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Scientific evidences of interventions in the voice of the teacher published in national journals of Speech Therapy in the last 10 years: a scope review

Evidências científicas das intervenções em voz do professor publicadas em periódicos nacionais de Fonoaudiologia nos últimos 10 anos: uma revisão de escopo

Evidencias científicas de intervenciones en la voz del docente publicadas en revistas nacionales de Fonoaudiología en los últimos 10 años: una revisión de alcance

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Abstract

Introduction: the importance of the voice for the exercise of teaching has been verified by speech therapy, considered the object of many studies. Although publications on the voice of the teacher have been constant in recent decades, articles that address the effects of interventions are more recent and less representative. **Objective:** to map and analyze studies on interventions in the teacher's voice published in national speech therapy journals, from January 2011 to March 2021. **Method:** this is a scope review study, whose eligibility criteria were complete articles available online in Portuguese, between the years 2011 and 2021 and that presented the intervention strategies used in the vocal health care of the teacher.

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Authors' contributions:
LVDC: Study conception, data collection, article writing.
EPGM: Study conception, methodology.
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The journals selected to compose this research were CoDAS, Revista CEFAC, Audiology Communication Research and Distúrbios da Comunicação. **Results:** from the electronic search, 247 available articles were identified, and a total of 18 articles were included in this study. The most used interventions are educational activities, followed by the application of specific techniques and speech therapy. It was found that there is a scarcity of studies with greater evidence and robustness regarding the results of the interventions carried out. **Conclusion:** the number of articles published per year ranged from one to three, with a predominance of observational and descriptive studies, concentrated in the Southeast region. The benefits presented by the application of techniques or the performance of educational activities to promote vocal health were evidenced by most publications.

Keywords: Voice; Teachers; Voice training.

Resumo

Introdução: a importância da voz para o exercício da docência tem sido constatada pela fonoaudiologia, considerada objeto de muitos estudos. Embora as publicações sobre voz do professor tenham sido constantes nas últimas décadas, os artigos que abordam efeitos de intervenções são mais recentes e pouco representativos. **Objetivo:** mapear e analisar os estudos sobre as intervenções em voz do professor, publicados nos periódicos nacionais de Fonoaudiologia, no período de janeiro de 2011 a março de 2021. **Método:** trata-se de um estudo de revisão de escopo, cujos critérios de elegibilidade foram artigos completos disponíveis *online* no idioma português, entre os anos de 2011 a 2021 e que apresentassem as estratégias de intervenção utilizadas no cuidado à saúde vocal do professor. Os periódicos selecionados para compor esta pesquisa foram CoDAS, Revista CEFAC, *Audiology Communication Research* e Distúrbios da Comunicação**. Resultados:** a partir da busca eletrônica, foram identificados 247 artigos disponíveis, sendo incluídos neste estudo um total de 18 artigos. As intervenções mais utilizadas são as atividades educativas, seguidas da aplicação de técnicas específicas e de fonoterapia. Constatou-se que há uma escassez de estudos com maior evidência e robustez quanto aos resultados das intervenções realizadas. **Conclusão:** o quantitativo de artigos publicados por ano variou de um a três, com predomínio de estudos do tipo observacional e descritivo, concentrados na região sudeste. Os benefícios apresentados pela aplicação das técnicas ou a realização de atividades educativas de promoção à saúde vocal foi evidenciado pela maioria das publicações.

Palavras-chave: Voz; Docentes; Treinamento da Voz.

Resumen

Introducción: la importancia de la voz para el ejercicio de la docencia ha sido constatada por la logopedia, considerada objeto de numerosos estudios. Si bien las publicaciones sobre la voz del docente han sido constantes en las últimas décadas, los artículos que abordan los efectos de las intervenciones son más recientes y menos representativos. **Objetivo:** mapear y analizar estudios sobre intervenciones en la voz del profesor, publicados en revistas nacionales de logopedia, de enero de 2011 a marzo de 2021. **Método:** se trata de un estudio de revisión de alcance, cuyos criterios de elegibilidad fueron artículos completos disponibles en línea en portugués, entre los años 2011 a 2021 y que presentó las estrategias de intervención utilizadas en el cuidado de la salud vocal del docente. Las revistas seleccionadas para componer esta investigación fueron CoDAS, Revista CEFAC, AudiologyCommunicationResearch y Distúrbios da Comunicação. **Resultados:** a partir de la búsqueda electrónica se identificaron 247 artículos disponibles y se incluyeron en este estudio un total de 18 artículos. Las intervenciones más utilizadas son las actividades educativas, seguidas de la aplicación de técnicas específicas y la logopedia. Se encontró que existe escasez de estudios con mayor evidencia y robustez en cuanto a los resultados de las intervenciones realizadas. **Conclusión:** el número de artículos publicados por año osciló entre uno y tres, con predominio de estudios observacionales y descriptivos, concentrados en la región Sudeste. Los beneficios que presenta la aplicación de técnicas o la realización de actividades educativas para promover la salud vocal fueron evidenciados por la mayoría de las publicaciones.

