



# Maximum phonation time and its relation to gender, age and lifestyle in healthy elderly

Tempos máximos fonatórios e sua relação com sexo, idade e hábitos de vida em idosos saudáveis

Tiempo máximo de fonación y su relación con el género, la edad y hábitos de vida en ancianos sanos

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## Abstract

**Objective:** To characterize and relate the maximum phonation time with gender, age and lifestyle in healthy elderly. **Methods:** 55 subjects, with 44 women and 11 men, average age 72, who answered a questionnaire developed by the researchers to identify with questions regarding gender, age, voice complaints, general health, physical activity and history of smoking and alcohol consumption. Maximum phonation times of vowels were collected /a/, /i/ and /u/ and the fricatives /s/ and /z/. Data were analyzed statistically using the non-parametric Mann-Whitney and Pearson correlation. **Results:** The maximum phonation time of vowels /a/, /i/, /u/ and the fricatives /s/ and /z/

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for males were 13,3s; 14,7s; 14,7s; 13,3s; 14,3s, respectively; and for females were 13,1s; 14,3s; 14,8s; 13,0s; 13,1s respectively. No significant association of maximum phonation time was found with sex, regular physical activity, smoking history and vocal complaints. There was no significant correlation between maximum phonation time of vowels and fricatives and age. Conclusion: The maximum phonation time of elderly women have values close to those shown by young adult women. For males, there was a significant reduction in the maximum phonation time in relation to adulthood. When analyzed exclusively, the maximum phonation time unrelated to the variables related to gender, age, regular physical activity and smoking history..

**Keywords:** vital capacity; phonation; aged; respiration; voice.

## Resumo

**Objetivo:** caracterizar e relacionar os tempos máximos fonatórios com sexo, idade e hábitos de vida em idosos saudáveis. **Método:** 55 sujeitos, sendo 44 mulheres e 11 homens, com média de 72 anos, que responderam um questionário de identificação elaborado pelas pesquisadoras com perguntas referentes ao sexo, idade, queixa vocal, saúde geral, prática de atividade física, tabagismo e etilismo. Foram coletados os tempos máximos de fonação das vogais /a/, /i/ e /u/ e das fricativas /s/ e /z/. Os dados foram analisados estatisticamente por meio dos testes não-paramétricos de Mann-Whitney e Correlação de Pearson. **Resultados:** Os tempos máximos fonatórios das vogais /a/, /i/, /u/ e das fricativas /s/ e /z/ para o sexo masculino foram 13,3s; 14,7s; 14,7s; 13,3s; 14,3s, respectivamente; e para o sexo feminino 13,1s; 14,3s; 14,8s; 13,0s; 13,1s, respectivamente. Não foi encontrada associação significativa de tempos máximos fonatórios com as variáveis sexo, prática de atividade física regular, histórico de tabagismo e queixa vocal. Não houve correlação significativa entre tempos máximos fonatórios de vogais e fricativas e idade. **Conclusões:** Os tempos máximos fonatórios de mulheres idosas apresentam valores próximos aos apresentados por mulheres adultas jovens. Já no sexo masculino, observa-se redução significativa dos tempos máximos fonatórios em relação à idade adulta. Quando analisados exclusivamente, os tempos máximos fonatórios não têm relação com as variáveis referentes a sexo, idade, prática de atividade física regular e histórico de tabagismo.

**Palavras-chave:** capacidade vital; fonação; idoso; respiração; voz

## Resumen

**Objetivo:** Caracterizar y relacionar los tiempos máximos de fonación con el sexo, la edad y el estilo de vida en adultos mayores sanos. **Método:** 55 sujetos, 44 mujeres y 11 hombres, con promedio de edad de 72 años, que respondieron un cuestionario de identificación desarrollado por los investigadores con preguntas sobre género, edad, quejas vocales, salud general, actividad física, tabaquismo y alcohol. Se recogieron el tiempo máximo de fonación de las vocales /a/, /i/ y /u/ y de las fricativas /s/ y /z/. Los datos fueron analizados estadísticamente mediante los testes no paramétricos de Mann-Whitney y correlación de Pearson. **Resultados:** Los tiempos máximos de fonación de las vocales /a/, /i/, /u/ y fricativas /s/ y /z/ para los hombres fueron 13,3s; 14,7s; 14,7s; 13,3s; 14,3s, respectivamente; y para las mujeres de 13,1s; 14,3s; 14,8s; 13,0s; 13,1s respectivamente. No se encontró asociación significativa de tiempos máximos de fonación con las variables género, actividad física regular, antecedentes de tabaquismo y quejas vocales. No hubo correlación significativa entre tiempos máximos de fonación de vocales y fricativas y edad. **Conclusión:** Los tiempos máximos de fonación de las mujeres de edad avanzada tienen valores cercanos a los mostrados por las mujeres adultas jóvenes. Para los hombres, hubo una reducción significativa en los tiempos máximos de fonación en relación a la edad adulta. Cuando se analizan exclusivamente, los tiempos máximos de fonación no se relacionan con las variables género, edad, actividad física regular y historia de tabaquismo.

