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Original article

Anxiety and vocal fatigue in schoolteachers before and after intervention

Ansiedade e fadiga vocal em professores escolares antes e após intervenção

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Abstract

Objective: to investigate vocal fatigue and anxiety by correlating such factors before and after educational lectures. **Materials and Methods:** longitudinal, prospective, convenience and analytical study. The participants were elementary school teachers from a school in Montes Claros, Minas Gerais, Brazil. A questionnaire was administered with sociodemographic, occupational data and the reduced State-Trait Anxiety Inventory (STAI-6) and Vocal Fatigue Index (VFI) instruments. **Results:** 25 teachers participated, being 96% female, with approximately 16 years of teaching. In the study, no statistical significance was observed in relation to pre- and post-intervention anxiety, but an increase in anxiety was evident through the post-intervention STAI-E scores. Regarding the voice, the presence of a risk for dysphonia can be observed, but there was a slight decrease in the VFI score after the intervention. **Conclusion:** The intervention proposal did not show statistical relevance, but in the pre and post lectures, an improvement in voice was observed, but there was an increase in the score on the anxiety instrument. It is believed that the time was short to obtain changes in habits. Longer follow-up and shorter periods of time between meetings are suggested.
Keywords: Voice. Voice Disorders. School Teachers. Anxiety.

Resumo

Objetivo: investigar sobre a fadiga vocal e a ansiedade correlacionando tais fatores antes e após palestras educativas. **Materiais e Métodos:** estudo longitudinal, prospectivo, de conveniência e caráter analítico. Participaram professores do ensino fundamental de uma escola de Montes Claros, Minas Gerais, Brasil. Aplicou-se um questionário com dados sociodemográficos, ocupacionais e os instrumentos Inventário de Ansiedade Traço-Estado reduzido (IDATE-6) e o Índice de Fadiga Vocal (IFV). **Resultados:** participaram 25 professores, sendo 96% do sexo feminino, com aproximadamente 16 anos de trabalho docente. No estudo, não foi observada significância estatística em relação à ansiedade pré e pós-intervenção, porém ficou evidente um aumento da ansiedade por meio das pontuações do IDATE-E pós-intervenção. Em relação à voz, pode-se observar a presença de risco para disfonia, mas houve discreta diminuição da pontuação do IFV após a intervenção. **Conclusão:** A proposta de intervenção não apresentou relevância estatística, mas nos pré e pós-palestras observou-se melhora na voz, porém houve aumento na pontuação no instrumento de ansiedade. Acredita-se que o tempo tenha sido curto para obter mudanças de hábito. Sugere-se acompanhamento mais prolongado e com menor espaço de tempo entre os encontros.
Palavras-chave: Voz. Distúrbios da Voz. Professores Escolares. Ansiedade.

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Introduction

Professionals who use voice as a work tool are likely to develop vocal problems and this is due to inadequate exposure in their work environments, personal and organizational questions[1]. Among these professionals, teachers are characterized as a population with high vocal risk due to the large amount of speech and intensity of voice in the workplace compared to other areas[1,2].

These professionals are among those who complain most about vocal problems. A retrospective cohort study conducted in Taiwan noted that the incidence rates of voice disorders were 27.3 in 1,000 per year in elementary/high schoolteachers and 13.4 in 1,000 per year in university professors[3]. The prevalence of vocal symptoms in teachers is about 2 times higher than the population of non-teachers. Symptoms such as voice failure, hoarseness, discomfort when speaking, weak voice, effort to speak, problems to project the voice, sore throat, throat clearing, vocal fatigue[1,3] are complaints of this population. Vocal fatigue is the most commonly reported, followed by hoarseness and throat pain[3].

Many teachers continue the routine naturally[3] and tend to minimize symptoms by considering them simply an expected consequence of their teaching activity[1] and only seek help when the condition is in an advanced state, with a greater number of symptoms[3]. Schools do not always have adequate physical structure, classrooms are always with many students and the teacher often works in more than one school. This daily routine leads these professionals to stress in speech and thus causes fatigue in the laryngeal musculature[4].

It is also worth noting that a vocal problem can be a causal factor for emotional problems and affect professional, social and psychological performance[5]. There are reports of an association between high levels of anxiety and vocal problems, as well as quality of life[1,6]. Anxiety disorders are those that have characteristics related to exacerbated fear and anxiety that lead to behavioral changes[7].

The mental health of teachers has been evidenced in several areas of knowledge, being of multidisciplinary interest due to the importance of this professional[8]. A study observed a strong correlation between vocal symptoms and common mental disorders and indicated that those with voice problems commonly present a high prevalence of various types of symptoms, such as depression, anxiety and/or somatic changes[1]. A study conducted among teachers from Finland showed a prevalence of vocal disorders in 54% with a strong association with emotional stress, with this explanatory variable being the most significant, with a risk of 3.6 times higher for vocal disorders[9].