Palabras clave: Voz; Docentes; Entrenamiento dela Voz.

Introduction

The voice is considered the main working instrument for the teacher. Individual factors, the work environment and intense vocal overload can jeopardize the health of this teacher's voice[1,2]. Faced with a vocal disorder, there may be impairment or even interruption of activities, causing withdrawal from the classroom[1].

Among the professional categories most affected by dysphonia, the class of teachers stands out, due to the intense use of the voice as a work instrument[3]. In addition, teachers work exposed to crowded classrooms, with noise and inadequate acoustics, triggering daily sound competition in their work environment. As a result of these factors, it is common for professors to develop inadequate voice production mechanisms to be able to teach classes[4].

The prevalence of vocal alterations in teachers varies according to the school system, school level and city where they work. Studies indicate that about 47.6% to 52% of professors have self-reported vocal complaints[5,6]. When analyzing the teachers who work in daycare centers, an even more significant prevalence was found, reaching up to 80% of Early Childhood educators[7].

Due to the importance that the voice has for the exercise of teaching, this theme has been the object of several studies[8]. However, although publications have been constant in recent decades, it is still necessary to know more about the subject, especially speech-language intervention strategies. In a study[9] that collected 500 publications on the teacher's voice, it was identified that 415 (83%) were about evaluations and, among these, the thematic approach aimed to evaluate the participants and the working conditions. Only 58 (14%), sought to know the effects of programs or interventions with teachers.

Collective interventions through vocal health programs are a present reality among studies on teachers' voices. Knowing the educational processes in the intervention actions allows us to rethink and improve the interventions, guiding future actions[10].

Given the above, this article aimed to map and analyze studies on interventions in the teacher's voice, published in national journals of Speech Therapy, from January 2011 to March 2021.

Material and Method

The present study consists of a scoping review, prepared by the recommendations of the Joanna Briggs Institute Reviewer's Manual[11] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for scoping review (PRISMA-ScR)[12] extension, whose protocol is registered in the OSF Registration, under no.osf.io/zrq89.

A research question was elaborated, respecting the PCC acronym (P-participant, C - concept and C - Context), which consisted of: What is the scenario of national publications that studied the results of interventions in the teacher's voice, published between the period from January 2011 to March 2021, in national speech therapy journals?

The inclusion criteria consisted of teachers of any level of education, submitted to group or individual interventions; aiming at vocal health or well-being, communicative aspects or even the effects of exercises, in professors with or without verbal complaints. The studies were limited to Brazil to know the national scenario.

Those primary research studies of the type of scientific article, which presented an interventionist or observational study design, to evaluate the results of the interventions carried out, were considered, considering the quantitative, qualitative, or mixed approaches.

Literature review articles of any nature, namely: theses, dissertations, and monographs, as well as studies carried out with teachers of other modalities, such as singing, theater, or music, were excluded.

A previous survey was carried out in the database Latin American and Caribbean Literature on Health Sciences (LILACS) via the Virtual Health Library (VHL) to raise keywords that could compose the search strategy, accompanied by the Descriptors in Health Sciences. Health (DeCS). After this step, a search strategy was developed (Chart 1), applied in the VHL to retrieve the articles in LILACS, and adapted to search in the ScientificElectronic Library Online (SciELO). These bases were considered because they are responsible for indexing the national Speech-Language Pathology journals. As a complementary search, a survey was carried out on the official websites of the journals.

Chart 1. Search strategies used in the databases.