**Palabras clave:** capacidad vital; fonación; anciano; respiración; voz.

## Introduction

The increase in global life expectancy has increased significantly the number of elderly<sup>1</sup>. Therefore, the health and autonomy for daily activities in this population become very important. As for the term “healthy elderly”, the Ministry of Health created an ordinance that defends the rights of older, established focus on integrated actions in promoting active aging, is postulating that the concept of health for the elderly individual goes beyond presence or absence of disease, translating into a condition of autonomy and independence, that is, in “functional capacity”<sup>1</sup>.

Advancing age brings physical changes, including laryngeal changes (joints, cartilage, intrinsic muscles, epithelium and innervations of the vocal folds and nearby structures that undergo anatomical changes with increasing age) and vocals. The laryngeal cartilages undergo gradual calcification and ossification process, with variations in speed and extent of ossification, but this process seems to be part of normal aging<sup>2</sup>.

The vocal aging, known as presbyphonia, begins and develops based on physical, mental health and social life of the subject<sup>2,3</sup>. Not only the presbyphonia amends vocal production, but also reduced lung capacity, since the aerodynamic forces are essential for a good glottal closure and, consequently, an efficient vocal projection<sup>3-5</sup>.

Studies have shown a reduction in lung capacity as an intrinsic feature for the vocal aging. This decrease can be of the order of 40% between 20 and 80 years old. There is decrease in forced expiratory volume and increased residual volume, causing loss of respiratory support for vocal production. Note also the elastic recoil of the lung and the reduction of respiratory muscle strength, which can influence the vocal production, but specifically causing a decrease in the maximum phonation time (MPT)<sup>2-5</sup>.

The MPT evaluation is an interesting and objective option to investigate quantitatively the phonation<sup>3</sup>. It is a parameter widely used in clinical vocal consisting in extracting measures to analyze the lung aerodynamic forces and myoelastic the larynx. Thus, the MPT refers to measuring the time for supporting the voice or speech sound, voiced or not voiced, prolonged expiratory in oneway<sup>6</sup>.

Prolonged emission of vowels shows that the elderly have the ability to control aerodynamics and myoelastic forces. The vowel /a/, according to

their phonetic features, allows evaluating changes in myoelastic balance of the larynx. Already the vowels /i/ and /u/ allow also assess the functioning and ensure the resonance system<sup>7</sup>. The evaluation of MPT the fricatives /s/ and /z/ are important for evaluating the dynamic phonation and glottal efficiency<sup>8</sup>. The /s/ is a non-voiced phoneme which measures the respiratory control; the /z/ is a voiced phoneme which adds glottal component to the issue. A sustained phonation, a dynamic individual with regular phonation is able to use pulmonary air temping efficiently, getting nearly equal values of /s/ and /z/, which does not happen with the dysphonic patients<sup>8,9</sup>.

Among the aging process affections are the decrease of lung function and forced expiratory volume, and increase in the residual volume, which cause loss of respiratory support for voice production and lead to the MPT decrease<sup>2</sup>. These changes may be delayed in people with healthy lifestyles<sup>10-16</sup>,

Although there are few studies evaluating the MPT in elderly<sup>3,17</sup>, most of which address the decline in lung function are in the Physiotherapy area<sup>4,5</sup>, there is a need of more studies in speech therapist point of view seeking to deepen the understanding of the relationship between MPT and variables such as sex, age, vocal abuse and living habits. It is believed that such investigations are relevant, since these variables can have positive or negative influence on MPT and, consequently, on the vocal dynamics and in the process of preserving the elderly voice.

As such, this study aimed to characterize the maximum phonation time in association with gender, age and lifestyle in healthy elderly.

