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Factors associated with vocal problems in teachers from Montes Claros, Minas Gerais

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Abstract

Teachers use their voices as a work tool and end up exposing themselves to risks of overload and vocal effort, which may impair professional performance. This study aimed to verify the prevalence and factors associated with vocal problems in teachers during the COVID-19 pandemic. This is a cross-sectional, analytical study, formed by 82 elementary school teachers from three state schools in Montes Claros, Minas Gerais, Brazil. To assess vocal problems, the Screening Index for Voice Disorder - SIVD was used. Data collection was carried out in July and August 2020, using the Google Forms Platform. A bivariate analysis was performed, followed by Poisson regression at a 5% significance level. The prevalence of vocal problems was 42.7% (n=35) and of possible vocal disorders was 11.0% (n=9). The most reported symptoms were phlegm (25.6%), hoarseness (19.5%), strained speech (17.1%), and dry throat (15.9%). In the final analysis of vocal problems, the diagnosis of gastroesophageal reflux (PR=2.245; 95%CI=1.548-3.256) and depressive symptoms (PR=1.722; 95%CI=1.020-1.907) were associated. The shift to remote classes showed the need for guidance for healthy vocal quality.

Keywords: Voice. Dysphonia. School Teachers. Speech-Language Pathology.

INTRODUCTION

Teachers are professionals who use their voice as a work tool and end up exposing themselves to the risk of overload or excessive vocal effort that can impair their ability and professional performance[1]. Any form of voice impairment or damage associated with a profession which makes it difficult to perform the job is called a Work-Related Voice Disorder (WRVD), where the damage may or may not organically alter the larynx. Therefore, WRVD is defined as a disorder that causes changes and alterations in vocal production, negatively impacting the exercise of a profession[2].

The signs of WRVD can be described by a worsening in vocal quality throughout the day which comes from effort and voice production during work and which vary according to the severity of the condition[1,3]. The literature points to a high average of vocal signs and symptoms among teachers[4], including hoarseness, dry throat, tiredness when speaking, and throat clearing[4-8].

Several factors can act alone or together, directly or indirectly, for the development of

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a vocal disorder, such as sex, age, smoking, alcohol consumption, gastroesophageal reflux (GER), allergies, in addition to the weekly workload, teaching time and voice intensive use[1,2]. These factors influence the voice of teachers, as they may arise from the lack of knowledge about vocal health or the difficulty in applying knowledge concerning what is known about voice care in the professional routine of teaching[8].

There are other factors such as anxiety and depression that need to be considered, as psychological distress is greatly relevant in the development or persistence of the condition[2,9]. Therefore, these factors should be studied, especially in the context of the pandemic when an increase in the prevalence of depressive and anxiety symptoms was observed in the population. This increase was probably due to the suspension of face-to-face classes and the imposition of home or remote work, impediment to moving freely, troubled family life, change in economic standards, disruption of social coexistence, feeling of helplessness and abandonment, family tragedies, fear of death, uncertainties regarding the effectiveness of control measures, and lack of effective treatment for the disease[10-12].

On the other hand, the work environment was modified in this pandemic period. As a result, other causes that contribute to vocal illness no longer exist, such as competitive environmental noise, which leads the teacher to increase vocal intensity in class, inadequate ventilation, dust, and a large number of students[13]. Given this new scenario, this study verified if there were changes in the presence of vocal signs and symptoms and which factors remain associated, so that new health education strategies aimed at this population may be implemented. Therefore, the objective of this study was to estimate the prevalence of vocal problems and possible self-reported voice disorders in elementary school teachers from state schools in Montes Claros and to analyze the associated factors during remote/distance teaching due to the COVID-19 pandemic.

METHODOLOGY

This is an analytical cross-sectional study, with a convenience sampling and is part of a study called "Factors associated with vocal and emotional problems, absenteeism and teachers' readiness to change: a longitudinal study". Of the 109 teachers from the 1st to the 9th grade of primary school from three state schools in Montes Claros, Minas Gerais, Brazil, 82 of them participated in the study (response rate=75.2%). The choice of institutions for the study was based on their proximity to the campus of United Colleges of Northern Minas (Funorte).

In accordance with the resolutions of the National Research Ethics Commission (CONEP), the online questionnaire was sent to the directors of the three schools who passed it on by email to all teachers who were conducting remote classes. Before answering the questions, the interviewees had access to the Informed Consent Form (ICF) and marked the agreement option. Data collection took place in July and August 2020.

