besides visual inspection, the researcher made use of proprioception of the patient and asked if they were feeling the tip of the compass at the apex of his tongue. These measurements were performed three times, and between one and another measure, the compass and calipers were completely closed to not interfere in the following measure.

The same procedure was used to measure the distance between the insertion of the frenulum and the apex of the tongue.
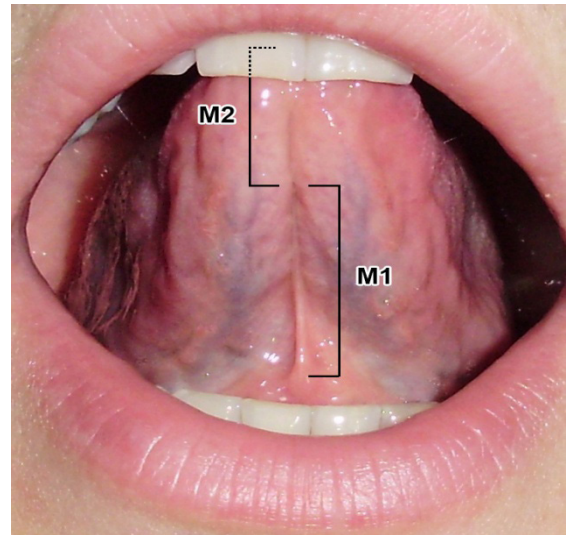

Figure 1 - Length of the measure M1 and M2

Each measurement was performed three times, and after this procedure, the values was written in a table. Finished the exam, it was calculated the average of the three values and the two measures were stored in an spreadsheet.

The formula proposed by index refers to the value found between the total length of the frenulum (M1) less the length of completion of the frenulum to the apex of the tongue (M2), being divided by the length value of the frenulum (M1) plus the length of the end of the frenulum to the apex of the tongue (M2) which result in a value that ranks as normal, short or anterior lingual frenulum (Equation 1).

In the proposed by percentage, the formula is developed in order to classify the frenulum proportional to the size of the tongue, which is the value obtained in the measurement of the extent of frenulum (M1) multiplied by one hundred and divided by the total length of the tongue (M1 + M2) obtaining the percentage of the tongue that is occupied by the frenulum (Equation 2).

At the end of the measurements, the students were asked to fill the form containing two objective questions involving the perception and possible discomfort of the exam.

Completed data collection, the researchers performed the classification of the frenulum of the tongue proposed by index and percentage according to the formulas and standards suggested in research with cadavers.

Regarding the statistical analysis, the paired t-test was adopted to assess the significance of the results of classifications and ages of participants with a significance level of $p < 0.05$. To demonstrate the correlation between index and percentage data

were analyzed using the Pearson Test of assessing the degree of association between variables.

■ RESULTS

The figure 2 shows the results obtained after the classification of the frenulum of the tongue according to the standard and the formula established by Oliveira, Lindoso and Coelho (2010)[19] proposed by the index and percentage.

After the classification was observed that in the proposed of porcentage, 91% of the frenulum (261) were classified as normal and 9% (26) were classified as short.
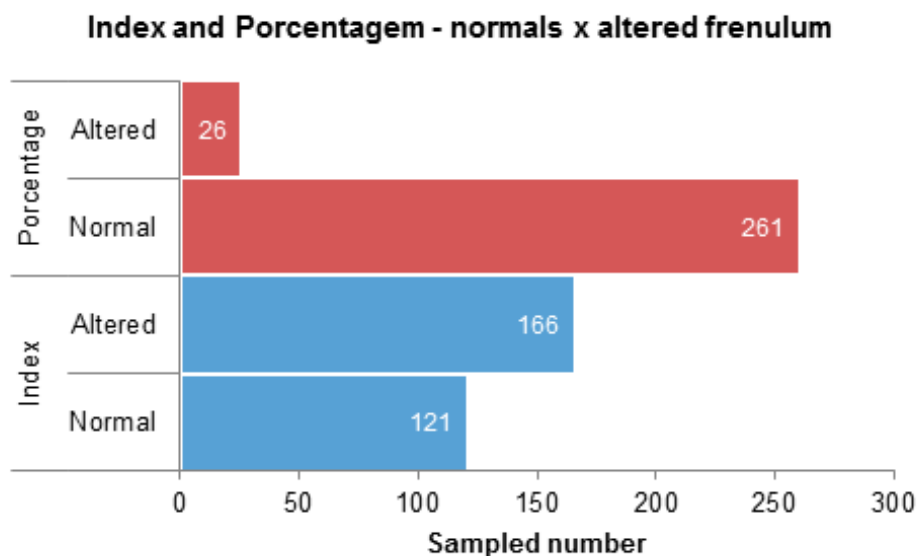
Index and Porcentagem - normals x altered frenulum