Cross-sectional study conducted with elementary and high school teachers from 20 public schools showed a prevalence of 38.8% of depressive symptoms, through the Beck-Depression

Inventory II, and showed that those with vocal disadvantage were twice as likely to report depressive symptoms[5]. Longitudinal study with teachers from municipal schools in Pelotas, Brazil, was conducted for three years. The incidence of Common Mental Disorder was 18% and the risk was 77% higher for teachers with voice disorders[6]. The occurrence of vocal and/or emotional problems in teachers can lead to work absentee[1,10].

Given this scenario, measures and interventions are necessary for the prevention of vocal disorders, in the short and long term, in order to provide quality of life to these professionals. The objective of this research was to investigate about vocal fatigue and anxiety, correlating these factors before and after educational lectures given to teachers of an elementary school in Montes Claros - Minas Gerais.

Materials and Methods

Longitudinal and analytical study. All teachers from the first to the ninth grade of elementary school of a state school were invited to participate. Fifty teachers attended the first meeting and they answered the questionnaire; however, during the semester there was a loss of half of this sample. The inclusion criteria were teachers who were in the regency and exclusion criteria were teachers who were in function deviation and incomplete questionnaires.

After signing the Informed Consent Form, the physical questionnaires were distributed and contained sociodemographic (sex, age), occupational (time of service, weekly workload) and two self-assessment instruments: the Trait-Anxiety Inventory Reduced status (STAI-6) and the Vocal Fatigue Index (VFI), both validated and widely applied in the teaching class.

The STAI-6 is a validated instrument, whose objective is the measurement of anxiety levels, and the STAI-trait refers to how the individual "usually feels" while the STAI-state (STAI-E), "how do you feel at the moment", the latter being the questionnaire applied. It consists of six questions: 1. I feel calm (a); 2. I am tense (a); 3. I feel at ease; 4. I feel nervous (a); 5. I am relaxed (a); 6. I am worried (a), whose answers make up a Likert scale of four points: 1- absolutely not; 2-one; 3 4- a lot. For the calculation of the final score, the positive questions (1, 3 and 5) are inverted and the score is obtained through the sum of the answers, with 6 being the minimum score and 24 being the maximum[11].

The VFI - Vocal Fatigue Index[12] was translated into Brazilian Portuguese[13] and later validated[14], having 17 questions divided into four domains: fatigue and vocal limitation (factor 1 consisting of seven items), vocal restriction (factor 2, three items), physical discomfort associated with voice (factor 3 with four items) and recovery with vocal rest (factor 4, three items). Responses

are scored on a scale of 0 to 4 points, where 0 corresponds to "absence" and 4 corresponds to "always occurs" (0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, 4 = always). Higher values mean increased symptoms, except for the vocal recovery item, in which the higher the score, the greater the vocal recovery. The cutoff points adopted are: 4.50 for Factor 1; 3.50 for Factor 2; 1.50 for Factor 3; 8.50 for Factor 4 and 11.50 for the total score, "which separates dysphonic individuals from vocally healthy", whose formula is = Factor 1 + Factor 2 + Factor 3 + (12 – Factor 4)[14].

At the beginning of July 2022, the questionnaires were completed and then the video "*Minha Voz, Minha Vida*" (Teachers Union of São Paulo - SINPRO-SP and Center of Voice Studies – CEV, 2011) is presented, showing the importance of voice care, cervical relaxation, breathing and heating. In August 2022, a banner was placed in the teachers' room, as well as tickets in classrooms to remind them of the vocal exercises. In September of the same year, the second meeting took place with the lecture on vocal health and emphasizing on neck relaxation exercises, breathing, heating and cooling of the voice; then there was the return of the results of the first data collection. In October, the same questionnaire of the first stage was reapplied. Finally, in November 2022, a conversation was held with a psychiatrist about mental well-being.

For data analysis, the Shapiro-Wilk test was performed to verify the distribution of normality. For the equivalence of the pre and post-intervention, the Wilcoxon test was applied and, subsequently, the Spearman coefficient was performed for the correlation between the result of the STAI-E 6 and the total VFI post intervention. The data were tabulated and analyzed using the statistical software IBM SPSS 20.0 (Statistical Package for the Social Science).

The project was approved by the Research Ethics Committee of the United College of Northern Minas (FUNORTE) under number 5,463,400 (CAAE 30007120.9 0000 5141).

Results

The participants in this longitudinal study were 25 teachers, the majority being female (96.0%), with a mean age of 40.5 years. The average family income was R$ 4,892.00. Regarding the occupational profile, teachers had an average working time of 16 years and 24 hours a week.