Data Base	Strategy	Number of articles retrieved
LILACS (via BVS)	(("professor" OR "professors" OR "docente" OR "docentes") AND ("voice" OR "voice disorders" OR "dysphonia")) AND (db:("LILACS") AND la:("pt ") AND year_cluster:("2011" OR "2012" OR "2015" OR "2014" OR "2016" OR "2017" OR "2019" OR "2013" OR "2020" OR "2018")) AND (year_cluster) :[2011 TO 2021])	117
SciELO	("professor" OR "professors" OR "teacher" OR "teachers") AND ("voice" OR "voice disorders" OR "dysphonia")	95

The literature survey took place between October and December 2020, and was updated in March 2021. From the electronic search, 247 articles were available, including 18 studies, according to the process described in Figure 1, suggested by PRISMA-ScR[12].

The search results were stored in a reference manager, Mendeley (from Elsevier), which served to check for duplicates and select articles. The selection process was performed by two review authors, who independently read all the titles and abstracts of the identified studies. The discordant cases were analyzed by a third reviewer who issued the final decision. The selected articles were read in full.

To extract data from the included studies, a form was prepared for this review, containing the following variables: first author, year of publication, State/Region, type of study, sample (number of participants, mean age, control group and experimental group when applicable), intervention performed and main results achieved. This form was calibrated with five studies by two of the reviewers and adjusted, and conflicting data were resolved by consensus, resulting in the final collection protocol. The results are presented in figures, charts and tables, accompanied by a narrative description. For quantitative data, the report was used using numbers and percentages.

To preserve the anonymity of the journals, they were identified using the letters A, B, C and D, totaling the four journals that had the articles included.