To assess vocal problems, the Screening Index for Voice Disorder - SIVD[14] was used to describe: hoarseness, voice loss, breaking voice, low-pitched voice, phlegm, dry cough, cough with secretion, pain when speaking, pain when swallowing, secretion in throat, dry throat and strained speech. Responses are classified on a Likert scale: never; rarely; sometimes; and always, and were

dichotomized in two ways: vocal problems, considering the presence of "sometimes" and "always" responses for at least one vocal symptom; and voice disorders, following the criteria of Ghirardi *et al.*[14], who consider the presence of responses sometimes and always for five or more vocal symptoms.

For the independent variables, sociodemographic data (age group, marital status, number of people in the house, family income), occupational data (teaching time, weekly workload), habits (if you drink water during classes, alcohol consumption, and smoking), health-disease (hypertension, diabetes mellitus, sleep disturbance, gastroesophageal reflux, anxiety, symptoms of depression) and voice (use of voice for other occupations, use of voice in everyday life, vocal warm-up is performed and the statement: "when I rest my voice improves") were used. Numerical variables were dichotomized by the mean.

The question for alcoholism referred to consumption before and in the present moment of social isolation due to the pandemic: I consumed and increased consumption, consumed and maintained the same consumption, consumed and reduced consumption, did not consume and started to consume, did not consume and continue without consuming. The variable was dichotomized into "no and yes", and "no" was considered as those who answered no to consuming and continued to not consuming. Regarding smoking, only one person reported using cigarettes, 98.8% did not smoke.

Arterial hypertension, diabetes mellitus, anxiety, sleep disorders, gastroesophageal reflux were surveyed with the question of whether the individual was diagnosed by the doctor for such problems.

Depression symptoms were verified using the Patient Health Questionnaire-9 - PHQ-9, validated in Brazil[15], and have responses on a Likert scale ranging from 0 to 3 points, whose sum is categorized into: 0-4 points (without depression); 5-9 points (mild depressive disorder); 10-14 points (moderate); 15-19 points (moderately severe); and 20-27 (severe). It was dichotomized between those without symptoms of depression (no) and those with symptoms of mild to severe depression (yes).

Bivariate analyses were performed using Pearson's Chi-Squared test or Fisher's Exact test, the latter, when the results did not meet the requirements for the application of Pearson's Chi-Squared. Variables with a significance of 20.0% ($p \leq 0.20$) were included in a multivariate analysis with Poisson regression with respective crude and adjusted prevalence ratios (PR) and 95% confidence intervals (95%CI). The variables that presented a significance of 5.0% ($p \leq 0.05$) remained in the final model.

The project was approved by the Research Ethics Committee of United Colleges of Northern Minas – FUNORTE under number 4.012.352 (CAAE 30007120.9.0000.5141).

RESULTS

The prevalence of vocal problems in teachers who answered sometimes and always was 42.7% (n=35) and the prevalence of possible vocal disorders was 11.0% (n=9), the main signs and symptoms being: throat clearing, hoarseness, and tiredness when speaking (Figure 1). Among these, 30.0% reported not improving their voice after rest.

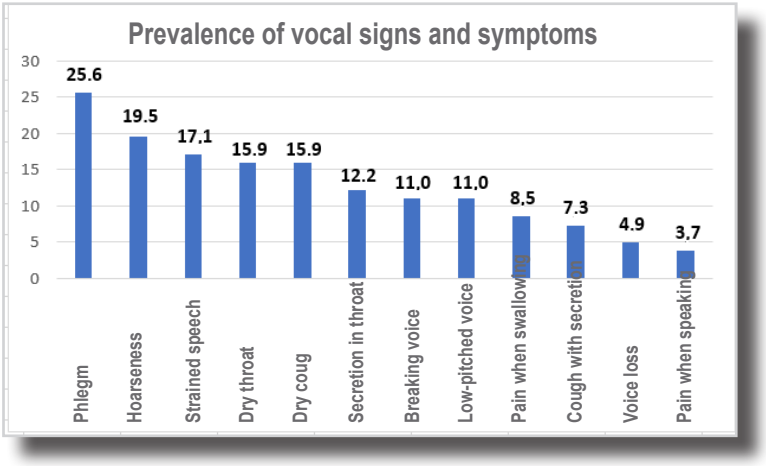

Figure 1 – Prevalence of vocal signs and symptoms among teachers who responded sometimes or always, and a person may have more than one symptom. Montes Claros, MG. 2020.