As for anxiety, the results of the Wilcoxon Signed Rank test between pre and post-intervention were not statistically significant (z=-0.199, p=0.843, r=0.0398). When checking the maximum value and the third quartile, there is a slight increase in score, indicating a slight emotional worsening (Table 1).

Table 1. Average STAI-State score among teachers at a state school. Montes Claros, 2022.

	Mean	SD	Minimum	Maximum	Q1	Median	Q3
Pre	12.28	2.89	6	17	10.0	13	14.5

Post	12.08	3.37	6	19	9.5	12	15.0

SD=Standard deviation; Q1=First quartile; Q3=Third quartile. Negative Ranks (n=14) Mean = 10.32; Positive Ranks (n=9) Mean = 14.61.

On the VFI, the total score, both on the first and second occasions, was above the cutoff point of 11.5, which means that teachers assessed themselves at risk for vocal fatigue. Regarding the analysis of the domains (factors 1, 2, 3 and 4), the results showed that the participants presented vocal fatigue and limitation, vocal restriction, physical discomfort associated with the voice and did not notice improvement in vocal quality after rest (Table 2).

When performing the Wilcoxon Signed Rank test, there was no statistical significance between before and after intervention in Factor 1 (z=-1.430, p=0.153, r=-0.286), Factor 2 (z=-0.263, p=-0.053), Factor 3 (z=-1.351, r=-0.053), Factor 4 (z=-0.244, p=0.807, r=-0.049), and Total (z=-1.202, p=0.229, r=-0.240). However, there was a small decrease in the parameters "fatigue and vocal limitation", "physical discomfort associated with voice" and in the total score.

Table 2. Average Vocal Fatigue Index score in teachers at a state school. Montes Claros, 2022.

		Mean	SD	Min.	Max.	Q1	Median	Q3
Factor 1. Fatigue and vocal limitation	Pre	10.80	7.90	0	28	5.0	10.0	16.5
	Post	9.24	6.75	0	20	3.0	8.0	14.5
Factor 2. Vocal restriction	Pre	4.64	3.28	0	12	2.0	4.0	7.0
	Post	4.60	3.29	0	12	2.0	4.0	7.5
Factor 3. Physical discomfort associated with the voice	Pre	5.12	4.78	0	14	0.0	4.0	10.0
	Post	3.89	3.87	0	14	0.0	4.0	6.5
Factor 4. Recovery with vocal rest	Pre	7.40	4.19	0	12	4.5	9.0	10.5
	Post	7.28	3.66	0	12	5.5	8.0	10.0
Total	Pre	25.16	13.89	7	60	12.0	23.0	35.5
	Post	22.44	11.64	2	51	15.0	18.0	32.0

SD=Standard deviation; Min.=Minimum; Max.=Maximum; Q1=First quartile; Q3=Third quartile. Negative Ranks Total (n=14) Mean = 12.68; Positive Ranks Total (n=9) Mean = 10.94.

In sample studied, there was no correlation between anxiety and vocal fatigue index (p=0.598).

Discussion

The study investigation refers to anxiety, vocal fatigue and the association of both events before and after educational lectures given shortly after the pandemic.

There is a compatibility with the literature found in relation to the prevalence of female teachers. The predominance of women is found in several studies (70.6%1, 65.5%5, 87.1%15, 75.2%16, 74%[17]), as well as in the representative study of Basic Education teachers in Brazil

(80.3%)[18] and in the educational census, with a composition of 79% of women teachers in basic education[19]. With regard to age, similar data were found[1,15-17] and as for working time, the means were below the present study: 11.2 years17, 14.8 years[16], 15.0 years[1]. On the weekly workload, there is divergence, because most of the surveys showed results above 24 hours a week, 54.8% work 40 hours and 8.3% more than 40 hours a week[1], 37.4 hours5, 37.13 hours[17]. High workload means greater vocal demand and, consequently, will lead to the emergence of voice problems in professors[1].

The data referring to anxiety before and after lectures, addressing breathing, relaxation with demonstration of such procedures, showed no significant statistical difference. Case-control study to verify the effects of Progressive Muscle Relaxation separated teachers into three groups. The group that attended a lecture showed no statistical difference, with maintenance of the mean in the instrument used. The group that did not participate in any meeting made it possible to observe an increase in the report of the perception of stress. Only the group participating in six meetings of progressive muscle exercises showed significant improvement[16].

Another intervention study evaluated the control of anxiety levels in two groups of teachers, using online mindfulness, a type of meditative therapy. One group performed weekly training for four weeks and another for 28 consecutive days. The STAI instrument was used for the evaluation and no statistical difference was found between the practices and the reduction of anxiety-state before and after the intervention in both groups, probably due to the context experienced, that is, the pandemic caused by SARS-CoV-2. However, positive reports were noted in teachers' speeches after the meditation[20].

