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Relationship Between Vocal Handicap and Vocal Tract Discomfort in University Professors

Relação entre desvantagem vocal e desconfortos do trato vocal em professores universitários

Relación entre la Discapacidad Vocal y las Molestias del Tracto Vocal en Profesores Universitarios

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Abstract

Introduction: Teachers face unique vocal health challenges due to the nature of their profession. **Objective:** To identify and correlate vocal tract discomfort and perceived voice handicap in university professors. **Methods:** Observational, cross-sectional, and analytical study. A sociodemographic questionnaire, the Voice Handicap Index-10 (VHI-10), and the Vocal Tract Discomfort Scale (VTDS) were applied to university professors from a Brazilian federal institution. Spearman's correlation test was used, with a 5% significance level ($p<0.05$). **Results:** A total of 126 professors participated: 5 (3.96%) were up

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to 30 years old, 47 (37.30%) between 30–40, 45 (35.71%) between 40–50, 21 (16.66%) between 50–60, and 8 (6.34%) over 60. Regarding teaching experience, 25 (19.8%) had less than 5 years, 36 (28.5%) between 5–10, 20 (15.8%) between 10–15, 24 (19%) between 15–20, and 21 (16.6%) over 40 years. The mean VHI-10 score was 4.03 (SD±4.02), with a median of 3, below the cutoff point. In the VTDS, dryness was the most frequent and intense symptom, followed by sore and irritated throat. Tightness was the least reported sensation. There were significant positive correlations, from weak to moderate, between the total VHI-10 score and all VTDS symptoms. **Conclusion:** There was no self-reported voice handicap, but there was vocal tract discomfort, especially dryness, sore throat, and irritation. However, even without a perceived vocal handicap, the VHI-10 score increased with the intensity of vocal tract discomfort.

Keywords: Teaching; Signs and Symptoms; Voice Quality; Voice.

Resumo

Introdução: Professores enfrentam desafios vocais específicos devido às exigências da profissão. **Objetivo:** Identificar e correlacionar desvantagem e desconforto do trato vocal em docentes universitários. **Métodos:** Estudo observacional, transversal e analítico, com aplicação de questionário sociodemográfico, Índice de Desvantagem Vocal reduzido (IDV-10) e Escala de Desconforto do Trato Vocal (EDTV) em professores de uma instituição federal brasileira. Utilizou-se o teste de correlação de Spearman ($p<0,05$). **Resultados:** Participaram 126 docentes: 3,96% com até 30 anos, 37,30% entre 30–40, 35,71% entre 40–50, 16,66% entre 50–60 e 6,34% acima de 60. Quanto ao tempo de atuação no ensino superior: 19,8% com menos de 5 anos, 28,5% entre 5–10, 15,8% entre 10–15, 19% entre 15–20, e 16,6% com mais de 40 anos. No IDV-10, a média foi 4,03 (DP±4,02) e a mediana 3, abaixo do ponto de corte. Na EDTV, a secura foi o desconforto mais frequente e intenso, seguida de dor e irritação na garganta. A sensação de aperto foi a menos referida. Houve correlações positivas e significativas, de fraca a moderada magnitude, entre o escore do IDV-10 e todos os sintomas da EDTV. **Conclusão:** Não houve autorreferência de desvantagem vocal, mas os participantes relataram desconfortos, sendo secura, dor e irritação na garganta os mais comuns. Ainda que não percebam desvantagem vocal, o escore do IDV-10 tende a aumentar conforme os sintomas de desconforto se intensificam.

Palavras-chave: Ensino; Sinais e sintomas; Qualidade da voz; Voz.

