

Perception of fatigue in professors according to the level of knowledge of vocal health and hygiene

Percepção de fadiga em professores universitários de acordo com o nível de conhecimento sobre saúde e higiene vocal

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ABSTRACT

Purpose: To analyze the perception of fatigue in university professors, according to their level of knowledge of vocal health and hygiene. **Methods:** Observational and cross-sectional study. The study counted with 235 university professors, divided into two groups: Group 1 (G1) - 201 professors with more knowledge of vocal health and hygiene; Group 2 (G2) - 34 professors with less knowledge of vocal health and hygiene. The participants answered to the Vocal Fatigue Index (VFI). The data were analyzed using the Mann-Whitney test ($p < 0.05$). **Results:** The G1 presented significantly higher fatigue perception than G2 in the factor of tiredness of voice and avoidance of voice use ($p = 0.010$) and improvement of symptoms with rest ($p = 0.039$). **Conclusion:** Professors with more knowledge of vocal health and hygiene have higher perception of vocal fatigue.

Keywords: Health evaluation; Fatigue; Faculty; Occupational health; Voice

RESUMO

Objetivo: Analisar a percepção de fadiga em professores universitários, de acordo com o nível de conhecimento sobre saúde e higiene vocal. **Métodos:** Estudo observacional, transversal e analítico. Participaram 235 professores universitários, divididos em: Grupo 1 (G1) - 201 professores universitários, com maior conhecimento sobre saúde e higiene vocal; Grupo 2 (G2) - 34 professores universitários, com menor conhecimento sobre saúde e higiene vocal. Os participantes responderam ao instrumento Índice de Fadiga Vocal (IFV). Os dados foram analisados utilizando-se o teste de Mann-Whitney ($p < 0,05$). **Resultados:** Professores universitários do G1 apresentaram percepção de fadiga significativamente maior que os professores universitários do G2, nos domínios fadiga e restrição vocal ($p = 0,010$) e recuperação com repouso vocal ($p = 0,039$). **Conclusão:** Professores universitários com maior conhecimento sobre saúde e higiene vocal apresentam maior percepção da fadiga vocal.

Palavras-chave: Avaliação em saúde; Fadiga; Docentes; Saúde do trabalhador; Voz

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INTRODUCTION

University professors are professional voice users at risk of developing voice problems due to environmental and organizational work conditions^(1,2). Only few studies have been performed in the field of voice with these professionals⁽³⁾, thus, there is insufficient evidence regarding the level of vocal risk of the teaching profession.

The few literature available regarding the university professors voice has shown that variables related to organizational work conditions, workplace, vocal care, vocal habits and lifestyle are considered to be risk factors to develop vocal symptoms, although with lower probability when compared to other teaching professions⁽⁴⁾. One of the symptoms that university professors have is vocal fatigue^(1,2,5,6).

Despite the lack of consensus regarding the etiology of vocal fatigue, one hypothesis states that it is due to the inadequate oxygen supply for the vocal task, thus, the performance of this task would decrease over time. This condition could be due to neuromuscular inefficiency and/or cardiovascular recovery deficits after the task⁽⁷⁾. In addition, the perception of fatigue of the teaching professions may be related with the vocal load of the lectures⁽²⁾.

Teachers are professional voice users that use their voice as the main tool for teaching and learning process⁽⁸⁾, therefore, the knowledge of vocal health and vocal hygiene is essential⁽⁹⁾. In this sense, a study observed that university professors have knowledge of vocal health and hygiene, in addition to the knowledge of strategies for voice improvement and in how to use strategies to keep the students' attention during the class⁽⁹⁾. It is known that vocal knowledge is essential to keep an adequate vocal behavior and that the lack of this knowledge may be a risk factor for the development of symptoms, such as vocal fatigue, and one of the reasons for development of behavioral dysphonias⁽¹⁰⁾.

To the best of our knowledge there are no studies that analyzed if the knowledge of vocal health and hygiene can influence on fatigue in university professors. However, based on what was previously presented, the present study hypothesis is that professors with less knowledge of vocal health and hygiene will have higher perception of vocal fatigue. With adequate scientific evidence it can be supposed that the association between vocal knowledge and perception of vocal fatigue might help to better understand the impact that the knowledge of vocal health and hygiene can bring to the development of this symptom in university professors.