As for the profile of teachers, most were female (90.2%), a mean age of 43.3 years old (SD=9.57), median of 43.0 years old, a minimum of 23 and maximum of 64 years old, all had higher education. The mean number of people in the house was 3.2 (SD=1.17) with a median of three people, with a minimum of one and a maximum of six people. The mean family income was R$5,561.34 (SD = 8,082.94) and a median of R$4,000.00, with a minimum of R$1,000.00 and a maximum of R$7,000.00. The average working time as a full-time professor was 13.2 years (SD=7.80) and a median of 12 years, with a minimum of 6 months and a maximum of 41 years.

Due to the low prevalence of possible voice disorders, we chose to analyze the factors associated with voice problems. In the bivariate analysis, the following variables were associated, with a statistical significance of up to 20.0%: alcohol consumption, medical diagnosis of sleep disorders, gastroesophageal reflux, anxiety, and symptoms of depression (Table 1).

Table 1 – Bivariate analysis, using the chi-squared test, for vocal problems in a sample of teachers from the three state schools surveyed. Montes Claros, MG, 2020.

Variables	Population N (%)	No vocal problems N (%)	With vocal problems N (%)	p-value
SOCIODEMOGRAPHICS				
Age Group				**0.320**
≤ 43 years	44 (53,7)	23 (52,3)	21 (47,7)	
> 43 years	38 (46,3)	24 (63,2)	14 (36,8)	
Marital Status				**0.381**
Has partner	47 (57,3)	25 (53,2)	22 (46,8)	
Has no partner	35 (42,7)	22 (62,9)	13 (37,1)	
Number of people in the house				**0.580**
≤ Three	52 (63,4)	31 (59,6)	21 (40,4)	
> Three	30 (36,6)	16 (53,3)	14 (46,7)	
Family income*				**0.500**
Above BRL 4,000.00	34 (41,5)	18 (52,9)	16 (47,1)	
Up to BRL 4,000.00	48 (58,5)	29 (60,4)	19 (39,6)	

to be continued...

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Variables	Population N (%)	No vocal problems N (%)	With vocal problems N (%)	p-value
OCCUPATIONAL				
Teaching time				**0.823**
≤ 12 years	41 (50.0)	23 (56.1)	18 (43.9)	
> 12 years	41 (50.0)	24 (58.5)	17 (41.5)	
Weekly workload				**0.905**
Up to 20h	24 (29.3)	14 (58.3)	10 (41.7)	
> 20h	58 (70.7)	33 (56.9)	25 (43.1)	
HABITS / LIFESTYLE				**0.783**
Drinks water during classes				
Yes	69 (84.1)	40 (58.0)	29 (42.0)	
No	13 (15.9)	7 (53.8)	6 (46.2)	
Alcoholic				**0.151****
No	54 (63.0)	34 (37.0)	20 (40.6)	
Yes	13 (46.4)	15 (53.6)	9 (50.0)	
HEALTH-DISEASE				
Medical diagnosis of hypertension				
No	66 (80.4)	38 (57.6)	28(42.4)	
Yes	16 (19.6)	9 (56.2)	7 (43.8)	
Medical diagnosis of diabetes mellitus				**0.392**
No	79 (96.3)	46 (58.2)	33 (41.8)	
Yes	3 (3.7)	1 (33.3)	2 (66.7)	
Medical diagnosis of sleep disturbance				**0.097****
No	80 (97.5)	47 (58.8)	33 (41.2)	
Yes	2(2.5)	0 (0.0)	2 (100.0)	
Medical diagnosis of gastroesophageal reflux				**0.041****
No	79 (96.3)	47 (59.2)	32 (40.5)	
Yes	3 (3.7)	0 (0.0)	3 (100.0)	
Medical diagnosis of anxiety				**0.123****
No	73 (89.0)	44 (60.3)	29 (39.7)	
Yes	9 (11.0)	3 (33.3)	6 (66.7)	
Symptoms of Depression (PHQ-9)				**0.028****
No	42 (51.2)	29 (69.0)	13 (31.0)	
Yes	40 (48.8)	18 (45.0)	22 (55.0)	
Use of voice for other occupations				**0.888**
No	65 (79.2)	37 (56.9)	28 (43.1)	
Yes	17 (20.8)	10 (58.8)	7 (41.2)	
Voice use in everyday life				**0.260**
Little to moderately	48 (58.5)	30 (62.5)	18 (37.5)	
A lot to too much	34 (41.5)	17 (50.0)	17 (50.0)	
Performs vocal warm-up				**0.780**
No	62 (75.6)	35 (56.5)	27 (43.5)	
Yes/ Sometimes	20 (24.4)	12 (60.0)	8 (40.0)	