## Materials and methods

Trata-se de estudo observacional, analítico, transversal, aprovado pelo Comitê de Ética em Pesquisa da Sociedade Evangélica Beneficente de Curitiba-PR, sob o número nº 533.258. Os sujeitos foram esclarecidos sobre a pesquisa e assinaram o Termo de Consentimento Livre e Esclarecido (TCLE). Participaram idosos frequentadores de um grupo de recreação mantido por uma universidade privada da cidade de Curitiba.

Foram considerados critérios de inclusão: idade igual ou superior a 60 anos; bom estado de

saúde geral; boas condições cognitivas para a colaboração durante a coleta de dados. Foram excluídos idosos com histórico autorrelatado de doenças neurológicas, psiquiátricas, câncer de cabeça e pescoço; cirurgias relacionadas à laringe ou ao pulmão; quaisquer doenças pulmonares e (ou) laringeas diagnosticadas no passado ou presente; queixa ou autorreferência de sintomas compatíveis com refluxo gastroesofágico. Permitiu-se a ocorrência de doenças comuns ao processo de envelhecimento, tais como diabetes, hipertensão, problemas cardíacos, alterações tireoidianas, colesterol elevado, rinites/alergias e refluxo laringofaríngeo, pois nenhuma delas associou-se de forma significativa às variáveis queixa vocal e aos tempos máximos fonatórios na presente amostra (Tabela 1).

A coleta de dados foi feita por conveniência, por meio de visitas ao local frequentado pelo grupo. Anteriormente ao início da coleta propriamente dita, os aspectos de saúde geral foram triados por meio do questionário elaborado pelos pesquisadores e os aspectos cognitivos por meio do Mini-Exame do Estado Mental (MEEM)<sup>18</sup>. O MEEM é composto por questões relativas à

memória imediata, memória de evocação, orientação temporal, orientação espacial, atenção e cálculo e linguagem<sup>19</sup>. O teste teve como objetivo obter uma amostra cognitivamente capaz de compreender a ordem para realização do Tempo Máximo de Fonação. Foram utilizados os critérios do próprio instrumento para definição das condições cognitivas. Todos os idosos abordados apresentaram condições cognitivas satisfatórias de acordo com o MEEM e, por isso, foram mantidos na pesquisa.

A amostra constituiu-se de 55 sujeitos, sendo 44 mulheres e 11 homens, com idades entre 65 e 79 anos e média de idade de  $72,00 \pm 6,25$  anos (mediana 71 anos), que responderam um questionário de identificação elaborado pelos pesquisadores com perguntas referentes ao sexo, idade, queixas vocais no presente e passado, dados de saúde geral, prática regular de atividade física no presente ou passado (atividades motoras corporais praticadas pelo menos duas vezes por semana, há no mínimo seis meses) e histórico de tabagismo e etilismo (Tabela 1).

**TABELA 1** – SAMPLE CHARACTERISTICS AS TO LIFE HABITS AND GENERAL HEALTH DATA

Variable	Yes		No		Total	
	n	%	n	%	n	%
Regular physical activity	22	40,00	33	60,00	55	100
Professional voice use history*	11	20,00	44	80,00	55	100
Current occupation with professional voice use*	1	1,80	54	98,20	55	100
Smoking (in the present or past)*	15	27,30	40	72,70	55	100
Alcoholism*	0	0,00	55	100,00	55	100
Vocal complaints	25	45,40	30	54,60	55	100
Diabetes*	9	16,40	46	83,60	55	100
Hypertension*	25	45,40	30	54,60	55	100
Heart disease*	4	7,20	51	92,70	55	100
Thyroid abnormalities*	12	21,80	43	78,20	55	100
High cholesterol*	16	19,10	39	70,90	55	100
Colds/allergies*	11	20,00	44	80,00	55	100
Gastroesophageal reflux*	10	18,20	45	81,80	55	100

Descriptive analysis. Caption: \* Variables considered interfering - all unrelated to vocal complaints and maximum phonation time ( $p < 0.05$ ).

The MPT were obtained through digital stopwatch brand Casio HS3. To collect, the elderly were told to remain in the standing position, breathe deeply and make the sounds requested for as long as they could. The maximum phonation times of vowels were analyzed /a/, /u/ and /i/ and fricatives /s/ and /z/. The timer was activated at the beginning of the issue and the extraction of measures was recorded in a specific protocol, considering seconds, and hundredths of seconds. Each sound was issued only once. However, if it were observed difficulty in understanding the task orders by the elderly, although not detected changes in MMSE, allowed up and considered the values of a second issue, which was held from the researcher's model. To calculate the s/z ratio was hosting the MPT division of fricative /s/ MPT at the fricative /z/.