Therefore, the aim of the present study was to analyze the perception of fatigue in university professors, according to their level of knowledge of vocal health and hygiene.

METHODS

This is an observational, cross-sectional and analytic study. It was accepted by the Committee for Ethics in Research of the *Universidade Estadual do Centro-Oeste* under the protocol number 1.639.096.

The professors participated in this online study using social network or email. The professors' contact information was obtained in the secretariats and websites of higher education institutions. The emails of departmental secretaries or course

coordinators were obtained on the institution's website. Next, the authors sent an email to disseminate the research; in this email there was a link to fill out the research questionnaires. Also, the professors who received the email were invited to share it with their colleagues.

The inclusion criteria was: teach in higher education level. The exclusion criteria were: have not signed the informed consent form; not be actively working due to any reason; have neurological problems, previous head and neck surgery with laryngeal or vocal impairment; history of organic dysphonia; previous vocal therapy and/or vocal conditioning. The volunteers answered an identification questionnaire, built by the authors, using Survey Monkey. The questionnaire aimed to investigate aspects related to socio-demographic information, work conditions, general health and vocal health information. This questionnaire was also used to characterize the study sample of the participants that were later included in the study.

A total of 235 university professors were included, 103 males and 132 females with a mean age of 40 years and 5 months old; they were from 39 different institutions, both private and public Brazilian universities. From the 235 professors, 88 had vocal complaint while 147 did not. The professors were divided into two groups regarding their knowledge of vocal health and hygiene. In order to make the groups division possible, the participants had to answer to the Brazilian version of the Vocal Health and Hygiene Questionnaire (VHHQ)⁽¹¹⁾. This questionnaire has 31 items, divided as positive, negative and no influence to the vocal health. The simple sum of the answers gives the protocol total score, its threshold is 23 points⁽¹¹⁾. The participants were then divided into two groups: Group 1 (G1) – 201 university professors with more knowledge of vocal health and hygiene, 122 females and 79 males, mean age of 40.34±9.67 years old; Group 2 (G2) - 34 university professors with less knowledge of vocal health and hygiene, ten females and 24 males, mean age of 41.35±9.82 years old.

Next, all participants answered the Vocal Fatigue Index (VFI)⁽¹²⁾. The VFI⁽¹²⁾ is a self-assessment tool that addresses to many symptoms related to fatigue. It has 19 questions divided into three factors: tiredness of voice and avoidance of voice use; physical discomfort symptoms and improvement of symptoms with rest. Each participant answered the questions individually on a five-point Likert scale, where 0 (zero) indicates "never" and 4 indicates "always". The simple sum of the answers for each factor gives the index score for each one of them. Considering the factors of tiredness of voice and avoidance of voice use and physical discomfort symptoms, higher scores indicate more vocal fatigue. On the other hand, for the improvement of symptoms with rest factor, higher scores indicate more perception of improvement with rest.

Data were analyzed using descriptive and inferential statistics. The Shapiro-Wilk test was used to test for normal distribution and showed that all variables had non-normal distribution. Thus, the Mann-Whitney test was used to compare the outcomes of the professor's self-assessment between both groups. Fisher's exact test was used to analyze the association between the nominal qualitative variable and both groups. The significance level was set at 5% ($p < 0.05$) for inferential analysis. The Statistica 13.0 software (Stat Soft Inc., Tulsa, Oklahoma, USA) was used.

Table 1. Analysis of the quantitative variables regarding working characteristics for each group of university professors

Variable	G1					G2					p-value
	Average	SD	Q25	Median	Q75	Average	SD	Q25	Median	Q75	
Hours lecture, weekly	14.47	8.11	8.00	12.00	18.00	15.03	11.93	8.00	10.50	14.00	0.252
Years in the profession	9.82	8.34	3.00	7.00	14.00	12.15	9.73	4.00	10.00	20.00	0.236

p<0.05 – Mann-Whitney test

Caption: SD = Standard-deviation; Q25 = first quartile; Q75 = third quartile; G1 = Group 1; G2 = Group 2