Figure 2 - Distribution of the lingual frenulum as the classification by index and percentage according to the standard of research in cadavers

In proposed by index, 166 of 287 participants (58%) showed alterations in lingual frenulum and this was classified as short. The remaining 121, representing 42%, were classified as having normal frenulum.

In both proposals were not found frenulum classified as frenulum with anterior insertion.

Regarding the average age of the participants and the average of the results for the index and porcentage classification according to the gender, the data are presented in Tables 1 and 2.

Table 1 - Distribution of ages average according to the gender

Gender	N	Mean	Median	Standard deviation	Standard error
Female	219	23,45	21,00	7,43	0,50
Male	68	27,82	25,00	10,34	1,25
Total	287	24,48	21,00	8,40	0,50

T-test (p) < 0,05: 0,001685867

Table 2 - Distribution of average results of classification according to gender

| Variable	Gender	Number	Mean	Median	Standard deviation	Standard error
Index	Female	219	-0,01	-0,02	0,14	0,01
	Male	68	-0,05	-0,07	0,13	0,02
	Total	287	-0,02	-0,03	0,14	0,01
Percentage	Female	219	49,30	48,80	6,45	0,44
	Male	68	47,55	46,75	6,59	0,80
	Total	287	48,88	48,50	6,51	0,38

Table 1 shows the significance (p) <0.05: 0.001685867 in the difference in the average age by gender, with age average 23 years to female and 28 years in males, which can be justified by an academic population.

Table 2 shows the average of results obtained in the classification index and percentage according to gender. The mean values in the ratio as the percentage was lower in males, where the index variable, the average was -0.05 and 47.55 respectively.

It was verified that both classifications the average of results were lower in males. There was significance in the results, and the values obtained were statistically efficient. (Index - (p): 0.0234599; Percentage - (p): 0.0265663).

One aspect also observed, was the degree of association between classifications according to the measurements obtained in the present study. Figure 3 shows the statistical results of the distribution of the degree of association between variables index and percentage according to the linear correlation coefficient of Pearson, where there was the greatest concentration of measures in the distribution line. In other words, the coefficient is between 0.90 and 1.00 indicating a very strong association between the classifications.
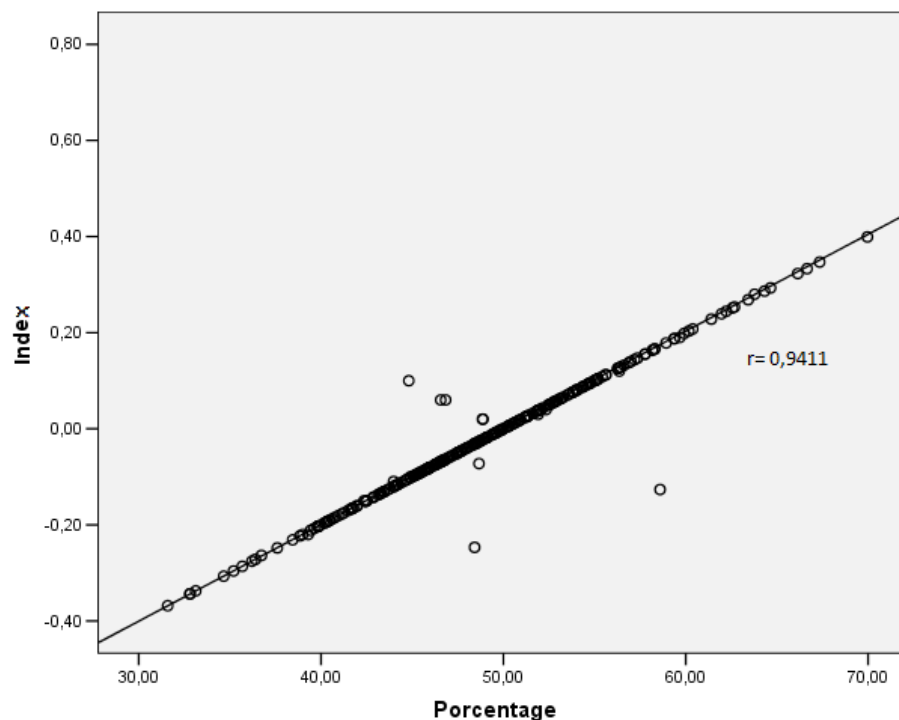
Figure 3 - Distribution of the degree of association between classifications of the Index and Percentage according with the linear correlation coefficient of Pearson

