

Fatigue and Vocal Symptoms in University Professors

Fadiga e Sintomas Vocais em Professores Universitários

Fatiga y Síntomas Vocales en Profesores Universitarios

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Abstract

Introduction: The voice is essential for teachers to practice their profession although many teachers do not know the phonation physiology and how to take care of their voices. In addition to changes in vocal quality, teachers may present vocal symptoms with relevant implications in the teaching-learning process. **Objective:** To verify fatigue and vocal symptoms in university professors and correlate the Vocal Fatigue Index (VFI) with the Vocal Symptom Scale (VoiSS). **Methods:** (VFI) and (VoiSS) protocols were applied in 126 university professors, 71 women and 55 men, aged 30 to 50 years, teaching at a Brazilian Federal University. Statistical analysis was performed using Spearman's Correlation, adopting a significance level of 5%. **Results:** The mean score of the "fatigue and vocal restriction" domain was 13.7 and 4.05 for the item "physical discomfort associated with voice". Without conversion, the mean value for the domain "recovery with vocal rest" was 7.93, but with conversion, the mean score was 4.06. Tiredness on speaking, burning in the throat and hoarseness were the most frequent symptoms in the participants; It was observed that higher is the vocal symptoms, higher is the vocal fatigue ($r = 0.727$, $p = <0.001$) **Conclusion:** Professors presented VFI mean scores of factors 1 and 2 higher than scores

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GTD: participated in the elaboration of the project, data collection, data analysis and manuscript writing. DNSF, MRBC and SCC: participated in data collection and analysis. EHMA: participated in manuscript revision and writing. MFG: participated in the design of the research project, guided all stages of the work, participated in the analysis of data review and writing of the manuscript.

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presented by vocally healthy individuals, and the score of the factor 3 was very similar of the score presented by individuals with dysphonia. Hoarseness was the prevalent symptom in all teachers. There was a strong positive correlation between the protocols

Keywords: Faculty; Fatigue; Signals and Symptoms; Voice.

Resumo

Introdução: Na profissão docente, a voz é primordial para o desempenho profissional, contudo muitos professores desconhecem a fisiologia da fonação e os cuidados necessários com a voz. Além de alterações na qualidade vocal, professores podem apresentar variados sintomas vocais, com implicações relevantes no processo ensino-aprendizagem. **Objetivo:** Verificar o índice de fadiga e sintomas vocais em professores universitários e correlacionar os protocolos Índice de Fadiga Vocal (IFV) e Escala de Sintomas Vocais (ESV). **Métodos:** Foram aplicados os protocolos IFV e ESV em 126 professores universitários de uma universidade federal brasileira, sendo 71 mulheres e 55 homens, com faixa etária entre 30 a 50 anos. Foi realizada análise estatística por meio da Correlação de Spearman, adotando-se nível de significância de 5%. **Resultados:** A média de pontuação do domínio “fadiga e restrição vocal” foi de 13,7 e 4,05 para o item “desconforto físico associado à voz”. Sem conversão, o valor médio para o domínio “recuperação com repouso vocal” foi de 7,93, e com inversão foi de 4,06. Cansaço ao falar, ardência na garganta e rouquidão foram os sintomas mais autorreferidos. Observou-se que, quanto maior os sintomas vocais, maior o índice de fadiga vocal ($r=0,727$; $p<0,001$). **Conclusão:** Professores universitários apresentaram escores médios dos fatores 1 e 2 do IFV maiores do que os escores apresentados por indivíduos vocalmente saudáveis, e escore médio do fator 3 semelhante ao escore médio de disfônicos. Rouquidão foi o sintoma prevalente em todos os professores. Houve correlação positiva forte entre os protocolos.

Palavras-chave: Docentes; Fadiga; Sinais e Sintomas; Voz.