Table 2. Analysis of the qualitative variable for each group of university professors

Vocal complaint		G1	G2	Total	p-value
Yes	N	81	7	88	0.034*
	%	40.3%	20.6%	37.4%	
No	N	120	27	147	
	%	59.7%	79.4%	62.6%	

*p<0.05 – Fisher exact test

Caption: N = number; % = percentage; G1 = Group 1; G2 = Group 2

Table 3. Analysis of the Vocal Fatigue Index factors for each group of university professors

Factor	G1					G2					p-value
	Average	SD	Q25	Median	Q75	Average	SD	Q25	Median	Q75	
Tiredness and avoidance	10.17	8.01	3.00	10.00	15.00	6.65	6.70	1.00	5.00	10.00	0.010*
Physical discomfort symptoms	2.67	3.08	0.00	2.00	4.00	2.82	4.25	0.00	0.50	4.00	0.438
Improvement of symptoms with rest	6.32	4.32	2.00	7.00	10.00	4.50	4.38	0.00	3.00	9.00	0.039*

*p<0.05 – Mann-Whitney test

Caption: SD = standard-deviation; Q25 = first quartile; Q75 = third quartile; G1 = Group 1; G2 = Group 2

RESULTS

No difference was found between groups regarding hours lecture and years in the profession (Table 1). Regarding presence of vocal complaint (Table 2), although both groups had more individuals with no vocal complaint, G2 presented more professors with vocal complaint when compared with G1 (p=0.034).

University teachers from G1 perceived more vocal fatigue than G2 in two factors: tiredness of voice and avoidance of voice use (p=0.010) and improvement of symptoms with rest (p=0.039) (Table 3).

DISCUSSION

To the best of our knowledge there are no studies that compared university professors with professors teaching in other educational stages. Nevertheless, studies with this population have inferred that university professors seem to be different from teachers teaching in other educational stages once they often have better environmental and organizational work conditions^(1,2), in addition to more knowledge of vocal health and hygiene⁽⁹⁾.

It is known that having more knowledge of vocal health and hygiene is an important aspect for an adequate vocal behavior, and that no knowledge at all is a risk factor for the development of symptoms such as vocal fatigue. University professors are considered to be professionals with access to vocal health and hygiene information⁽⁹⁾; plus, they usually have better working conditions and less vocal load in teaching activities when

compared with other teaching professionals^(1,2). However, the literature has shown that this population often has the perception of vocal fatigue. Thus, it is important to investigate if vocal knowledge may influence in the perception of vocal fatigue in university professors.

Vocal load is one of the main risk factors to develop symptoms such as vocal fatigue⁽¹³⁾. Therefore, the present study controlled some variables that could have influenced vocal load in order to properly compare both study groups. The groups in the present study were similar regarding hours lecture per week, and years in the profession (Table 1). On the other hand, although both groups had more participants without vocal complaints, G2 presented significantly higher frequency of participants with vocal complaint when compared to G1 (Table 2).

In the present study, the statistical analysis showed that teachers with more knowledge of vocal health and hygiene had considerably higher perception of fatigue in factors of tiredness of voice and avoidance of voice use and improvement of symptoms with rest than teachers with less knowledge of vocal health and hygiene (Table 3).

The lack of knowledge of vocal health and hygiene is considered to be one of the reasons for the development of behavioral dysphonias⁽¹⁰⁾. However, having this knowledge will not necessarily avoid the development of dysphonia, once the knowledge alone does not mean that the individual will perform healthy vocal practices and have better self-regulation behavior⁽¹⁴⁾, especially while working.

Data of the present study showed that professors with more knowledge of vocal health had higher perception of vocal fatigue. This study initial hypothesis was that professors with less knowledge of vocal health and hygiene would have higher perception of vocal fatigue. However, this hypothesis was

rejected with the results analysis and two others were made: professors with more knowledge of vocal health and hygiene have better perception of fatigue, or, the presence of fatigue leads professors to seek knowledge of vocal health and hygiene. The aim of the present study was not to establish causality; still, this discussion is necessary to better understand the outcomes. Moreover, it is important to highlight that professors with more knowledge of vocal health and hygiene also had higher frequency of vocal complaints.