◼ DISCUSSION

The classifications of the frenulum of the tongue are used to assess and characterize the structure in normal and altered, but depend on the criteria used by professional appraiser.

There are few studies that propose methods for classification of frenulum of the tongue and among these; the minority seeks to assess the frenulum by quantitative means.

Current literature suggests the importance of establishing a quantitative method to classify frenulum of the tongue which, added to the qualitative data and medical history of the patient, will allow to create a reliable parameter to differentiate normal and altered frenulum [2,3,8].

A survey of the insertion of the lingual frenulum in 40 cadavers in the Anatomy Laboratory of the University of Vale do Itajaí (UNIVALI) showed that, with the data collected would be possible to propose two new ways of classification the lingual frenulum, by index and percentage, since there is still no consensual objective way to classify the frenulum clinically [19].

Whereas the classification standard of proposals was created from measurements found in cadavers, where the question: mass and muscle mobility should be emphasized, it brought need for implementing these proposals and verifies the effectiveness of the standard for living humans. The relevance of the research is given by considering the possibility of using one of the formulas in clinical practice aiming to reduce the assessment time, providing greater reliability of the results and less divergence between evaluators.

According to scientific study, it was shown that the best way to measure the lingual frenulum was taking the measure with wide open mouth with tongue in papilla [2]. This method was also used in this study, noting the ease in measurements when the apex of the tongue is supported by the incisive papilla.

Through the analysis of the results obtained with humans alive, after the measurements and classification of frenulum in accordance with the formulas and standards set in cadavers, it was verified that the values found in the proposal of classification by percentage are feasible, finding the same pattern established in the proposal made in cadavers [19], so, so, it were obtained larger amount of normal frenulum that altered frenulum.

In the index, in contrary, were not verified feasible values, once it was obtained a greater amount of altered frenulum. This may be related to the difference in muscle mobility of cadavers and live human beings, since the classification by index evaluates the formula according to the observation of the visible insert. Also, a factor associated with not feasibility of the values is the pattern established by the proposed by index in relation to a normal and short frenulum of tongue.

Considering the increased reliability for studies on living, considering that the visible observation occurs upon muscle mobility, it is suggested that the standard be adapted for the classification of short frenulum, for smaller or equal to -0.21 and not less than 0 (zero), as proposed in the research with cadavers.

From the values found in research with students, it was noted was that the degree of association between the variables, index and the percentage, where it was observed that the highest concentration of measurements was found in the margin of 50% (percentage) and 0.00 (index), indicating the normality of the lingual frenulum. Measures that showed lower values of 40% (percentage) and -0.20 (index) indicated short frenulum. These data are considered statistically efficient, where he obtained a very strong degree of association between variables.

The data analyzed show that the pattern established in corpses in the proposed classification of lingual frenulum by percentage shown to be reliable in the population of living human beings, classifying the structure in proportion to the size of the tongue (the fixed point on the floor of the mouth to the apex of language).

In the proposal by index, differences were observed in the pattern between cadavers and live humans, since, as evidenced in the above results, it was found an increased amount of altered frenulum, according to the established pattern in the study of cadavers.

It is noteworthy that the facts discussed so far show that in the proposed of percentage is possible the application of standard measures suggested in the study with cadavers [19]. As regards the proposed by index, the pattern found in the cadavers must be replaced by new standard of measures of living humans demonstrated by this work.

The threshold values are part of a range of existing variation, considering that it refers to a measuring of soft structure, being the professional appraiser to reach a borderline result, supplement your evaluation with qualitative methods and clinical history of the patient to confirm the results obtained on classification.

Data classification of lingual frenulum in cadavers, proposed by Oliveira, Lindoso, Coelho (2010)[19] are shown in Table 3. Table 4 presents the values suggested in the present study on the classification of the lingual frenulum in living humans.