Resumen

Introducción: En la profesión docente, la voz es primordial para el desempeño profesional, sin embargo muchos profesores desconocen la fisiología de la fonación y los cuidados necesarios con la voz. Además de cambios en la calidad vocal, los profesores pueden presentar variados síntomas vocales, con implicaciones relevantes en el proceso enseñanza-aprendizaje. **Objetivo:** Verificar el índice de fatiga y síntomas vocales en profesores universitarios y correlacionar los protocolos Índice de fatiga vocal (IFV) y Escala de Síntomas Vocales (ESV). **Métodos:** Se aplicaron los protocolos IFV y ESV en 126 profesores universitarios de una universidad federal brasileña, siendo 71 mujeres y 55 hombres, con rango de edad entre 30 a 50 años. Se realizó análisis estadístico a través de la Correlación de Spearman, adoptando un nivel de significancia del 5%. **Resultados:** El promedio de puntuación del dominio “fatiga y restricción vocal” fue de 13,7 y 4,05 para el ítem “incomodidad física asociada a la voz”. Sin conversión, el valor medio para el dominio “recuperación con reposo vocal” fue de 7,93, y con inversión fue de 4,06. Cansancio al hablar, ardor en la garganta y ronquera fueron los síntomas más autorreferidos. Se observó que, cuanto mayor los síntomas vocales, mayor el índice de fatiga vocal ($r=0,727$; $p<0,001$). **Conclusión:** Profesores universitarios presentaron escores medios de los factores 1 y 2 del IFV mayores que los puntajes presentados por individuos sanos sanos, y puntaje promedio del factor 3 semejante al puntaje medio de disfónicos. La ronquera fue el síntoma prevalente en todos los profesores. Hubo correlación positiva fuerte entre los protocolos.

Palabras claves: Docentes; Fatiga; Signos y Síntomas; Voz.

Introduction

Vocal health of the teacher should be considered as an indicator of health and an aspect of quality of life, since voice is an important resource in the teacher-student relationship, with relevant implications in the teaching-learning process¹. Vocal fatigue is associated with negative feelings of vocalization, tiredness after voice use, phonatory effort, perception of worsening with voice over time, head and neck tension, throat or neck pain, reduced vocal projection, hoarseness, among others. This symptom is often found in teachers² and is directly related to hydration, which helps to reduce the trauma of vibration during phonation^{3,4} and with stress⁵. In addition, teachers who present vocal complaints and who seek speech-language assistance tend to present greater sensations of vocal fatigue when compared to dysphonic professionals who do not seek care⁶. However, there are few studies on the vocal health of the university professor, which highlights the need for further research with the public⁷.

Professors tend to have vocal symptoms such as hoarseness, failure of voice, weak voice, and shortness of breath⁸. In addition to these symptoms, national studies with university professors found that stress and anxiety led to a list of symptoms of general aspects of participants^{9,10}. These results suggest that the appearance of these symptoms may be related to the profession¹⁰ and that fatigue causes negative effects on the quality of life of university professors¹¹. The frequent appearance of vocal symptoms in professors impairs performance and attendance at work and contributes to the idea of the future changing of the profession due to vocal problems¹².

Additionally, there are several factors that are present in the work of the professor that favor the aggravation of vocal quality and may contribute to the development of dysphonia, such as: inadequate acoustics in the classroom, high student demand per professor, lack of multimedia resources, inadequate feeding, excessive working hours, long classroom sessions, air conditioning, lack of lubrication of vocal folds due to low water intake. Nevertheless, it is common for these professionals to present deleterious habits such as: alcohol consumption, smoking, use of narcotic drugs¹³, as well as allergenic factors, for example, the use of crayon or whiteboard pen with alcohol in its composition.