The data were tabulated and the variables were analyzed statistically using the Software Statistica. In addition to the descriptive analysis, the Mann-Whitney test (nonparametric) associated continuous variable referring to the MPT to categorical variables analyzed in this study. The Pearson correlation test was used to correlate the age variable to MPT variables. 5% significance level was adopted for all analyzes.

## Resultados

The Table 2 shows the average of the maximum phonation time of the vowels /a/, /i/, /u/ and fricatives /s/ and /z/ for males and females and the comparison of values between the genders..

**TABELA 2 -ELDERLY MAXIMUM PHONATION TIMES ACCORDING TO SEX (n = 55)**

MPT	Women (n=44)			Men (n=11)			Pvalue		
	Mean (SD)	Median	Minimum	Maximum	Mean	Median		Minimum	Maximum
MPT /a/	13,1 (±5,8)	13,00	3,00	24,60	13,3 (±5,3)	12,70	7,02	23,10	0,94
MPT/i/	14,3 (±6,5)	13,70	4,00	27,90	14,7 (±5,9)	14,30	7,41	23,00	0,78
MPT/u/	14,8 (±5,5)	15,00	3,00	27,30	14,7 (±6,7)	14,60	7,59	22,33	0,79
MPTvogais	14,1 (±5,7)	14,70	3,66	25,10	14,2 (±5,7)	14,20	7,59	22,33	0,98
MPT/s/	13,0 (±6,5)	11,20	4,20	32,20	13,3 (±7,1)	12,00	5,00	30,20	0,82
MPT/z/	13,1 (±5,2)	12,90	4,30	23,90	14,3 (±8,0)	12,70	5,00	27,00	0,87
Relation s/z	0,99 (±0,0)	10,00	0,48	1,60	1,01 (±0,0)	10,02	0,60	1,48	0,83

p<0,05; Mann-Whitney Test. Caption: MPT: Maximum Phonation Time

The association data were obtained between MPT and sex variables, regular physical activity (at least twice a week), smoking history (past or present) and vocal complaints. There was no

significant association for any analyzes ( $p > 0,05$ ) (Table 3). *queixa vocal*. Não houve associação significante para nenhuma das análises ( $p > 0,05$ ) (Tabela 3).

**TABELA 3** - ASSOCIATION DATA BETWEEN MPT AND SEX VARIABLES, REGULAR PHYSICAL ACTIVITY, SMOKING HISTORY AND VOCAL COMPLAINTS (n=55)

TMF		Vocalcomplaints		Smoking history		Regular Physicalactivity	
		yes	NO	YES	NO	YES	NO
MPT/a/	mean	12,7	13,5	12,7	13,3	13,7	12,8
	median	12,6	14,2	12,7	13	12,6	13,9
	SD	6	5,4	5,4	5,8	5,4	5,8
	p	0,44		0,33		0,58	
MPT/i/	mean	13,2	15,4	14,3	14,4	15,4	13,8
	median	13,3	14,5	14,1	13,5	13,7	13,8
	SD	5,9	5,6	7	6,2	6,1	6,5
	p	0,25		0,84		0,43	
MPT/u/	mean	13,7	15,7	14,9	14,7	15,5	14,3
	median	14,5	15,7	14,5	14,9	16,4	14,6
	SD	5,3	5,9	6,5	5,4	4,7	6,3
	p	0,25		0,8		0,41	
MPT meanvowels	mean	13,2	14,9	14	14,2	14,8	13,6
	median	13,3	15,1	14,7	14,4	14,6	14,7
	SD	5,5	5,7	6	5,5	5,1	6
	p	0,25		0,82		0,42	
MPT/s/	mean	13	13,1	15,5	12,1	14,4	12,1
	median	12	11,2	15,3	11,6	10,7	12
	SD	6,8	6,5	9	5,2	8,1	5,3
	p	0,87		0,36		0,49	
MPT /z/	mean	13,1	13,6	14,2	13,1	14,0	12,9
	median	13,1	12,3	12,8	12,9	13,5	12,7
	SD	5	6,1	7,2	5,2	5,8	5,8
	p	0,87		0,76		0,44	
relation s/z	mean	0,9	1,0	1,0	0,9	1,0	0,9
	median	0,9	1,0	1,0	0,9	1,0	0,9
	SD	0,0	0,0	0,0	0,0	0,0	0,0
	p	0,86		0,09		0,75	

$p < 0,05$ ; Mann Whitney Test. Legend: TMF: Tempos Máximos de Fonação; DP: desvio padrão

The MPT were correlated to the variable age. No correlation was found for any of the analyzed

crossings (Table 4).