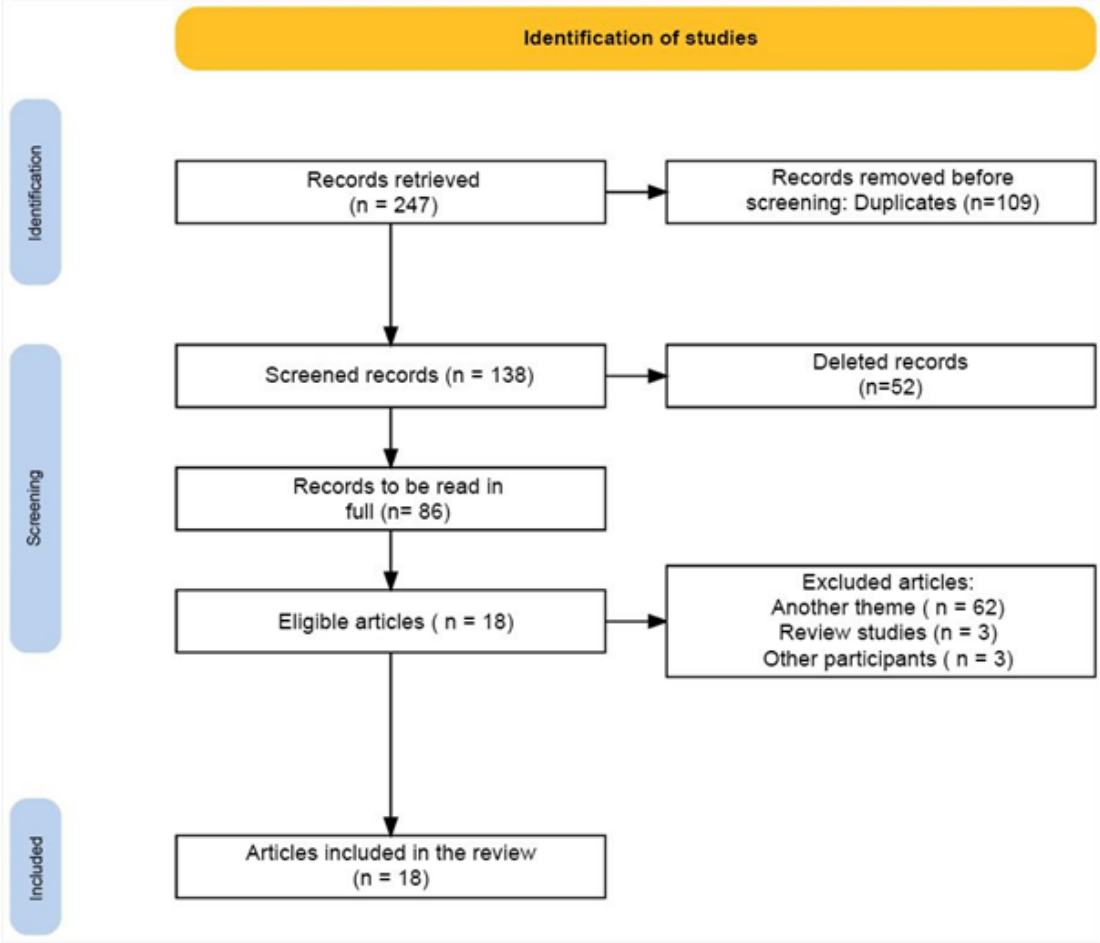

Figure 1. Flow diagram of the process of identification, eligibility, selection and inclusion of articles.

Results

The search resulted in 247 articles, of which 212 were retrieved by electronically searching the databases and 45 were retrieved by other means, of which 18 were included in the present review[13-30] (Figure 1). Counting the studies that reported the number of participants and the mean age, 665 teachers were studied, with 202 women and 35 men being identified, with a mean age of 41.1 years.

Figure 2 shows the distribution of studies by journal, according to the year of publication. It is observed that the year 2017 had the highest percentage of published works, and journal B was the one that brought the most studies on the subject.

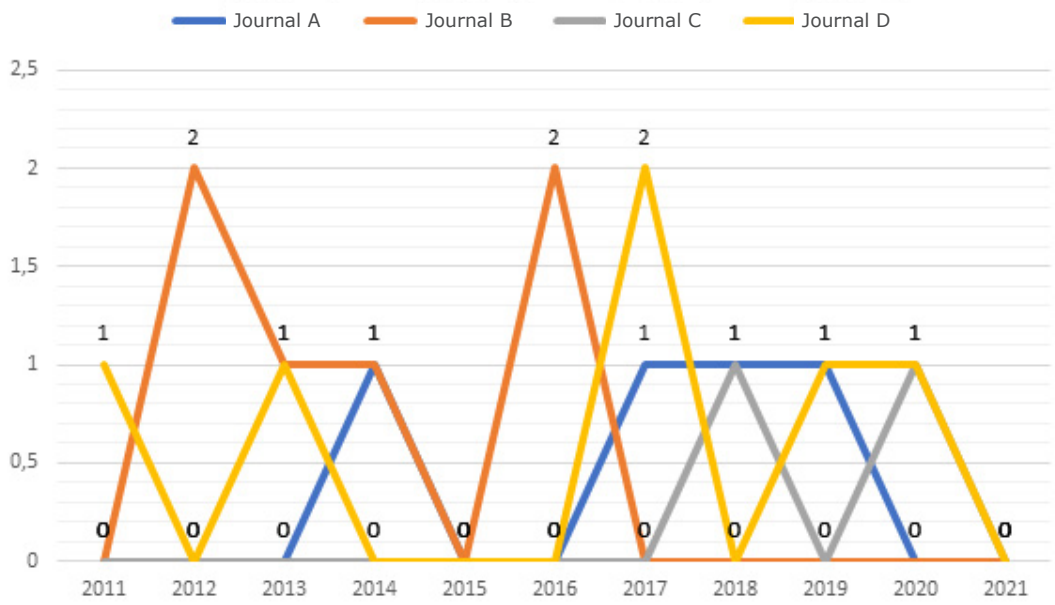

Figure 2. Distribution of publications from January 2011 to March 2021 by journal.

In six studies[16,18-21,30] (33.3%) there was no limitation regarding the level of education, four[17,22,26,29] (22.2%) did not inform the level of education, another four[14,23,24,28] (22.2%) studied only elementary school teachers, one[15] (5.6%) developed their study with high school teachers, two[25,27] (11.1%) with higher education teachers and one[13] (5, 6%) developed the research with teachers of kindergarten and elementary school.

Table 1 shows the quantitative distribution of the number of publications by State and Region, with the Southeast and Northeast regions leading the journals.