Among the forms of vocal evaluation that stand out are the protocols that evaluate different parameters, such as the Vocal Fatigue Index (VFI) and the Vocal Symptom Scale (VoiSS). The VFI, validated and translated into Brazilian Portuguese by Zambon et al., in 2017, assists in the identification of people with vocal fatigue and characterizes their complaints¹⁴. The VoiSS, translated and adapted for Brazilian Portuguese¹⁵ is a version of the patient-derived Voice Symptom Scale¹⁶, a robust self-evaluation tool for voice and vocal symptoms to evidence clinical responses related to possible dysphonias. VoiSS is currently considered the most rigorous and psychometrically robust protocol for vocal self-assessment, providing information on the functionality, emotional impact and physical symptoms that a voice problem may have on the individual's life¹⁵.

By adding data to the literature on the voice of the university professor regarding fatigue and vocal symptoms, this study aimed to verify the vocal fatigue index, identify vocal symptoms in university professors and to correlate the applied protocols.

Methods

This was a cross-sectional study carried out in a Brazilian federal university in which 126 university professors linked to the field of study participated, with 55 men (43.7%) and 71 women (56.3%), with ages between 30 and 50 years old, and mean age of 43 years. The sample was selected for convenience¹⁷, being previously requested and accepting the presence of the researchers in meetings of each department of education, in which all the professors of the department were present. This first contact with the participants was aimed at clarifying the research and inviting them to participate in the study. After the acceptance of the participants and signing the informed consent form, the protocols were sent via digital platform, individually, providing practicality regarding the provision of answers by professors.

Professors of both sexes were included in the present study and were linked to any one of the university's teaching centers. Professors who were on leave, professionals who underwent head and neck resections and / or professors who underwent speech-language therapy were excluded. This study was approved by the Ethics Committee of the institution, under number 1.708.786

Participating professors were instructed to complete the VFI and ESV protocols. The VFI consists of 19 questions, divided into three categories, 11 questions on fatigue and vocal restriction, five on physical discomfort associated with voice, and three on recovering with vocal rest. Each question was scored as to the occurrence of symptoms as: never (zero points), almost never (one point), sometimes (two points), almost always (three points), and always (four points). In the first domains, the score is obtained by the simple sum of the questions. Therefore, the higher the score, the greater the fatigue in the aspects surveyed. Unlike the other items, the higher the score of the third area, the greater was the improvement of symptoms⁶. Thus, the total score varies from 0 to 76, with the subscale fatigue and vocal restriction (factor 1) from 0 to 44, with physical discomfort associated with voice (factor 2) from 0 to 20, and recovery with vocal rest (factor 3) from 0 to 12.

The VoiSS was used in order to provide participants' self-knowledge and self-perception of their voice and what it interferes with. The VoiSS consists of 30 questions, 15 of the category limitation (functionality), eight of the category emotional (psychological effect) and seven of the category physical (organic symptoms). Each question was scored according to the frequency of occurrence

of symptoms as: never (zero points), rarely (one point), sometimes (two points), almost always (three points), and always (four points). The scale score is made by the simple sum of the scores obtained for each question and its maximum score is 120 points. Individuals with dysphonia present total scores superior to 16 total points, being 11.5 in the area limitation, 6.5 in physical and 1.5 in emotional, considered cutoff values for this instrument¹¹.

Data were submitted to descriptive statistical analysis, with frequency, proportion and comparison of means, relating the aspects of self-perception of professor's vocal fatigue with vocal symptoms, as well as comparisons between the sexes and other data related to the classroom. For the organization of the data, Microsoft Office-Excel spreadsheet was used. The results were obtained by the statistical package Statistical Package for Social Sciences (SPSS), version 24.0. For correlation between the VFI and VoiSS protocols, the Spearman Correlation test was used and the significance level of 5% ($p \leq 0.05$) was adopted.

Results

Table 1 represents the means of each subitem of the VFI and VoiSS protocols.

Table 1. Mean score of the subitems of the Vocal Fatigue Index and Vocal Symptom Scale protocols .

