

MAXIMUM PHONATION TIME OF /A/, MAXIMUM PHONATION TIME PREDICTED AND RESPIRATORY TYPE IN ADULT WOMEN WITHOUT LARYNGEAL DISORDERS

Tempo máximo de fonação /a/, tempo máximo de fonação previsto e tipo respiratório de mulheres adultas sem afecções laríngeas

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ABSTRACT

Purpose: to verify the differences between the maximum phonation time /a/ and maximum phonation time predicted in relation to the respiratory type, and correlate the the maximum in adult women with vital capacity within the normal range and without laryngeal affections. **Methods:** cross-sectional analytic research, quantitative and retrospective, in the database, 51 female subjects with an otorhinolaryngological diagnosis of absence of laryngeal affections, aged between 18 and 44 years (mean 27.64). It was used: higher value of maximum phonation time /a/, maximum phonation time predicted, vital capacity and respiratory type. The value of maximum time predicted for women, was calculated by multiplying the vital capacity by 0.0051, and the value found was decisive for the classification of phonation time /a/ in normal, below or above expectations. **Results:** there were significant differences between maximum time predicted and respiratory type superior (17,44s) and mixed (15,17s). No significant difference phonation time /a/ in different and respiratory type, or correlation between phonation time /a/ and maximum time predicted. **Conclusion:** there was no correlation between phonation time /a/ and maximum time predicted and the maximum time predicted was significantly higher in respiratory type superior than in mixed.

KEYWORDS: Voice; Phonation; Vocal Folds; Voice Disorders

■ INTRODUCTION

The maximum phonation time (MPT) is a widely used assessment in the clinical practice, by speaking vowel, fricative, and counting numbers, because, in addition to describe the vocal behavior, it is a evaluation easy to obtain and noninvasive¹⁻⁶. Through this assessment it is possible to verify the efficiency of coordination between levels of voice production^{1-3,7,8}, Besides analyzing voice quality, since no perceived changes in spontaneous speech can be observed in the sustained emission^{9,10}.

Another important assessment is the vital capacity (VC), which assesses the maximum amount of air a person can exhale after a deep inspiration. The VC can influence the extent of MPT, since it also depends on the airflow from the lungs. However, the VC is not the only intervening variable in the MPT, since lesions of the vocal fold edge, incoordination pneumofonoarticulatória⁹⁻¹¹ and possibly, the respiratory type (RT) can influence them.

The literature points the obtained MPT (MPTO) relating to the value obtained in the sustained vowel /a/ and predicted MPT (MPTP) for the expected value with respect to the subject VC¹. The MPTP is considered an important measure for clinical practice, because its value is predicted from the VC of the individual, in the case of an individual measure. Thus, it is possible to obtain a more

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reliable parameter for comparison, on the personal MPT, being able to relate it to the RT.

The RT can be classified into superior, characterized by the expansion only of the upper region of the chest^{1,12-14}, mixed, when there is little elevation of the upper and lower regions, with anterior displacement of the middle thoracic region; bottom, characterized by the absence of expansion of upper and lower presence of expansion; and costodiaphragmaticoabdominal type (CDA), considered completed, because there are harmonic expansion of all chest, without over-drive the upper region^{1,6,12}.

The MPT vowel /a/ (MPT /a/) infers coordination between respiratory, aerodynamic and myoelastic forces of the larynx. It evidences the vocal quality^{1,5,6,12}. RT refers to the local expansion of the chest during inspiration, thus influencing the support of MPT / a /, and when inappropriate, there isn't efficient use of VC to speech, and may be reflected in incoordination pneumophonoarticulatory¹².

It is important to conduct research that investigates the relationship of the MPT with the RT, in order to verify the necessity of the work of breathing in speech therapy in patients with dysphonia¹⁵⁻¹⁷. In the literature, there are few studies on the subject, but checkup controversy regarding the importance of the adequacy of RT during speech therapy¹⁶.

Based on the above, the objective of this study was to determine the difference between the MPT /a/ and MPTP compared to RT, and correlate the MPT / a / with the MPTP in adult women with VC within the normal range and no laryngeal disorders (LD).

■ METHODS

This is a cross-sectional analytical observational study, quantitative and retrospective. Data were obtained from the database of patients cared in the voice sector of a clinical school of Speech.