**TABELA 4 - CORRELATION BETWEEN MAXIMUM PHONATION TIMES AND ELDERLY AGES**

	MPT	Age
MPT/a/	Corrcoef (r)	-0,15
	Pvalue	0,24
MPT/i/	Corrcoef (r)	-0,16
	Pvalue	0,21
MPT/u/	Corrcoef (r)	-0,08
	Pvalue	0,51
MPT/averageofvowels	Corrcoef (r)	-0,14
	Pvalue	0,28
MPT /s/	Corrcoef (r)	-0,02
	Pvalue	0,67
MPT /z/	Corrcoef (r)	-0,14
	Pvalue	0,55
s/zratio	Corrcoef (r)	-0,09
	Pvalue	0,48

$p < 0,05$ ; Pearson Correlation Test. Caption: CorrCoef (r): Pearson Correlation Test; MPT: Maximum Phonation Time

## Discussion

The voice has its most effective period between 25 and 45 years old. It is believed that the voice period senescence occurs around age 60, varying with the individual characteristics<sup>10</sup>.

Based on the literature, the MPT of vowels /a/, /i/ and /u/ within the normal range for adult males vary between 16.06 and 26,27s, and adult female are between 14.04 and 26,96s<sup>20</sup>. In this study, the MPT of older (/a/ = 13,1s /i/ = 14,3s; /u/ = 14,8s; average of vowels = 14,1s) were within that expected to adulthood in vowel /i/, /u/ and middle vowel, and the MPT of the vowel /a/ was slightly below. For the men (/a/ = 13,3s /i/ = 14.7 s; /u/ = 14.7 s; average of vowels = 14.2 s) all MPT were decreased compared to values of adult men, as pointed out in the literature.

For fricatives /s/ and /z/ MPT expected for women varies between 15.57 and 34,17s and for men between 17.50 and 32,18s<sup>8,17,20,21</sup>. The elderly group of this study averaged MPT the deaf fricative /s/ equal to 13,0s and 13,3s and MPT the fricative /z/ of 13,1s and 14,3s, respectively, for women and men, being decreased for both sexes, compared to those found in adults. However, due to the lowering of both the MPT, the s/z ratio was

within recommended in the literature for both sexes, and 0.99 for women and 1.01 for men<sup>7</sup>.

The analysis of fricatives /s/ and /z/ is important to carry out a quantitative evaluation of the voice because through it you get measures on the dynamics phonation and glottal efficiency. The deaf fricative /s/ measures the respiratory control, and the fricative /z/ add component glottal the issue<sup>8</sup>. The aging process is responsible for changes in breathing apparatus and phonation, reducing the elasticity of the lung tissue and the strength of respiratory muscles, therefore reducing respiratory support and subglottic airway pressure, resulting in reduced sound pressure and pneumophonic incoordination, which justifies MPT /s/ reduced<sup>3-5</sup>.

In the larynx, the major structural changes brought about by advancing age are: progressive ossification of cartilage skeleton of the larynx, decreased lubrication and flexibility, tissue atrophy, previous or fusiform slit formation and changes in vibration cycles of the vocal folds (PPVV)<sup>10,11,15,23</sup>. In the pulmonary function, the main changes are the reduction of elasticity of the lung tissue, the strength of respiratory muscles, causing a decrease in vital capacity and subglottic air pressure. Considering the lowering of MTCT/MPT of fricatives, but with



s/z ratio within the recommended<sup>7</sup>, it is inferred that there may be a fault in the respiratory support of the elderly. It is noteworthy that the ratio s/z has received questions because of not always present results consistent with the clinical examination by a speech therapist.

In general, the literature cites the reduction of MPT in the elderly compared to adults, justifying it by laryngeal and lung changes due to aging<sup>3</sup>. In this study, despite the MPT slightly reduced and the correlation coefficient is already negative, there was no significant correlation between MPT and age, confirming other studies<sup>10-14</sup>.

Whereas the elderly of this study were healthy, playgroup goers, and had an average of 72 years, it is believed that they have general health and vocal quite satisfactory, which may have contributed to the findings from this study. In addition, the ages in the general group ranged between 65 and 79 years and did not consider the elderly group aged from 80 years, which could have different results in this research.