Resumen

Introducción: Los docentes enfrentan desafíos particulares en la salud vocal debido a la naturaleza de su trabajo. **Objetivo:** Identificar y correlacionar la desventaja vocal y el malestar del tracto vocal en profesores universitarios. **Métodos:** Estudio observacional, transversal y analítico. Se aplicaron un cuestionario sociodemográfico, el Índice de Desventaja Vocal reducido (IDV-10) y la Escala de Disconfort del Tracto Vocal (EDTV) a profesores universitarios de una institución federal brasileña. Se utilizó la prueba de correlación de Spearman con un nivel de significancia del 5% ($p<0.05$). **Resultados:** Participaron 126 docentes: 5 (3,96%) tenían hasta 30 años, 47 (37,30%) entre 30–40, 45 (35,71%) entre 40–50, 21 (16,66%) entre 50–60, y 8 (6,34%) más de 60. En cuanto a la experiencia docente, 25 (19,8%) tenían menos de 5 años, 36 (28,5%) entre 5–10, 20 (15,8%) entre 10–15, 24 (19%) entre 15–20, y 21 (16,6%) más de 40 años. El promedio del IDV-10 fue 4,03 (DE±4,02), con una mediana de 3, por debajo del punto de corte. En la EDTV, la sequedad fue el síntoma más frecuente e intenso, seguida de dolor e irritación de garganta. La sensación de tensión fue la menos reportada. Se observaron correlaciones positivas significativas, de magnitud débil a moderada, entre el puntaje total del IDV-10 y todos los síntomas sensoriales de la EDTV. **Conclusión:** No se identificó desventaja vocal autorreportada, pero sí malestar en el tracto vocal, siendo la sequedad, el dolor de garganta y la irritación los síntomas más comunes. Aun sin percepción de desventaja vocal, el puntaje del IDV-10 aumentó con el malestar vocal.

Palabras clave: Enseñanza; Signos y Síntomas; Calidad de la Voz; Voz.

Introduction

Teachers face unique challenges related to vocal health due to the nature of their occupation[1,2]. The voice is their primary tool of work, used daily to transmit knowledge and establish effective communication with students. However, this intense vocal activity places them in a position of high vulnerability, making them susceptible to a significant incidence of vocal changes[2].

Furthermore, a study showed that university professors may experience high levels of work-related stress, which in turn directly influences the acoustic parameters of their voice, such as jitter, shimmer, and the harmonic-to-noise ratio, impairing vocal quality and increasing the risk of dysphonia[3]. These factors are exacerbated by unfavorable environmental conditions and the constant pressure to meet pedagogical demands, directly impacting vocal health[4].

University professors face a high vocal workload in their profession[5], with vocal changes being one of the main reasons for absenteeism from work[6]. Additionally, studies indicate the presence of high scores of vocal symptoms[7,8], which can negatively impact voice-related quality of life, although elevated scores in this aspect have been observed[9].

According to a systematic review published in 2022, 41% of university professors reported vocal disorders[5]. This high vocal demand makes them susceptible to various symptoms, such as vocal fatigue, hoarseness, tiredness when speaking, throat irritation, and dry throat, which can significantly affect both their professional and personal quality of life[5,7,8]. These symptoms can lead to vocal disadvantage, negatively impacting the psychosocial well-being of university professors[10].

University professors with vocal disorders have a higher total score on the Vocal Handicap Index (VHI) compared to those without voice problems[5,11]. This highlights the importance of understanding and addressing vocal symptoms early in this professional group to prevent dysphonia and improve their professional, emotional, and social quality of life[5,11]. Therefore, considering that the vocal health of professors is a crucial aspect of their overall health and quality of life, this study aimed to identify and correlate vocal handicap and discomforts of the vocal tract in university professors..

Material and methods

Study design

An observational, cross-sectional, and analytical study. This study followed the STROBE guidelines (Strengthening the Reporting of Observational Studies in Epidemiology)[12], which provide recommendations to improve the quality of reporting in observational studies.

Study setting

The state of Espírito Santo (ES) is the smallest in the Southeast region, with a geographical area of 46,098.1 km², making it one of the smallest states in Brazil. In the educational context, the state has Higher Education Institutions (HEIs), with one public university and the others being private. The only public HEI in the state is multicampus, responsible for the training of thousands of students in undergraduate and graduate programs. This study was conducted at one of these institutions, a federal university with four campuses distributed across the state, two located in the capital, and one in each of the north and south of ES.