*** Income - Reference value - minimum wage = R$ 1,045.00**
**** Refers to p-value ≤ 20%**

In the multiple model, the variables that showed a significant association with vocal problems at a level of 5.0% (p≤0.05), a magnitude assessed by the Prevalence Ratio (PR) and respective confidence intervals (CI), were: medical diagnosis of gastroesophageal reflux and symptoms of depression (Table 2).

Table 2 – Crude and adjusted prevalence ratio (PR) and a 95% confidence interval by Poisson test for voice disorders according to sociodemographic, work, and lifestyle variables in teachers from three state schools. Montes Claros, MG, 2020.

Variables	Crude prevalence ratio (CI 95%)*	p-value (≤0.20)	Adjusted prevalence ratio (CI 95%)*	p-value (≤0.05)
Medical Diagnosis of Gastroesophageal Reflux				
No	1	0.041	1	<0.001
Yes	0.405 (0.310-0.529)		2.245 (1.548-3.256)	
Symptoms of Depression				
No	1		1	
Yes	2.726 (1.105-6.728)	0.028	1.722 (1.020-1.907)	0.042

* CI - Confidence Interval

DISCUSSION

The prevalence of possible vocal disorders (11.0%) was below 46.1%[7] and 63.4%[16], in studies conducted before the pandemic using the same instrument. This result is perhaps due to the context of distance learning that changed the way teachers communicated during classes. In the state of Minas Gerais, the Department of Education developed a platform called "School Connection" through which teachers taught synchronous remote classes with the possibility of using headphones and a microphone. It also contained a Tutored Study Plan (TSPs) that offered study materials to students and there was also a chat room for queries that were usually answered by the teacher during class hours.

Research with teachers from 21 states, from the five Brazilian regions, self-assessed vocal quality during the pandemic and most reported using their voices less frequently and at a reduced intensity[13]. Another study carried out in the remote period with higher education professors recorded an average below the cutoff point for the Screening Index for Voice Disorder (SIVD), both for teachers who used traditional methodology and for those who used active methodology, suggesting an absence of vocal disorders occurring in these groups[17]. No other studies were found with teachers that investigated the prevalence of voice disorders in remote classes due to COVID-19. A survey carried out at the beginning of the return to in-person classes, at the end of 2021[18], with teachers from the state network of Minas Gerais, found a prevalence of 22.0% of voice disorders and most reported that when wearing a mask during work, they had to strain their voice.

When considering the prevalence of vocal problems during the remote period, 40.7% of university professors using a traditional methodology and 34.0% using an active methodology, responded that they had some vocal problem at the time of the investigation[17]. Despite the differences between in-person and remote teaching, the latter also requires vocal use, with video recordings and activities for asynchronous study, in addition to the need to use screens and headphones, and the change to an ergonomically incorrect posture, which are factors that can influence the maintenance of at

least one vocal problem[17]. In a study with Irish individuals who worked from home during the pandemic, 33.0% reported vocal problems[19].

The international literature, before the COVID-19 pandemic, using other instruments, recorded a high frequency of vocal problems, with 59.7% in China[20] by the Voice Handicap Index (VHI-10, China) and 54.0% in Finland[21] by means of a questionnaire with seven signs and symptoms of which occurred two or more weekly or more frequently in the last 12 months. In Latvia[22], the question "Have you ever had problems with your voice?" was used, and 66.7% of respondents answered affirmatively.

National studies, which also used other instruments for this investigation with teachers, found higher prevalence than the present study. In Paraíba, the prevalence of teachers with vocal problems at the time of the survey or in the past was 87.6%[23] and studies in Montes Claros, MG reported a prevalence of 61.1%[24] in teachers from municipal schools and 65.9 % in teachers from state schools[25]. Other national surveys before the pandemic carried out in Mato Grosso do Sul, Rio Grande do Sul, Paraná and Alagoas showed, respectively, a prevalence of 21.5%[26], 24.3%[27], 25.7%[28], and 29.3%[29] , of vocal problems under the present study. Such divergences in relation to the prevalence of vocal problems can be explained by the different instruments used to characterize the condition beyond the collection period.