Subitems	Minimum-maximum encountered	Maximum possible	Mean	Median
VFI - VoiSS	0 - 38	44	13.78*	14
VFI - PD	0 - 18	20	4.05*	3.5
VFI - RVR	0 - 12	12	7.93* ^{''} 4.06 ^{''''}	9
VoiSS- Limitation	0 - 51	60	14.85*	14
VoiSS - Physical	0 - 18	28	6.98*	7
VoiSS - Emotional	0 - 19	32	1.43	0

FVR = fatigue and vocal restriction; PD = physical discomfort associated with voice; RVR = recovery with vocal rest. * Score considered high for subitem. '' value without inversion. '''' value with inversion

The vocal symptoms most reported by university professors are shown in Table 2. It should be noted that the same professor may have marked more than one symptom, so the total number of professors in the Table exceeds the number of professors

listed in this study (126) and also that the data in Table 2 refer to all professors interviewed, not just one group, as done in Table 3. Therefore, generally, fatigue in speech was the most frequent symptom.

Table 2. Most reported symptoms by university professors.

	# of professors	Female	Male
Fatigue to speak	62 (49.2%)	43	19
Burning in throat	59 (46.8%)	36	23
Hoarseness	29 (23%)	19	10

Table 3 shows the number of students per class and the vocal symptom most reported by professors. In this case, it was decided to distribute the professors in three groups: teachers who lecture for up to 25 students per class, 30 students per class and more than 30 students. This division was made

with the purpose of investigating if vocal symptoms are more prevalent in teachers who give classes to a larger number of students per class. It is observed that, regardless of the number of students in the classroom, hoarseness is the most reported vocal symptom.

Table 3. Number of students per class and vocal symptom most reported.

Number of students per classroom	# of professors	# of professors with vocal symptoms	Most cited symptoms
Up to 25	43 (34.1%)	36 (31.3%)	Hoarseness (75%)
Up to 30 25 - 30	36 (28.6%)	32 (27.8%)	Hoarseness (59.3%)
More than 30 / less than 40 30 - 40	47 (37.3%)	47 (40.9%)	Hoarseness (65.9)
Total	126 (100%)	115 (100%)	

The duration in higher education is expressed in Table 4, noting that only eleven participants (8.73%) claimed they did not feel any vocal discomfort.

Table 5 shows the correlation between the VFI and VoiSS protocols and the correlation coefficient (r) between them, indicating a significant positive and strong correlation between the protocols.

Table 4. Duration of performance in the higher learning profession and quantity of professors who reported at least one vocal symptom.

Duration in higher education	Number of professors	# of professors with symptom(s)
Up to 05 years	25	24 (96%)
From 6 to 10 years	34	30 (88.23%)
11 to 15 years	22	22 (100%)
More than 15 years	45	39 (86.6%)
Total	126	115 (91.26%)

Table 5. Correlation between the scores of the Vocal Fatigue Index and Vocal Symptom Scale protocols.

Correlated protocols	r**	p***
Vocal Fatigue Index and Vocal Symptom Scale	0.727	< 0,001*

Legend: * Statistically significant values ($p \leq 0.05$) - Spearman correlation; ** r - correlation coefficient; *** p - level of statistical significance.

Correlation between the domains of the VFI and VoiSS protocols is shown in Table 6. It was observed that the level of significance was lower than 5% ($p < 0.050$) among all subitems of the protocols.

Table 7 represents the correlation between age, duration and total scores of the VFI and VoiSS protocols. It was verified that there was no correlation between the factors.

Table 6. Correlation between the domains of the Vocal Fatigue Index and Vocal Symptom Scale protocols.

	VoiSS- Limitation		VoiSS - Physical		VoiSS - Emotional	
	r**	p***	r**	p***	r**	p***
VFI - Fatigue and vocal restriction	0.702	0.001*	0.469	0.001*	0.466	0.001*
VFI - Physical discomfort associated with voice	0.622	0.001*	0.577	0.001*	0.451	0.001*
VFI - Recovery with vocal rest	0.258	0.004*	0.287	0.001*	0.199	0.026*

Legend: * Statistically significant values ($p \leq 0.05$) - Spearman correlation; ** r - correlation coefficient; *** p - level of statistical significance.