Participants and Eligibility Criteria

The sample was recruited online through emails, whose contacts were obtained from the websites of the university's educational centers. The researchers sent email invitations to the professors at the institution, explaining the rationale and objectives of the study, and providing a link for reading and consenting to the Informed Consent Form (ICF) and filling out the sociodemographic questionnaire and protocols.

Professors without vocal complaints were included in the sample, regardless of self-declared biological sex and age group, who were affiliated with any of the university's educational centers and had previously signed the ICF. Exclusion criteria included professors on leave for any reason during data collection, those who had undergone tumor resections in the head and neck, and/or professors who had previously undergone or were undergoing speech therapy.

Variables

After signing the ICF, the professors completed a sociodemographic questionnaire to collect information on biological sex, age, years of experience in higher education teaching, and the

number of students per class. They then completed the 10-item Voice Handicap Index (VHI-10), an instrument consisting of ten statements with a Likert scale from zero to four points, with a total score ranging from zero (no handicap) to 40 points (maximum handicap)[13], with a cutoff score of 7.5[14]. Next, the professors completed the Vocal Tract Discomfort Scale (VTDS), which assesses the frequency and intensity of eight vocal tract discomfort sensations using a scale from 0 (never/none) to 6 (always/extreme). These sensations include burning, tightness, dryness, sore throat, itching, sensitive throat, irritated throat, and the sensation of a lump in the throat, highlighting the frequency and intensity of discomfort in the vocal tract[15,16].

Statistical Analysis

The data were organized and tabulated in an MS Excel spreadsheet, and the results were analyzed using the IBM SPSS statistical package (Statistical Package for Social Sciences), version 23.0. The relationship between the variables was studied. The Kolmogorov-Smirnov test for normality was used, and since all variables tested showed non-normality, a non-parametric approach was applied. To assess the correlation between the protocols, the Spearman Correlation test was used. The following classification of correlation coefficients was adopted for the interpretation of correlation magnitudes: <0.3 (weak linear correlation); ≥0.3 to <0.6 (moderate linear correlation); ≥0.6 to <0.9 (strong linear correlation); ≥0.9 to <1.0 (very strong linear correlation); and r = 1.0 (perfect linear correlation)[17].

Ethical Aspects

The project was approved by the Research Ethics Committee of the institution under opinion number 1,708,786. It is emphasized that the anonymity of the participants' information was protected to prioritize the principles of confidentiality and privacy related to this investigation.

Results

A total of 126 university professors were interviewed, with 55 (43.7%) being male and 71 (56.3%) being female. Regarding age, five (3.9%) were under 30 years old, 47 (37.3%) were in the 31-40 age range, 45 (35.7%) were between 41 and 50 years old, 21 (16.6%) were in the 50-60 age range, and 8 (6.3%) were over 60 years old. Concerning the number of students per class, 43 (34.1%) had up to 25 students, while 83 (65.9%) had more than 25 students. Regarding professional experience, 54 (42.8%) had less than ten years in the profession, and 72 (57.2%) had more than ten years in higher education teaching. No association was found between the protocol items and biological sex.

In the VHI-10, the median did not exceed the cutoff value of the protocol. In the VTDS, dryness was identified as the most frequent discomfort, with an average of 2.30, and also the most intense, with an average of 2.06.

Table 1. VHI-10 and VTDS Scores (n=126).