This research was approved by the Ethics Committee on Research (ECR) of the home institution (23081.016945/2010-76). In addition, all individuals previously signed a consent form (CF), authorizing the use of ratings data in scientific research, since provided the confidentiality of personal information.

The inclusion criteria for the selection of database records were: female sex, by its dominance in the database; aged 18 to 44 years old, as this age group is free of voice change and presbyphonia¹⁰; anamnesis data for the application of exclusion criteria; otolaryngology diagnosis, presenting absence of LD; owning VC within normal limits and complete data for the values of MPTP, MPT /a/, RT and VC.

As exclusion criteria, there were adopted: report or diagnosis of neurological, endocrine, psychiatric or gastric changes; record of hearing disorders audiological routine examination in clinical school^{8,10}, record of previous speech therapy and or singing techniques; being a smoker and / or drinker and / or alcoholic^{5,8,10}.

After applying the criteria of inclusion and exclusion above, there were 51 female subjects' records remaining for the sample of convenience. We used measures of MPT /a/, MPTP, VC and RT, collected by different evaluators, standardized, following the protocol of the clinical school.

To collect the MPT /a/, subjects were standing, deeply inspired by the nose and issued the phoneme / a / in normal pitch and loudness, until the end of expiration without use of expiratory reserve air three times, being timed and chosen the most valuable support.

The VC was obtained with the subject in the same position by dry spirometer Fami-Ita ®. Performing a maximal inspiration and maximal expiration in just one device, positioned at the height of the patient's mouth was requested. The VC measurement used in this study was the highest value among the six collections made, three with and three without nasal occlusion, because it was intended to obtain the absolute value of VC regardless of nasal air escape or not. For VC, it was used as a normal pattern for females, in this study, equal to or greater than 2100ml.

The MPTP was found by multiplying the value of VC 0.0051 for females. The RT was classified as upper, mixed, or CDA, not being found record of lower RT.

After tabulating the data, there was tested the normality of variables (Lilliefords test) and the test ANOVA- Duncan was chosen to verify the differences between the mean values of MPT /a/ and MPTP of the group, according to the respiratory types. The Pearson correlation test was used to correlate MPT /a/ and MPTP. The level of significance was set at 5% ($p \leq 0.05$).

The classification used in the correlation values was: very weak correlation (0 to 0.19); weak correlation (.20 to .39); moderate correlation (0.40 to 0.69); strong correlation (0.70 to 0.89); very strong correlation (0.90 to 1.00).

■ RESULTS

Table 1 is the difference between the values of MPT / a / as the RT. Observed MPT /a/ lower the upper RT, although without statistical significance.

Table 2 shows the difference between the values of MPTP as RT, with a statistically significant difference between MPTP and mixed upper RT.

Table 3 is exposed to correlation between MPT / a / and MPTP without statistical significance.

Table 1 - Difference between the values of maximum phonation time /a/ according the respiratory type

Type respiratory	Mean MPT/a/	p-value
CDA (n=4)	15,86s	
Mixed (n=40)	14,85s	0,627
Superior (n=7)	13,49s	
Total (n=51)		

Test ANOVA - Duncan

MPT/a/ - maximum phonation time /a/

CDA – Costodiafragmaticoabdominal

Table 2 – Difference between the values of maximum phonation time predicted according the respiratory type

Type respiratory	Mean MPTP	p-value
CDA (n=4)	15,68s	
Mixed (n=40)	15,17s (A)	0,027*
Superior (n=7)	17,44s (B)	

Test ANOVA – Duncan

* difference significant between A and B

CDA = costodiafragmaticoabdominal

MPTP – maximum phonation time predicted

Table 3 - Correlation between maximum phonation time /a/ and maximum phonation time predicted

	r	p-value
MPT/a/		
MPTP	0,094	0,508

Correlation test *Pearson*

MPT/a/ - maximum phonation time /a/

MPTP - maximum phonation time predicted

■ DISCUSSION

In this study, there was no significant difference between the mean MPT / a / and RT (Table 1). However, the values of MPT /a/ were below normal for females in mixed upper RT within the normal range only in RT CDA, with the highest values of MPT /a/ found in the group. It may suggest that women in this study with RT CDA showed greater aerodynamic forces control between the lung and larynx myoelastic with increased recovery and control of air, resulting in longer sustain vogal^{11,14,16}. However, it is necessary to confirm these data with

samples containing higher studies, since in the present study group with RT CDA counted only four subjects.