Bad vocal habits like alcoholism, smoking and use of drugs can often cause systemic changes in individuals<sup>15</sup>. In the present study, there was no difference between the MPT elderly smokers and nonsmokers. These data are similar to those found in a study that analyzed the frequency of alcohol consumption habits and smoking in 113 dysphonic patients aged 16 to 75 years, showing that there were no significant differences between smokers and alcoholics who had dysphonia<sup>24</sup>. Another research that analyzed the MPT in smoking women of found a significant difference only for the member of the MPT /i/<sup>25</sup>, also agreeing with the findings of this research.

The practice of regular physical activity (at least twice a week) was not related to the MPT obtained. According to the literature, physical and vocal conditioning can slow presbylarynx and presbyphonia<sup>10-13</sup>. Studies show that seniors who practice physical exercises or vocal training may have a later onset of laryngeal and vocal signs related to voice aging<sup>10-13</sup>. In this research, these data were not confirmed, which can be related to the time of onset of physical activity, which was not addressed in this research. However, considering that there are other assessments of vocal behavior, there must be conducted other studies to verify if the regular practice of physical activity since adulthood may not be slowing down other parameters

related to the voice directly linked to presbylarynx, which were not purpose of this study.

In the present study, there was no difference in the MPT based on sex. This difference is found in adults, but in the elderly, there is still a lack of data on the expected normal for the MPT of vowels and fricatives. In elderly men, in general, it is more evident reduction in thickness and arching of the vocal folds (vocal folds/PPVV) due to muscle atrophy, which are closely linked to the formation of cracks in the spindle vocal folds and, consequently, reducing MPT<sup>3,21</sup>. In older women, the few changes of MPT with respect to age may be related to the vocal modifications during the period of menopause, where the superficial layer of lamina propria turns thicker the swollen, causing a mass increase, and deep layer of the lamina propria has a density of collagen fibers becoming more dense<sup>22</sup>. Therefore, it is believed that the similarity of MPT for female and male in the elderly is related to the very process of laryngeal anatomical and physiological changes that occur in this age group.

The vocal complaints variable also had no significant association with MPT, noting that there was no difference in the MPT seniors who possessed or not the voice complaints. In general, the literature shows that the main vocal complaints referred by the elderly are related to changes in feeling uncomfortable throat (throat clearing and globus sensation)<sup>11,26</sup> or changes in vocal quality as crackling, breathiness, tension, hoarseness and tremor<sup>11,23,27,28</sup> and not with the decrease in MPT. Other diseases or laryngeal lesions such as polyps, paralysis of vocal folds, functional dysphonia, neurological disorders such as Parkinson's disease or essential tremor, and inflammatory conditions such as chronic laryngitis caused by laryngopharyngeal reflux, may also be responsible for voice complaints in the elderly<sup>23</sup>.

For this reason, the vocal complaints may not have had a significant relationship when they were associated with MPT parameter analyzed in isolation, with no association with other assessments of vocal behavior.

The data from this study show that in the studied elderly group, MPT elderly, especially males, are lowered; there is no relationship of MPT with gender, age, regular physical activity and smoking history. Therefore, it is suggested that further research be carried out to analyze this measure in conjunction with other data of vocal assessment,



bringing relevant information to clinical practice and to define the most appropriate behavior in a healthy elderly.

Although the presence of some interfering variables, it was decided to proceed with the analysis in relation to MPT, as it was considered that the elderly groups will always be heterogeneous and, therefore, must be analyzed on its complexities.

The limitations of this study are to analysis of only a sustained emission of each vowel, and the sample reduced heterogeneous study with a restricted age. For future studies, it is suggested to research the MPT involving a larger number of subjects, with the analysis of three sustained each vowel and fricative, with increased age, and the contemplation of a greater number of junctions and a multifactorial analysis, with other vocal characteristics and living habits, vital capacity for analysis and control of the performance of physical activity time..

## Conclusion

The elderly women maximum phonation time have values close to those presented by young adult women. For males, there is reduction of MPT with respect to expected literature to adulthood. When analyzed exclusively the MPT have no relation to the variables related to gender, age, regular physical activity and smoking history. Therefore, it is suggested that, in clinical practice, this measure is analyzed in conjunction with other data of vocal assessment, to define the behavior before a senior with voice complaint.

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