Table 1. Description in number and percentage of the distribution of publications by journals, State and design of studies

Quantitative by journals	**n**	**%**
Journal A	04	22,2
Journal B	06	33,3
Journal C	02	11,1
Journal D	06	33,3
Total	18	100,0
Distribution of publications by State	**n**	**%**
São Paulo (SP)	06	33,3
Minas gerais (MG)	04	22,2
Pernambuco (PE)	01	5,6
Sergipe (SE)	01	5,6
Bahia (BA)	02	11,1
Ceará (CE)	01	5,6
Rio Grande do Sul (RS)	02	11,1
Goiás (GO)	01	5,6
Total	18	100
Study design	**n**	**%**
As for the approach		
- Quantitative	12	66,6
- Qualitative	04	22,2
- Mixed	01	5,6
- No information	01	5,6
Total	18	100
As for the type		
- Observational	06	33,3
- Interventional	06	33,3
- Other types	05	27,8
- No information	01	5,6
Total	18	100
Regarding the control of interventional studies		
- Controlled	02	33,3
- Not controlled	04	66,7
Total	06	100

Source: survey data.

Studies with a quantitative approach were the most frequently found, of which six (33.3%) were interventional, among them, two had a randomized clinical trial design, and four had a quasi-experimental design (Table 1 and Chart 2).

Regarding the intervention adopted by the articles in the present review, it was observed that the studies sought to know from the effects of a collective vocal intervention, to promote voice health, to the monitoring of teachers after speech therapy discharge from their treatments, according to the categories presented in Table 2. The other characteristics of the included studies are described in Table 2.

Chart 2. Characterization and description of the studies included in the sample.

Author (year) Study location	Type of Study type of education	Sample	Intervention Category	Evaluation of the intervention	Main results
MACÊDO FILHO (2020)[13] Ceará (Northeast)	- Experience report professional, qualitative and descriptive - Kindergarten and elementary school	- N: SI; - Age (MD and DP): SI. Groups: - EG: N/A; - GC: N/A.	Vocal health and well-being. Activities carried out through conversation circles.	Teachers' reports.	Vocal health education actions provided great learning about voice preparation, as teachers were taught vocal cord warm-up and cool-down techniques
DORNELAS (2020)[14] Sergipe (Northeast)	- Intervention study, before and after. - Elementary School	- N = 13; women. - Age (MD and SD): 39.2 (± 7.68) years. Groups: N/A	Intervention through exercises Comparison before and after performing the ESA exercise.	Auditory-perceptual assessment of the vowel /ɛ/ and speech. Acoustic evaluation (F0, local jitter (%) and local shimmer (%).	Vocal self-assessment showed a better voice after the intervention. There was no statistical difference in the perceptual-auditory and acoustic parameters measured before and after the intervention.
MASSON (2019)[15] Bahia (Northeast)	- Prospective, exploratory intervention study, quasi-experimental. - High School and Youth and Adult Education (EJA)	- N = 18; men (37.5%) and women (62.5%). - Age (MD and SD): 44.3 (± SI). Groups: - EG: 8 participants; - GC: 10 participants.	Intervention programs Comparison between groups that performed a warm-up program (AV) and vocal cool-down (DV) (GE) with the group that performed vocal rest (CG).	Application of a questionnaire, auditory-perceptual analysis, acoustic analysis, and analysis of the degree of discomfort.	There was no statistically significant difference between the group performing AV before and VI after the class and the control group. However, there was an improvement in vocal quality and reduced the discomfort of aspects related to the body in the EG.
FERREIRA (2019)[16] São Paulo (Southeast)	- Observational and descriptive - Unlimited level of education.	- N = 257; - Age (MD and DP): SI. - Groups: N/A	Vocal health and well-being. "Promoting the Teacher's Vocal Well-being" program, face-to-face meetings and in a distance learning format.	- Questionnaire composed of seven questions at the end of each module; - Two questions to raise awareness about the theme in the discussion forums.	There was a need to carry out more conceptual activities before the practices. The distance education format achieved its objective, providing a moment to listen to the teacher's needs and reflect on his part about his practice and work environment.
NOGUEIRA (2018)[17] Minas Gerais (Southeast)	- Analytical cross-sectional observational study. - SI education level.	- N = 25; being 92% women and 8% men. - Age (MD and SD): 38 (±8.16) years. - Group: N/A	Speech therapy and its results after discharge. Vocal training through the Comprehensive Vocal Rehabilitation Program (PIRV)	Profile and Vocal Participation and Activities Protocol (VAPP)	The performance of vocal warm-up and cool-down by teachers increased after speech therapy (87%), as well as the use of a microphone and hydration during classes. Teachers were more aware of harmful environmental factors for the voice after speech therapy.
CAVALCANTI (2018)[18] Minas Gerais (Southeast)	- Retrospective longitudinal observational study - Unlimited level of education.	- N = 33; women. - Age (MD and SD): 39.2 (± 7.68) years. - Groups: N/A	Intervention programs Comprehensive Vocal Rehabilitation Program (PIRV)	Auditory-perceptual analysis (G on the GRBAS scale); Acoustic analysis of voice; IDV-10 and URICA-VOZ protocols; own form to indicate how the teacher evaluates his voice.	Positive results for treating behavioral dysphonia, with improved vocal quality and self-perception. The MPT and Shimmer measures showed a statistically significant association and the VDI showed a difference before and after the program.
SOUZA (2017a)[19] Bahia (Northeast	- Pre and post-test, single group, blind to the evaluator. - Unlimited level of education.	- N = 29; being 18 women and 11 men. - Age (MD and SD): 45.3 (± 8.48) years. - Groups: N/A	Intervention through exercises ETVSO with commercial straw.	Auditory-perceptual assessment; CAPE-V protocol; Screening Index for Voice Disorder (ITDV)	Improvement in vocal quality after four weeks of intervention and self-reported beneficial effects.
SOUZA (2017b)[20] Minas Gerais (Southeast)	- Retrospective cross-sectional observational study - Unlimited level of education.	- N = 31; - Age (MD and SD): 39 (±7.94) years. - Groups: N/A.	Intervention programs Comprehensive Vocal Rehabilitation Program (PIRV)	Auditory-perceptual analysis, acoustic analysis and vocal self-perception protocols	The study showed that the proposed intervention favored the adhesion and satisfaction of teachers.