Self-perception is a subjective parameter, it cannot be predicted based on factors from the patient's history or findings in clinical examination; however, it provides important information on the patient's perception of voice, as well as the degree to which voice might be a handicap in his daily life⁽¹⁵⁾. The literature has shown that individuals with vocal disorders commonly do not have good vocal self-perception⁽¹⁵⁾, which confirms the higher perception of vocal complaints. Further, no studies that correlated the influence that knowledge of vocal health and hygiene has with self-perception were found.

Although studies with university professors did not use specific instruments to measure the perception of vocal fatigue, they showed high occurrence of symptoms associated with vocal fatigue, that were mainly related to vocal demand^(1,2,5,6). It is inferred that more knowledge of vocal health and hygiene may help professors to have more perception regarding voice related situations, such as presence of vocal fatigue and the avoidance of voice use due to fatigue. Professors may also better understand differences in their vocal characteristics due to strategies such as vocal rest. Considering that the perception of vocal fatigue is related to progressive increase in phonatory effort and progressive decrease in phonatory capabilities⁽¹⁶⁾, individuals who are occupational voice users and have good self-perception may be more aware of any limitations in their vocal use when presenting vocal fatigue either if it affects working conditions, emotional or psychosocial aspects⁽¹⁷⁾. Reinforcing this inference, this group perceived more fatigue improvement with vocal rest, strategy that has been proven by the literature to be effective⁽¹²⁾.

According to the literature, the main factors that explain vocal fatigue are: neuromuscular inefficiency, involving the recruitment of more muscles than needed, or incorrect pattern of muscle activation, which will lead to greater energy demands for the task and/or deficit to recover from a vocal task; cardiovascular recovery deficits, which will lead to increased time for cardiovascular recovery and for the return to the baseline homeostatic state after vocal use⁽⁷⁾. Therefore, although knowledge of vocal health and hygiene is important for an adequate vocal behavior, considering muscle conditioning, the knowledge of adequate vocal behavior alone may be enough for a better perception of fatigue and its consequences. On the other hand, data of the present study showed that having knowledge of vocal health and hygiene does not seem to be enough to avoid the perception of vocal fatigue. This might have happened once professors have high vocal load due to the high demand of lectures and, information on vocal health and hygiene are only indirect strategies. In order to improve the professors vocal use, provide them with better conditioning for their vocal demand and aiming to delay the sensation of vocal fatigue, these indirect strategies must be added to direct strategies, such as vocal and cardiovascular training. It is inferred that both strategies should be addressed to guarantee better vocal performance and lower perception of fatigue. However, further studies are needed to

investigate whether the combination of both strategies would be better to adequate vocal behavior and neuromuscular efficiency during vocal tasks, as well as better recovery after vocal use⁽⁷⁾, in university teachers.

On the other hand, seeking for knowledge of vocal health and hygiene may be a compensatory strategy to the presence of vocal complaints. Although the present study did not aim to establish cause and effect relationship, it is hypothesized that professors who perceive vocal fatigue may have sought for vocal health and hygiene information in order to minimize the symptoms. However, this knowledge alone does not seem to be enough to reduce the perception of vocal fatigue.

Therefore, the present study intends to start a discussion about the role that knowledge of vocal health and hygiene has in the perception of fatigue. Longitudinal studies with adequate design are needed to establish a causal relationship between the perception of vocal fatigue among university professors and their knowledge of vocal health and hygiene, their cardiovascular training and their vocal load. In addition, further research that controls variables related to vocal activities that are work related and to vocal activities that are not work-related, such as hobbies and pleasure, is suggested. Such studies may offer more elements to understand this topic.

CONCLUSION

University professors with greater knowledge of vocal health and hygiene have higher perception of vocal fatigue considering the factors of tiredness of voice and avoidance of voice use and improvement of symptoms with rest.