PROM	Subitems	Median	Sample	Female	Male	p-value
VHI-10	Total	3	4.03±4.02	4.07±3.76	3.98±4.38	0.396
VTDS - Frequency	Burning	1	1.34±1.39	1.33±1.38	1.345±1.69	0.726
	Tightness	0	0.82±1.39	0.817±1.20	0.836±1.17	0.963
	Dryness	2	2.30±1.50	2.45±1.64	2.10±1.30	0.545
	Sore throat	2	1.75±1.46	1.80±1.46	1.69±1.49	0.782
	Itching	1	1.14±1.31	1.21±1.34	1.04±1.29	0.396
	Sensitive throat	1	1.61±1.60	1.66±1.722	1.56±1.46	0.702
	Irritated throat	2	1.74±1.40	1.81±1.43	1.65±1.42	0.599
	Lump in the throat	0	0.85±1.40	0.77±1.22	0.964±1.55	0.807
VTDS – Intensity	Burning	1	1.21±1.36	1.18±1.37	1.25±1.38	0.426
	Tightness	0	0.76±1.19	0.74±1.23	0.80±1.16	0.609
	Dryness	2	2.06±1.53	2.26±1.67	1.80±1.30	0.350
	Sore throat	1	1.68±1.44	1.76±1.53	1.58±1.33	0.675
	Itching	1	1.09±1.38	1.12±1.35	1.05±1.43	0.453
	Sensitive throat	1	1.56±1.58	1.60±1.63	1.50±1.55	0.670
	Irritated throat	2	1.75±1.46	1.78±1.44	1.70±1.51	0.826
	Lump in the throat	0	0.77±1.29	0.69±1.17	0.89±1.45	0.467

Legend: Fisher's Exact; VHI-10 = Reduced Voice Handicap Index; VTDS = Vocal Tract Discomfort Scale; SD = Standard Deviation.

There were significant positive correlations, ranging from weak to moderate magnitude, between the total VHI-10 score and all the sensory symptoms of the VTDS. Moderate positive correlations occurred between the VHI-10 score and the frequency and intensity of all vocal tract discomforts, except for the intensity of the sensation of a lump in the throat, which showed a weak positive correlation (r=0.257).

Table 2. Correlation between the VHI-10 and VTDS PROMs.

VTDS	Subitems	VHI - 10
		r
Frequency	Burning	0.437**
	Tightness	0.387**
	Dryness	0.407**
	Sore throat	0.516**
	Itching	0.374**
	Sensitive throat	0.489**
	Irritated throat	0.499**
	Lump in the throat	0.316**
Intensity	Burning	0.458**
	Tightness	0.323**
	Dryness	0.445**
	Sore throat	0.459**
	Itching	0.318**
	Sensitive throat	0.529**
	Irritated throat	0.475**
	Lump in the throat	0.257*

Legend: Spearman Correlation Test; *significant if p<0.05; **significant if p<0.001; VHI-10 = Reduced Vocal Disadvantage Index; VTDS = Vocal Tract Discomfort Scale.

Discussion

University professors represent a professional group susceptible to a range of challenges related to vocal health, given the high level of vocal demand imposed by the nature of their work activities. Studies indicate that among voice professionals, teachers are among those with the highest incidence of vocal changes[17]. Specifically, among university professors, approximately 40% are affected by these changes[5].

Moreover, it is considered that the vocal doses required during classes may be a response to the high vocal demand imposed by acoustic conditions and classroom size[18], highlighting the importance of further investigations to better understand this dynamic and develop effective prevention and intervention strategies.

The vocal handicap data from this study corroborate previous research, in which university professors did not show self-perception of vocal disadvantage[10,19]. However, it is important to note that, although the group in this study consisted of teachers with no complaints, this could influence the lack of reference to vocal disadvantage. However, not reporting vocal disadvantage does not mean that these professors do not experience vocal symptoms and/or discomfort sensations. This underscores the importance of using self-assessment protocols that prompt them to reflect more deeply on their vocal production conditions.

Other studies have shown that the VHI score of higher education teachers with vocal complaints is higher than that of teachers without complaints[5,11] and that vocal disadvantage may be correlated among voice professionals without a diagnosis of vocal disorders[11]. Additionally, factors such as shyness can be confounders in the self-perception of vocal disadvantage in voice professionals[20]. Therefore, it is plausible to consider that self-perception of vocal disadvantage may vary between different groups, emphasizing the importance of its monitoring in subsequent studies for a more complete understanding of this dynamic.

Regarding vocal tract discomfort (VTD), dryness was the most frequent and intense. This discomfort is also the most reported by individuals with vocal complaints[21] and female university professors[22], demonstrating that dryness of the throat is one of the most frequently reported symptoms by professors. Dryness can occur due to several factors, such as caffeine intake, unfavorable nasal and sinus conditions, smoking, excessive alcohol consumption, exposure to air conditioning, and insufficient hydration[5]. Hydration of the vocal cords helps reduce the phonation threshold pressure[23], so it should be frequently practiced by professors.