Author (year) Study location	Type of Study type of education	Sample	Intervention Category	Evaluation of the intervention	Main results
CHRISTMANN (2017)[21] RS (South)	- Randomized clinical trial, pre-test and post-test, with a control group, blind to the evaluator. - Unlimited level of education.	- N = 41; women. - Age (MD and DP): EG1: 38 years (± SI), EG2: 41 years (± SI); GC1: 34 years (± SI), GC2: 40 years (± SI). - Groups: - GE1: 15 participants - GE2: 9 participants; - GC1: 9 participants; - GC2: 8 participants;	Intervention through exercises. Intensive brief therapy with FingerKazoo (FK).	Auditory-perceptual analysis; Multi-Dimensional Voice Program Advanced (VPA); Protocol Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V) and videolaryngos-troboscopy.	Brief and intensive therapy with fingerkazoo provided numerous positive effects on auditory, acoustic, and laryngeal perceptual parameters. The benefits were more evident in those without the structural laryngeal disease. Thus, the fingerkazoo, in brief and intensive therapy, can be used as a resource for speech therapists in the treatment of hyperfunctional dysphonia in teachers
SANTOS (2016)[22] Minas Gerais (Southeast)	- Prospective observational study - SI education level	- N = 54; women. - Age (MD and SD): 41 (± 8.26) years. - Group: N/A	Speech therapy and its results after discharge. traditional voice therapy	Analysis of medical records, including the results of the PPAV and the teaching cycle(s) in operation. Post-therapy: a questionnaire and the VAPP (online)	Reduction in the number of vocal symptoms after speech therapy discharge. There is no improvement in quality of life, with a decrease in dysphonia limitation in all analyzed parameters.
CRUZ (2016)[23] São Paulo (Southeast)	- Case study - Elementary School	- N = 1; women. - Age (MD and SD): 44 (± SI) years. - Groups: N/A	Effects of sound amplification on the teacher's voice. Dynamic free field system (DigiMaster 5000 (DM) at Phonak).	Auditory-perceptual assessment, acoustic voice assessment and vocal self-perception.	The active free field system, during the day, was effective in reducing symptoms and improving the vocal quality, identified by the auditory-perceptual and acoustic evaluation.
RIBAS (2014)[24] Goiás (Midwest)	- Quasi-experimental, quantitative study. - Elementary School.	- N = 20; being 14 women and six men. - Age (MD and SD): SI; - Group: N/A	Vocal health and well-being. Voice experience.	Application of Voice Complaints and Voice Quality of Life protocols before and after the intervention	Increase in voice perceptions, a decrease in some complaints and a slight improvement in the voice's impact on quality of life. The structure of the study was not enough to promote vocal health.
ANHAIA (2014)[25] Rio Grande do Sul (South)	- Prospective, randomized, parallel clinical trial - University education	- N = 42; 36 women and 6 men; - Age (MD and SD): G1 = 38 years / G2 = 38.5 years. Groups: - G1 (Experimental): 20 (women) - G2 (Control): 22 (16 women and 6 men)	Comparison of the effect of two interventions through a randomized clinical trial Comparison G1 (scapular girdle massage, facial musculature and digital laryngeal manipulation) with G2 (vibrating sound techniques, nasal sound, over articulation and mastication)	- Voice signs/ symptoms questionnaire; - Auditory-perceptual assessment; - Voice acoustic analysis; - Vocal Profile and Participation and Activities Protocol (PPAV); - Visual Analogue Scale (VAS) to assess pain; - Physical examination of palpation.	Reduction of symptoms in both groups. No difference between interventions in the two groups. - Intragroup results showed: a) better results in self-perception and acoustics (glottic noise energy), improvement in pain, decrease in cervical tension, and progress in the degree of dysphonia. b) G2 = best result in self-perception and acoustics (shimmer and glottic noise energy), maintenance of auditory-perceptual assessment, no difference in cervical tension.
XAVIER (2013)[26] Pernambuco (Northeast)	- Descriptive study, with a quantitative-qualitative approach. - SI teaching level.	- N = 27; women. - Age (MD and SD): 35 (± SI) years. Groups: N/A	Vocal health and well-being. We are conducting voice workshops.	Recordings of teachers' voices before and after performing the vocal exercises and Self-Perception Questionnaire	80% of the teachers answered that they had noticed an improvement in their professional performance, a decrease in hoarseness, an improvement in their vocal quality; decreased effort when speaking; and decreased throat clearing. 93.3% of the teachers expressed the desire to continue practicing exercises.