Table 7. Comparison between age, duration and the scores of the Vocal Fatigue Index and Vocal Symptom Scale protocols.

Scales	Age		Duration in higher education (years)	
	r**	p***	r**	p***
VFI	-0.031	0.729	0.066	0.470
VoiSS	0.071	0.428	0.066	0.466

Legend: * Statistically significant values ($p \leq 0.05$) - Spearman correlation; ** r - correlation coefficient; *** p - level of statistical significance.

Discussion

Different definitions of vocal fatigue are found in the literature, which makes it difficult to evaluate it objectively. It is often described as a vocal alteration symptom, as an isolated phenomenon or as an aspect that, when associated with inadequate compensatory behaviors, can favor dysphonia and phonotrauma¹⁸. With this, VFI was developed as a self-report tool that allows reliable identification and quantification of vocal fatigue symptoms in humans¹⁹.

In the American validation process of the VFI protocol, the authors present mean scores for healthy individuals and dysphonic individuals on three factors: Fatigue and vocal restriction (factor 1), Physical discomfort associated with voice (factor 2); Recovery with vocal rest (factor 3). For factors 1, 2 and 3, mean scores of 5.16, 1.44 and 5.8 respectively were found for healthy subjects and 24.47, 6.9 and 7.71 respectively for individuals with dysphonia¹⁹. Considering these values, it is observed that the university professors studied presented mean scores above the vocally healthy individuals and below the individuals with dysphonia

for factors 1 and 2, while for factor 3 the mean was very similar to that of dysphonic individuals. These data point to the warning of university professors in developing possible dysphonia related to vocal fatigue complaint.

In a survey of 102 teachers in private elementary and middle schools, scores similar to those in this study were observed for the areas fatigue and vocal restriction and physical discomfort associated with voice, with scores 13.56 and 3.58, respectively¹⁸. In the area recovery with vocal rest, the score was 4.10, lower than the findings with professionals from the higher education profession of this study. These refer, to a greater degree, to fatigue improvement when they perform vocal rest. However, because they are not teachers of the same category of education when compared to the participants of the aforementioned research, it is suggested that factors such as teaching for children causes greater vocal demand due to the need to provoke the attention of this audience and avoid the dispersion of students. In addition, professors working in universities may present better working conditions²⁰.

In 2018, a study was based on the application of the VFI protocol in 235 university professors, with 103 men and 132 women²², and the scores were considered as superior means. The authors indicated greater fatigue in the public surveyed, but there was no comparison with teachers from other classes of education to analyze the data of vocal fatigue. The authors emphasize the need for the speech-language pathologist to pay attention to the fatigue symptom, which may be intrinsically linked to the teaching activity²¹.

In one study, the VoiSS instrument was applied to 975 subjects, 486 of whom were dysphonia and 489 were vocally healthy, and obtained 16 points as a cutoff point for classification of dysphonia²². Thus, it can be inferred that the participants of this study presented a score compatible with that obtained in dysphonic subjects in the areas of limitation and physical. If we consider the VoiSS as a screening tool, classifying the subjects of this study into pass and fail, considering the cut-off value of the study, most university professors (86) would be in the failure group, that is, 67.4%. However, this fact does not appear to mean that teachers' complaints and vocal symptoms reflect on the limitation of their work and extra-occupational activities²³.

Compared with the male and female genders in all teachers, the most common symptom for men was burning in the throat, whereas for professors, fatigue in speaking, as well as the symptoms hoarseness and burning in the throat, corroborating with national studies^{23,24}. In addition, women are more likely to get scores of vocal protocols close to individuals with dysphonia³. Moreover, although men represent the majority of university professors,²⁵ the professors responded most to the protocols (56.3%), as well as in other studies^{20,21,23}.