Randomized research conducted with teachers from Ghana, Africa, followed during the school year the perception of anxiety and stress. Anxiety symptoms increased on average for all teachers throughout the year, having as associated factors, in addition to personal stress, the work environment, especially with regard to the lack of support from parents of students. The authors add that awareness-raising meetings with parents can be a strategy for such difficulties, especially in a place of education with few resources[21].

In the present study, there was a slight increase in the anxiety score in the STAI-E after intervention. Perhaps because the application of the second questionnaire was close to the end of the school year. A study found that many teachers mention that the situation of illness usually becomes more recurrent whenever the end of the semester approaches, but usually do not miss work, even though they are not well enough in health.[22] There also seems to be an increase in symptoms over time. Longitudinal research with future teachers revealed that those with high vocal disadvantage were predisposed to having higher anxiety scores after four years of follow-up[23].

As for vocal fatigue, the results showed that the teachers had scores above the average cut-off point, indicating that the individuals are not vocally healthy. Research with teachers of Early Childhood and Elementary Education of the Municipal Public School of Maceió, Alagoas, and who reported complaints of vocal fatigue, found that at the beginning of the week, before the beginning of classes, the total average of VFI was 23.9 and after the end of the week was 27,5 and increase in the mean of the three factors: fatigue and vocal limitation (11.2/13.30, vocal restriction (3.4/4.7) and physical discomfort associated with voice (4.0/5.6)[24].

Although there was no statistical significance, it was possible to verify a decrease in the total mean of VFI, in fatigue and vocal limitation, as well as in physical discomfort, indicating an improvement. Maybe the time was short to get a change of habit. Two lectures are probably not enough, but have awakened knowledge about vocal health and the necessary exercises. In addition, classroom tickets and the banner with warm-up and cool-down exercises may have influenced this post-intervention improvement.

A study with experimental and control groups, in order to verify the immediate effects of vocal heating and cooling in teachers, found no statistically significant difference, but the group submitted to the intervention obtained better vocal quality[25].

On the other hand, a study of permanent education, using the conversation wheel, in fifteen actions on vocal health and vocal preparation with techniques of heating and cooling of the voice for labor activities, allowed teachers better vocal performance[26].

Another hypothesis to justify the reduction of the mean of the post-intervention domains was the removal of the facemask, since it muffles the sound and prevents speech intelligibility, causing the individual to increase the volume of the voz[27]. In the first collection of the present study, carried out in July, there was the recommendation of the use of the mask and, in October, the second collection, it was no longer necessary to use it. A research with teachers from the state network of Minas Gerais, conducted in the return to face-to-face classes, found that they performed vocal effort due to the mask[28]. Face masks, in work activities, increase the perception of vocal effort, hinder speech intelligibility and breath coordination[29].

Recovery with vocal rest maintained the same mean before and after intervention. A study conducted with teachers with voice disorders found that 30.0% reported not improving their voice after resting[30]. A vocal problem when it becomes chronic presents improvement of the symptoms more difficult with night vocal rests or weekends[31].

In the present study, there was no association between anxiety and vocal fatigue. The studies found with an interventional proposal for teachers, in order to evaluate aspects of anxiety, are reduced,

but there is a positive relationship between the presence of vocal disorders and the predisposition of emotional problems[5].

It is important to emphasize that it is not possible, through the cut of this study, to exhaust the analysis about anxiety and voice in teachers, since there are external variables in different occasions. Perhaps, different forms of dynamics to work anxiety and conversation circles could have promoted changes. From the aspect of vocal fatigue, supposedly the greatest limitation of the study was the large interval between the lectures and the short interval of time between the first and second application of the questionnaires, so that, in fact, there were changes. Weekly interventions with all exercises proposed here are suggested. In addition, there was a small number of teacher participation in this research, which also represents a limiting factor.

Conclusion

There was no statistical difference before and after intervention regarding anxiety, vocal fatigue, as well as between both. It was possible to notice a persistence of anxious symptoms throughout the research, showing the possibility of the development of anxiety disorders in the analyzed group. New strategies are necessary to identify and work those with psychological complaints for the best exercise of the profession.

Although the score of the instrument used for the voice indicated improvement, the proposal of lectures with demonstrations and weekly reminders were not enough to actually promote significant changes to vocal fatigue, requiring, perhaps, regular monitoring for the practice of the proposed exercises.

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Conflict of interest

The authors declare no competing interests.

Authors' contributions

The authors have approved the final version of this article and declare themselves responsible for all aspects of the manuscript, such as integrity, originality and accuracy.

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