Author (year) Study location	Type of Study type of education	Sample	Intervention Category	Evaluation of the intervention	Main results
SERVILHA (2013)[27] São Paulo (Southeast)	- Type of study SI - University education	- N = 8; six women and two men. - Age (MD and SD): 52.5 (± SI) years. - Groups: N/A.	Vocal advice and improvement. Voice advise.	Application of the IDV protocol.	The intervention showed positive and beneficial results, perceived through the regression of values of all subscales of the research instrument, especially the emotional consequences generated
LUCHESI (2012)[28] São Paulo (Southeast)	- SI - Elementary School	- N = 5 (150 speech samples); - Age (MD and SD): 41 (± SI) years. Groups: N/A	Vocal advice and improvement. vocal enhancement program	Auditory-perceptual analysis (Visual Analog Scale). E Acoustic analysis (Praat.).	Significant increase in frequency range and a statistically significant increase in F1. The developed program can improve the professional use of voice.
GAMA (2012)[29] Minas Gerais (Southeast)	- Prospective study of qualitative analysis. - SI teaching level.	- N = 39; - Age (MD and SD): 39 41 (± SI) years. Group: N/A	Speech therapy and its results after discharge. Voice therapy – direct and indirect approach.	Interviews were carried out over the phone using a previous script composed of open questions.	Most patients reported systematically following speech therapy guidelines after being discharged from voice treatment, such as hydration, dietary care, avoiding vocal abuse, and vocal warm-ups and vocal exercises.
KASAMA (2011)[30] São Paulo (Southeast)	- Experimental study. - Unlimited level of education.	- Unlimited level of education. - N = 22; 19 women and 3 men. - Age (MD and SD): 42.6 (± SI) years. Vocal health and well-being.	Vocal health and well-being. Interventions in small groups theoretical and practical content.	Voice Quality of Life Protocol – QVV is; a specific protocol designed for the research to assess the opinion of teachers regarding the vocal health program.	The changes cited as the most important are related to general aspects of vocal hygiene, in particular hydration, breathing, beneficial effects of exercises, attention to one's own and students' voices and recognition of the importance of voice. After the intervention, a reduction in the frequency of reports of vocal symptoms was noted.

Caption: N = number; SI = no information; MD = mean; SD = standard deviation; EG = experimental group; CG = control group; N/A = not applicable.