It is noteworthy that professors had the option of marking more than one symptom, so the total number of professors in Table 2 exceeds the number of professors listed in the present study (126). In addition, the data in Table 2 refer to all teachers interviewed and not just to one group, as done in Table 3. Therefore, generally, fatigue in speech was the most frequent symptom. Only 11 professors did not report any vocal symptoms. Dry throat and speech effort, indicative of lack of vocal hydration, were also symptoms reported by university professors²⁶. Such changes in the normal voice pattern can lead to vocal problems, leading to dysphonia.

It is observed that teachers who claimed to teach for more than 30 students presented more vocal symptoms than those who give classes to smaller classrooms. It is also verified that all those who reported teaching to more than 30 students in the same class reported having felt or feeling some sign of voice change, hoarseness being the prevalent symptom among all groups. Hoarseness was also the most frequent symptom in a study conducted with 846 professors from a private university in São Paulo (Brazil), being even more frequent in women²⁷. This symptom generally suggests abuse and overloading of laryngeal structures due to the intense use of voice⁸. It is suggested that this adjustment is due to the attempt of projection of the ideal voice throughout the classroom in which often the environment is not favorable. This change, which can be classified as inadequate use of voice, implies in tissue damage of the vocal folds, which can generate nodules and polyps²⁸.

In search of a possible association of the time of profession in higher learning and vocal symptoms, although 91.26% of the participants had signaled at least one annoyance in the voice, it was observed that there was no correlation between such factors. Both professors who have been working

for less than 5 years as professors with more time in their federal university career have had some type of vocal symptom, but the time of profession does not seem to interfere with the appearance of these symptoms. This data corroborates a study carried out in 2018 with 235 university professors, which showed that there was no strong correlation between the VFI and VoiSS protocols with the variables age, duration of university performance and weekly workload²¹.

It is important to emphasize that some characteristics differ between primary and secondary school teachers. One of the main distinctions is that, generally, professors of Brazilian public universities are of exclusive dedication. This means that professionals should not engage in any other work activity elsewhere, unlike teachers in the core network who often work in more than one school to earn extra income. Another difference between such teaching classes is that there is a limited number of hours for senior professors in federal universities to work in classrooms, even if the employee is in administrative and / or postgraduate positions. It is assumed that the reduction of classroom hours results in less vocal exhaustion and longer time for vocal rest, preventing and guarding against possible vocal problems compared to teachers from private institutions and / or teachers other than higher education.

We observed in our study that the correlation between the total scores of the protocols was statistically significant and with strong positive correlation. That is, this analysis allows us to infer that the greater the vocal fatigue of these professors, the greater their vocal symptoms. Studies for validation, application and correlation of vocal self-assessment protocols have been developed in several parts of the world. The use of these instruments is an important contribution to the speech-language assessment, since information about the self-perception of the individual is obtained, adding to the objective and subjective data found by the speech-language pathologist and enriching the evaluation process. Therefore, the protocols are tools that can help the clinician better understand the complaints of his client and therefore we believe that they must be inserted in the process of evaluation and rehabilitation of dysphonia.

In the analysis of the sub-items fatigue and vocal restriction, physical discomfort associated with voice and recovery with vocal rest of the VFI, and

the emotional and physical sub-items of the VOISS (Table 6), there was statistical significance among the subitems of the protocols ($p < 0.05$), but the correlation coefficients between their subdivisions ranged from negligible correlations (0.199, 0.258 and 0.287), weak (0.451, 0.466 and 0.469) moderate (0.577 and 0.622) and strong (0.702) That is, in all correlations, it was found that the higher the result of a subitem, the higher the sub-level score of the other protocol despite the relationships that had strong correlation coefficients being more likely to occur. These data indicate, for example, that vocal limitation is closely related to fatigue and vocal restriction, that is, the more vocal fatigue and restriction tends to be, the greater the individual's limitation on the use of his voice.