In addition to dryness, the most self-reported symptoms, both in frequency and intensity, were sore throat and irritated throat, respectively. The data corroborate a study that observed a prevalence of 50.8% of sore or irritated throat in a total of 846 university professors[24].

The causes of dryness and sore throat are multifactorial and can be infectious or non-infectious. In non-infectious cases, physical-chemical factors (e.g., smoking, snoring, shouting, drug use) and environmental factors (e.g., pollution, temperature, humidity/air conditioning) can influence throat pain[25]. Irritated throat is also highly self-reported by teachers from other levels of education[26]. Furthermore, maintaining vocal effort during classes, often necessary to maintain the teaching-learning relationship, may explain the frequency of the sensation found.

The increased vocal intensity by professors during the exercise of their profession may characterize a risk factor for laryngeal mucosal damage, which results in, among other symptoms, throat irritation[27]. Therefore, it is believed that the throat irritability reported by professors may be associated with vocal intensity during the academic term and also with the presence of inflammatory processes and/or tissue involvement in the larynx and hypopharynx regions.

On the other hand, the least reported sensations in the present study were "tightness" and "lump in the throat." This finding corroborates a study conducted with Brazilian elementary school teachers, where it was found that, for both biological sexes, the least reported VTD variables in frequency and intensity were "tightness" and "lump in the throat," while the most cited symptom was "dryness"[28]. Additionally, a study that only analyzed the frequency of symptoms through the VTDS and with teachers from different education levels, but not including university professors, showed that "dryness" and "irritated throat" were the most frequent signs reported by participants, and "tightness" was the least cited[26]. Also, in the study by Limoeiro et al. (2019), it was concluded that there were no statistical differences between teachers regarding the frequency

of VTD[26]. Although these studies were conducted with teachers from other educational levels, such data reflect the idea that dryness is highly reported by teachers from various educational levels, while tightness is the least self-reported VTD.

The correlations between the VHI-10 score and the frequency and intensity of all VTDs demonstrate that the higher the self-reported frequency and intensity of vocal tract discomfort, the higher the vocal handicap score. The positive correlation between the protocols has already been demonstrated in studies with teachers with and without muscle tension dysphonia[29]. These correlations suggest a direct relationship between the perception of vocal disadvantage and the occurrence of discomfort in the vocal tract, indicating that the presence of vocal problems can significantly influence the experience of vocal discomfort. Thus, the importance of evaluating self-perception of the voice as a crucial indicator in identifying and monitoring potential vocal problems in different populations is emphasized.

Although occupational stress was not studied in this research, it also emerges as an important factor, as it can alter the acoustic parameters of the voice, compromising vocal quality and increasing the effort required for efficient vocal production[3]. Therefore, the need for integrated interventions that address not only vocal aspects but also psychosocial and environmental factors that influence the vocal health of university professors is reinforced.

This study has some limitations, such as restricting the sample to university professors from a single institution, which may limit the generalization of the findings to other academic realities, especially those with different structural, organizational, and vocal health support conditions. Thus, it is recommended that future research adopt methodologies that integrate perceptual-auditory and acoustic voice evaluations, as well as expand the sample to different institutional and regional contexts to deepen the understanding of the factors that impact the vocal health of educators.

Additionally, it is essential that future investigations consider variables such as hydration, the presence of flu-like symptoms at the time of data collection, sleep quality and duration, workload, and other aspects of the teaching routine, such as stress levels and vocal well-being. Nevertheless, the reports of frequency and intensity of vocal tract discomfort symptoms found in the present study suggest that the evaluated university professors may be exposed to unfavorable working conditions and vocal risk behaviors during their profession.

Conclusion

There was no self-reported vocal disadvantage, but rather discomfort in the vocal tract, with dryness, sore throat, and irritation being the most reported symptoms. However, it was observed that, even without the perception of vocal disadvantage, the score increased as the self-reported discomfort in the vocal tract intensified.

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