REFERENCES

1. 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. <http://dx.doi.org/10.1590/1982-021620153314>.
2. Aparecida E, Servilha M, Manchado P, Cat U, Dunlop JB. Condições de trabalho, saúde e voz em professores universitários. *Rev Ciênc Méd*. 2008;17(1):21-31.
3. Korn GP, Pontes AAL, Abranches D, Pontes PAL. Hoarseness and risk factors in university teachers. *J Voice*. 2015;29(4):518-8. <http://dx.doi.org/10.1016/j.jvoice.2014.09.008>. PMID:25795353.
4. Korn GP, Pontes AAL, Abranches D, Pontes PAL. Vocal tract discomfort and risk factors in university teachers. *J Voice*. 2016;30(4):507-8. <http://dx.doi.org/10.1016/j.jvoice.2015.06.001>. PMID:26279322.
5. Servilha EAM, Arbach MDP. Queixas de saúde em professores universitários e sua relação com fatores de risco presentes na organização do trabalho. *Distúrb Comun*. 2011;23(2):181-91.
6. Servilha E, Costa A. Conhecimento vocal ea importância da voz como recurso pedagógico na perspectiva de professores universitários. *Rev CEFAC*. 2015;17(1):13-26. <http://dx.doi.org/10.1590/1982-0216201514813>.
7. Nanjundeswaran C, VanSwearingen J, Abbott KV. Metabolic mechanisms of vocal fatigue. *J Voice*. 2017;31(3):378-11. <http://dx.doi.org/10.1016/j.jvoice.2016.09.014>. PMID:27777059.

8. Ilomäki I, Kankare E, Tyrmi J, Kleemola L, Geneid A. Vocal fatigue symptoms and laryngeal status in relation to vocal activity limitation and participation restriction. *J Voice*. 2017;31(2):248-10. <http://dx.doi.org/10.1016/j.jvoice.2016.07.025>. PMID:27544637.
9. Servilha E, Costa A. Knowledge about voice and the importance of voice as an educational resource in the perspective of university professors. *Rev CEFAC*. 2015;17(1):13-26. <http://dx.doi.org/10.1590/1982-0216201514813>.
10. Behlau M, Zambon F, Moreti F, Oliveira G, Barros Couto E Jr. Voice self-assessment protocols: different trends among organic and behavioral dysphonias. *J Voice*. 2017;31(1):112-27. <http://dx.doi.org/10.1016/j.jvoice.2016.03.014>. PMID:27210475.
11. Moreti FTG. Questionário de Saúde e Higiene Vocal – QSHV: desenvolvimento, validação e valor de corte. [tese]. São Paulo: Universidade Federal de São Paulo; 2016. 103 p.
12. Zambon F, Moreti F, Nanjundeswaran C, Behlau M. Equivalência cultural da versão brasileira do Vocal Fatigue Index – VFI. *CoDAS*. 2017;29(2):1-6. <http://dx.doi.org/10.1590/2317-1782/20172015261>. PMID:28300936.
13. Hunter EJ, Titze IR. Quantifying vocal fatigue recovery: dynamic vocal recovery trajectories after a vocal loading exercise. *Ann Otol Rhinol Laryngol*. 2009;118(6):449-60. <http://dx.doi.org/10.1177/000348940911800608>. PMID:19663377.
14. Almeida AA, Behlau M. Relations between self-regulation behavior and vocal symptoms. *J Voice*. 2017;31(4):455-61. <http://dx.doi.org/10.1016/j.jvoice.2016.10.010>. PMID:27838284.
15. Behrman A, Sulica L, He T. Factors predicting patient perception of dysphonia caused by benign vocal fold lesions. *Laryngoscope*. 2004;114(10):1693-700. <http://dx.doi.org/10.1097/00005537-200410000-00004>. PMID:15454756.
16. McCabe DJ, Titze IR. Chant therapy for treating vocal fatigue among public school teachers. *Am J Speech Lang Pathol*. 2002;11(4):356-69. [http://dx.doi.org/10.1044/1058-0360\(2002/040\)](http://dx.doi.org/10.1044/1058-0360(2002/040)).
17. Paolillo NP, Pantaleo G. Development and validation of the Voice Fatigue Handicap Questionnaire (VFHQ): clinical, psychometric, and psychosocial facets. *J Voice*. 2015;29(1):91-100. <http://dx.doi.org/10.1016/j.jvoice.2014.05.010>. PMID:25261955.