The data in Table 7 corroborate with the literature regarding the non-correlation between vocal fatigue, vocal symptoms and age and / or duration^{21,29}. However, the study by Banks et al. (2017) contradicts this hypothesis and indicates that the age of the teacher can affect the rate of vocal fatigue³⁰. The relationship between aging and vocal function is known, but more studies are needed to verify whether or not there is a correlation between these parameters.

Conclusion

University professors presented higher mean scores, of factors 1 and 2 of the VFI, of the scores presented by vocally healthy subjects and inferior to the scores of the dysphonic individuals, while the factor 3 score was similar to the mean score of individuals with dysphonia. Hoarseness, fatigue in speaking and burning in the throat were the prevalent symptoms in this population. The main complaint for women was fatigue when speaking, while for men it was burning in the throat. The age group and the duration of profession are not related to the presence of fatigue and vocal symptoms, however the number of students in the classroom does. There was a strong positive correlation between the VFI and VoiSS protocols, indicating that the more vocal fatigue the university professor presents, the more vocal symptoms are self-reported.

References

1. Penteado RZ. Relações entre saúde e trabalho docente: percepções de professores sobre saúde vocal. *Rev Soc Bras Fonoaudiol.* 2007; 12(1): 18-22.
2. Hunter EJ, Banks R. Gender Differences in the Reporting of Vocal Fatigue in Teachers as Quantified by the Vocal Fatigue Index. *Ann Otol Rhinol Laryngol.* 2017; 126(12): 813-18.
3. Souza CL, Carvalho FM, Araújo TM, Reis EJFB, Lima VMC, Porto LA. Fatores associados a patologias de pregas vocais em professores. *Rev. Saúde Pública.* Oct. 2011; v. 45, n. 5:914-921.
4. Mendes ALF, Lucena BTL, Araújo AMGD, Melo LPF, Lopes LW, Silva MFBL. Voz do professor: sintomas de desconforto do trato vocal, intensidade vocal e ruído em sala de aula. *CoDAS.* Apr. 2016; v. 28, n. 2:168-175.
5. Dornelas R, Silva K, Carregosa ES, Gois JN, Alves MEAC, Silva VL, Irineu RA. Relação entre a função glótica e a desvantagem vocal em professores da rede pública de ensino. *Rev. CEFAC.* June 2017; v. 19, n. 3:303-307.
6. Abou-Rafêe M, Zambon F, Badaró F, Behlau M. Fadiga vocal em professores disfônicos que procuram atendimento fonoaudiológico. *CoDAS.* 2019; 31(3): e 20180120.
7. Batista EC, Matos LAL. O trabalho docente no ensino superior e a saúde vocal: um estudo de revisão bibliográfica. *Estação Científica (UNIFAP).* Jul. 2016; v. 6, n. 2:67-77.
8. Silva GJ, Almeida AA, Lucena BTL, Silva MFBL. Sintomas e causas autorreferidas em professores. *Rev. CEFAC.* Feb 2016; 1(18): 158-166.
9. Servilha EAM, Pereira PM. Condições de trabalho, saúde e voz em professores universitários. *Rev. Ciênc. Méd. Jan/Fev. 2008;* vol. 1 (nº 17): 21-31.
10. Junior FVB. Saúde vocal e docência no ensino superior [tese de mestrado]. Mossoró: Universidade Federal Rural do Semi-Árido; 2013.
11. Moghtader M, Soltani M, Mehravar M, JafarShaterzadeh Yazdi M, Dastoorpoor M, Moradi N. The Relationship between Vocal Fatigue Index and Voice Handicap Index in University Professors with and without Voice Complaint. *J Voice.* 2019.