As for the main vocal signs and symptoms reported by teachers throat clearing, hoarseness, tiredness when speaking, dry throat, and dry cough are highlighted. Similar vocal problems were also observed in other studies. Israeli university professors, during online teaching, reported the following symptoms: tiredness when speaking, vocal strain, hoarseness, and frequent need to clear the throat[30]. Furthermore, dry throat was the main vocal problem (43.0%), followed by stress (27.0%), and a general feeling of tiredness (27.0%) in a Brazilian study carried out in a pandemic context[31]. The most reported vocal signs and symptoms in Irish people working from home were dry throat and hoarseness[19]. These results demonstrate that, although the frequency of voice disorders has decreased, compared to the literature, teachers experience the same vocal signs and symptoms, regardless of the education system (remote or in-person). Epidemiological research in Latvia, with 522 teachers, found that the habit of clearing the throat doubled the risk of having a voice disorder[22]. A study carried out with teachers, having as one of the inclusion criteria those with vocal problems, verified that of the twelve signs and symptoms surveyed, the most prevalent were: hoarseness, dry throat, voice failure, tiredness when speaking, and throat clearing[5].

Regarding the response of those who did not improve their voice after rest, it is known that when the symptoms are at the beginning, they tend to decrease with vocal rest at night, weekends and vacations, but when they become continuously present, some symptoms tend to remain[2]. A study with teachers from municipal schools showed a prevalence of 25.7% of chronic vocal problems[24]. University professors had difficulty in recovering after vocal rest, regardless of the teaching methodology used in the period of remote classes[17].

The medical diagnosis of gastroesophageal reflux and the presence of depressive symptoms were associated with the presence of vocal problems. As it is a chronic condition that irritates the larynx, the presence of reflux is not directly linked to the education system, but affects the teacher's vocal health in both contexts.

The association between the presence of voice problems and signs suggestive of gastroesophageal reflux is still controversial. Studies show an association between both, but do not prove a causal relationship[21,28,32,33]. A prospective cohort study with patients from two hospitals in Belgium, verifying the therapeutic

result of GER disease, identified after three months that there was a significant improvement in vocal problems through the Vocal Handicap Index and the GRBASI Scale, in addition to an improvement in Maximum Phonation Time[34]. Another prospective case-control study found that patients with reflux had an incidence of hoarseness, frequent throat clearing, coughing, and feeling of a lump in the throat[35]. A study conducted in Saudi Arabia with 186 teachers and 260 people from the general population used the instruments Reflux Symptoms Index and Vocal Handicap Index and the results suggested an association between reflux and voice disorders. The authors also concluded that such tools are valuable, but cannot be used for a diagnosis[36]. A survey with 15,641 teachers from Minas Gerais during the period of the pandemic found that there was an increase in the consumption of unhealthy foods, such as sweets, soft drinks, sausages, and snacks that potentiate the symptoms and severity of the disease[37].

Regarding the association with depression, teachers with vocal symptoms had more episodes of depression when compared to those without vocal symptoms[38]. In the study with Israeli teachers, emotional health was correlated with the occurrence of vocal symptoms during the remote period, especially among those who had some previous level of psychological stress[30]. A cohort study with teachers, reassessed after three years using an instrument to measure the impact of a possible voice problem on daily life, observed that those who presented emotional problems (anxiety, depression, or somatoform) had twice the risk of developing a disorder vocal[9].

Some limitations of this study must be pointed out. In addition to being a convenience study, data collection was carried out at a specific moment of the pandemic, that is, it represented characteristics in a different period, and the results are not able to be generalized for the entire professional class and for the entire pandemic period. Because it was a cross-sectional study, it was not possible to establish a causal relationship. Another limitation concerns the use of self-reporting; however, validated instruments were used for vocal problems and depressive symptoms, which have good reliability and validity, demonstrating important contributions to understanding vocal problems among teachers. The data showed the importance of attention to vocal health and the need to carry out interventions for a better quality of life in this professional class. Teachers with possible voice disorders will be referred for otorhinolaryngological and speech therapy evaluation.

CONCLUSION

A low prevalence of voice disorders was observed in the remote period when compared to the literature prior to the pandemic. As for signs and symptoms, the main ones were throat clearing, hoarseness, and tiredness when speaking. The diagnosis of gastroesophageal reflux and symptoms of depression were associated with vocal problems. These factors are worrisome and should be considered in health promotion programs. The school is the ideal locus for the collective construction of progressive education actions for well-being.

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