Table 3 - Distribution of patterns of classification of the lingual frenulum in research with cadavers

Types of frenulum	Index	Percentage
Anterior insertion	≥ 0,61	≥ 81%
Normal	0 a 0,60	41 a 80%
Short	< 0	≤ 40%

Table 4 - Distribution of patterns of classification of the frenulum of the tongue suggested in research on living human beings

Types of frenulum	Index	Percentage
Anterior insertion	≥ 0,41	≥ 71%
Normal	-0,20 a 0,40	40 a 70%
Short	≤ -0,21	≤ 39%

According to the standard set in the proposal by index and percentage in study done in cadavers, did not were found frenulum with anterior insertion, where the value would be, according to the proposal by index, greater than or equal to 0.61, and in the proposal by percentage greater or equal to 81%. Thus, the pattern described in Table 4 refers to the borderline value found in the normalcy.

The standard established by Oliveira, Lindoso; Coelho (2010) [19] refers to altered frenulum (short), with lower values than the standard normalcy, in other words, altered frenulum in the index should present itself less than 0 (zero) and in the percentage classification, equal to or less than 40%.

The average of the results obtained (Table 2) is in the classification of the frenulum as normal, but as in males the results were lower, it is noted that they are closer to altered frenulum than in females. It is not possible to affirm that these data extend to all subjects by the significant difference in the number of participants, being 219 females and 68 males.

Found in the literature, studies report a higher incidence of abnormal frenulum in males[14,20]. Thus, even without significant evidence and the average frenulum, in both variables do not classify as altered in accordance with the model proposed by Oliveira, Lindoso and Coelho (2010) [19]. Results show a trend towards the existence of difference of measures of altered frenulum according to sex.

It is noteworthy that to make measurements of the lingual frenulum presented here, is required the contribution of the patient, since him should be able to understand and execute a command.

Regarding the measurements made in this study, only eight of the 287 participants reported discomfort when performing the examination, cited as tongue position, discomfort in the temporomandibular joint (TMJ) and difficulty in opening the mouth.

In the item about perception of the test, 249 participants reported tranquility, 04 participants reported being uncomfortable, 6 participants reported tiring, and 43 considered the test as rapid. It is noteworthy that some participants chose more than one option as it could be multiple alternatives, justifying the value of the sum of the items evaluated be larger than the number of respondents. It is important to mention that the perception of limited mouth opening did not exist by the patient before the exam, which justifies its inclusion in the study and the previously reported perception.

Considering the responses obtained, it is observed that the proposed method is feasible from the perspective of the evaluator and evaluated.

■ **CONCLUSION**

In the proposal by percentage is possible to apply the standard measures suggested in the study with cadavers. As regards the proposal by index, the pattern found in the cadavers must be replaced by new standard measures of living humans observed in this work.

So we suggest the use of both classifications in clinical practice, thus benefiting the patient, as it will be assessed by a standardized and safe method, ensuring greater diagnostic accuracy for both the evaluator and evaluated.

Because the measurements in soft structure, it is up to the evaluator professional complement their evaluation with qualitative methods and clinical history of the patient.

It expects that further research be conducted in order to verify the possible speech-language features presented in patients with altered frenulum of the tongue related to the classifications proposed by the study.

RESUMO

Objetivo: verificar a aplicabilidade clínica das propostas de classificação do frênulo da língua por índice e porcentagem. **Métodos:** a casuística desta pesquisa foi composta por 287 sujeitos de ambos os sexos com idade variando entre 23 e 28 anos. Os frênulos da língua foram classificados a partir de duas medidas definidas com o auxilio de compasso e de paquímetro digital, e analisadas nas fórmulas e padrões propostos a partir de uma pesquisa realizada com cadáveres que resultou em fórmulas para mensurar o frênulo da língua por índice e porcentagem. **Resultados:** observou-se que o padrão estabelecido na classificação do frênulo da língua pela proposta por porcentagem é fidedigno. Na proposta por índice um novo padrão foi encontrado na população pesquisada. **Conclusão:** após aplicação clínica, sugere-se que um novo padrão na classificação por índice seja adotado. Na proposta por porcentagem o padrão inicial deve ser mantido, proporcionando a efetividade de ambas as formas de classificação do frênulo da língua na prática fonoaudiológica.

DESCRITORES: Freio Lingual; Língua; Classificação

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