The literature indicates that the RT CDA is ideal for the professional voice, it provides more adequate phonation, with greater balance in the issuance of spoken and sung voice, as it experiences greater influence of the diaphragm and abdominal muscles, providing greater utilization of the pulmonary area^{12,18,19}. Even more, the abdominal support contributes to a more stable voice with greater projection and reduced laryngeal hyperfunction¹².

The study traced the vocal profile of tourist guides and, among the variables studied, included the MPT

and RT. The majority of the sample had MPT below normal standards and mixed RT, converging with the present results. However, the authors did not perform a statistical correlation to verify the interaction of these variables¹⁸.

Another study found higher prevalence of TR in subjects with organofunctional LD¹⁴. The authors suggest a possible relationship between RT and LD, because the upper RT can cause incorrect use of voice by increasing the level of tension in the laryngeal region and raising the chances of the presence of LD^{6,12,13}. This occurs due to the need of using extrinsic muscles of the larynx and elevating the shoulder girdle which increases laryngeal tension and reduces the space tireoidea membrane with insufficient supply of air and high pitch vocal production by elevation and tension of the larynx^{1,12,13}.

In research, the values of MPT/ a /, VC and RT in adults without LD were analyzed. All subjects had VC within normal limits; the majority (76%) showed MPT below expectations and the predominant RT was mixed (64%). The work emphasized the possible influence of RT on the values of MPT/ a /, suggesting that RT with inappropriate use of VC can contribute by reducing the MPT¹⁶, that comes with the results of this study in which the highest values of MPT/ a / were found in RT CDA, although without statistical significance.

However, in this study, there was significant difference between the MPTP and the upper and mixed-RT (Table 2), with the highest average in the upper RT MPTP precisely, differing expectations, since, according to the literature, it provides lower air intake and greater tension during phonation^{1,12}.

In this work, there was also no correlation between MPT /a/ and MPTP (Table 3), contrary to what is found in the literature on the subject¹. This finding may be explained by the fact that the MPTP is calculated using only the measurement of the VC and the expected value for each sex^{1,19}, but MPT / a / doesn't depend only on VC^{1,5,7,9,12,20,21}, but on height, weight and age^{7,11}, coordination among respiratory and speech levels and the presence or absence of LD^{1,10,12}.

Thus, it is possible that the extent of MPT /a/ and MPTP have submitted divergence due to all the variables involved in the realization of MPT / a /, showing the need for further studies on the extent of MPTP, rare in the literature.

■ CONCLUSION

There was no correlation between MPT / a / and MPTP and there was significant difference of the MFT only between the upper and mixed RT. Higher values were found in the upper RT.

Although not statistically significant, women who had had higher RT CDA showed higher MPT /a/.

RESUMO

Objetivo: verificar a diferença entre o tempo máximo de fonação /a/ e tempo máximo de fonação previsto em relação ao tipo respiratório, e correlacionar os tempos máximos em mulheres adultas com capacidade vital dentro da normalidade e sem afecções laringeas. **Métodos:** pesquisa transversal analítica, quantitativa e retrospectiva, em banco de dados, de 51 sujeitos do sexo feminino, com diagnóstico otorrinolaringológico de ausência de afecção laríngea, com idades entre 18 e 44 anos (média 27,64). Utilizaram-se os dados: maior valor de tempo máximo de fonação de /a/, tempo máximo de fonação previsto, capacidade vital e tipo respiratório. O valor do tempo máximo previsto para mulheres foi calculado multiplicando-se a capacidade vital por 0,0051, e o valor encontrado foi determinante para a classificação do tempo de /a/ em normal, abaixo ou acima do previsto. **Resultados:** houve diferença significativa entre tempo de fonação previsto e os tipos respiratórios superior (17,44s) e misto (15,17s). Não houve diferença significativa do tempo máximo de fonação /a/ nos diferentes tipos respiratórios, nem correlação entre tempo de fonação /a/ e tempo previsto. **Conclusão:** não houve correlação entre tempo de /a/ e tempo de fonação previsto e este último foi significativamente maior no tipo respiratório superior do que no misto na população estudada.

DESCRITORES: Voz; Fonação; Pregas Vocais; Distúrbios da Voz

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