12. Behlau M, Zambon F, Guerrieri AC, Roy N. Epidemiology of Voice Disorders in Teachers and Nonteachers in Brazil: Prevalence and Adverse Effects. *J Voice.* 2012; 26(5): 665.e9.
13. Santos AS, Almeida DM, Paula LG, Ribeiro MA, Oliveira MP. Comunicador eficaz: a voz do professor e saúde preventiva. *Revista Eletrônica de Educação da Faculdade Araguaia.* 2012; 2(2): 551-63.
14. Zambon F, Moreti F, Nanjundeswaran C, Behlau M. Cross-cultural adaptation of the Brazilian version of the Vocal Fatigue Index – VFI. *CoDAs.* 2017; 29(2): e 20150261.
15. Moreti F, Zambon F, Oliveira G, Behlau M. Equivalência cultural da versão Brasileira da Voice Symptom Scale: VoiSS. *J. Soc. Bras. Fonoaudiol.* Dec. 2011; v. 23 (n. 4): 398-400.
16. Deary IJ, Wilson JA, Carding PN, MacKenzie K. VoiSS: a patient-derived Voice Symptom Scale. *J Psychosom Res.* 2003; 54(5): 483-9.
17. Etikan I, Musa SA, Alkassim RS. Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics.* 2016; Vol. 5 (Nº. 1): 1-4.
18. Zambon F; Moreti F, Nanjundeswaran C, Behlau M. Equivalência cultural da versão brasileiro do Vocal Fatigue Index – VFI. *CoDAS [online].* 2017, vol. 29, n.2, e20150261. Epub Mar 13, 2017.
19. Nanjundeswaran C, Jacobson BH, Gartner-Schmidt J, Verdolini AK. Vocal fatigue index (VFI): Development and validation. *J Voice.* 2015 Jul; 29: 433–40
20. Servilha EAM; Arbach MP. Avaliação do Efeito de Assessoria Vocal com Professores Universitários. *Distúrb. Comun. Ago. 2013;* v. 25, n. 2.
21. Cercal GCS, Dassie-Leite AP, Paula AL, Novis JMM. Sintomas e fadiga vocal em professores universitários. In: XXVI Congresso Brasileiro de Fonoaudiologia; Out 10-13; Curitiba. Anais eletrônicos. Suplemento; 2018: 536.
22. Behlau M, Madazio G, Moreti F, Oliveira G, Santos LMA, Paulinelli BR, et al. Efficiency and cutoff values of self-assessment instruments on the impact of a voice problem. *J Voice.* 2016; 30(4): 506.e9-506.e18.
23. Anhaia TC, Klahr PS, Cassol M. Associação entre o tempo de magistério e a autoavaliação vocal em professores universitários: Estudo observacional transversal. *Rev. CEFAC.* 2015;17(1): 52-7.
24. Souza LBR, Penha PBC. Relação entre o tempo de serviço e qualidade de vida em voz de um grupo de professores universitários. *Rev. Ciênc. Méd. Biol.* 2016; 15(1): 15-22.
25. Ministério da Educação do Brasil. Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Diretoria de Estatísticas Educacionais. Censo da Educação Superior. Brasília, 2017.
26. Servilha EAM, Correia JM. Correlações entre condições do ambiente, organização do trabalho, sintomas vocais autorreferidos por professores universitários e avaliação fonoaudiológica. *Distúrb. Comun.* 2014; 26(3): 452-62.
27. Korn GP, Pontes AAL, Abranches D, Pontes PAL. Hoarseness and Risk Factors in University Teachers. *J Voice.* 2015; 28(4): 518.e21.
28. Mahato NB, Regmi D, Bista M, Sherpa P. Acoustic Analysis of Voice in School Teachers. *JNMA J Nepal Assoc.* Mar-Apr 2018; 56(211): 658-661.
29. Cielo CA, Ribeiro VV. Autoavaliação vocal de professores de Santa Maria/RS. *Rev. CEFAC.* 2015;17(4):1152-60.
30. Banks RE, Bottalico P, Hunter EJ. The Effect of Classroom Capacity on Vocal Fatigue as Quantified by the Vocal Fatigue Index. *Folia Phoniatri Logop.* 2017; 69(3): 85-93.