Four studies sought to analyze the effectiveness of specific techniques, such as the perilaryngeal manual massage technique[25], Finger Kazoo technique[21], semi-occluded vocal tract exercise (SOVTE)[19,] and vocal warm-up and cool-down techniques[15]. The Comprehensive Rehabilitation Program (PIRV) was studied in three publications[17,18,20] as an intervention program; in all of them, it proved effective.

Two studies[22,29] specifically analyzed the effect of speech therapy on the quality of life and vocal behavior of teachers after discharge.

One study[25] was a randomized clinical trial to verify the effect of two interventions, comparing manual massage with traditional vocal training; the results are shown in Table 2.

Two studies[27,28] showed the results of work with oral communication with teachers through counseling and vocal improvement.

Discussion

Studies on the teacher's voice are constant in Speech-Language Pathology and Audiology, with many publications in specialized national journals, with different approaches regarding the theme and study design.

Among the studies included in the present review, it was possible to perceive the existence of experimental studies of the controlled and randomized type, which sought to evaluate the comparison of exercises to identify the one with the best effect[21,25]. This fact becomes essential because the performance of randomized clinical trials is considered the one with one the best scientific evidence to verify the effect of an intervention. It is still possible to prove the prevalence of observational studies that evaluated the results of interventions

and, still, some with qualitative approaches. It was observed that the observational design, whether analytical or descriptive, is the most common among the studies surveyed.

Quasi-randomized clinical trials were also present in the studied sample, those intended to verify the effect of an exercise/technique in the same model before and after. This scenario shows a significant advance regarding study designs in research with the teacher's voice. The presence of research with controlled and randomized clinical trials allows progress in the area of voice towards a practice based on good quality evidence[31].

Evidence-based practice has been disseminated in speech therapy, aiming to "use the best clinical evidence available, combined with professional clinical experience and patient preferences for decision-making"[32]. The growing discussion and search for evidence-based speech therapy raise awareness of the need for more clinical studies to prove the effects and safety of interventions in rehabilitation with teachers.

It is relevant to consider that non-experimental studies bring essential information for understanding a given topic as well as research with a qualitative approach, whose data allow understanding of the perception and deepening the meanings, values, motives and attitudes, favoring the interpretation of realities that cannot be quantified[33]. Three studies included in the present review[13,23,29] show this reality of qualitative research in the study of the teacher's voice. One study[26] used a quantitative-qualitative approach.

Analyzing articles by region of publication allows us to understand how studies are being developed in our geographic space, knowing the panorama of the diversities of speech therapy work with the teacher in Brazil. Although discussions on the subject have grown, publications on the teacher's voice are still scarce in some regions.

Women are still the majority in research carried out with teachers, which is considered an inclusion criterion by many researchers[22]. It should be emphasized that the female sex is predominant in Brazilian education, with women being more predisposed to voice problems than men, not only because of the high vocal workload for the exercise of their professional activity, but also because of the various social roles assumed by women[34].

Although data regarding the mean age of the participants were not identified in all the articles included, among the studies that presented this data, the mean age was 41.1 years. The importance of considering this variable in research with the teacher's voice is worth mentioning. As age advances, vocal efficiency is expected to decrease, worrying more from 45 onwards[35].

Other relevant data are the teaching workload and the length of time in the profession, as they are variables that can affect voice problems for teachers. Among the included studies, the teaching hours ranged from 8:19 pm to 40:25 am. However, in a study carried out[20], despite the extensive workload, the participants showed good adherence to the treatment and participation in the program. In a later way, the search for a cure is a reality among teachers, who, due to the extensive workload, often do not have time to seek and maintain a speech-language pathology follow-up[25].

The teacher's self-perception to identify the first signs/symptoms of vocal alterations, as well as the stimulus for them to know their voice better, is a theme that is very present in research. This fact may be linked to the diversity of existing self-perception protocols. These instruments were widely used in the mapped studies to assess the effects of applied intervention approaches. Among these studies are those by Nogueira (2018)[17], Cavalcanti (2018)18, Souza (2017a)[19], Souza (2017b)[20], Santos (2016)[22], Anhaia (2014)[25], Servilha (2013)[27] and Kasama (2011)[30] who verified the impact of voice on quality of life, performance and the number of symptoms present among teachers.

The analysis of the included studies showed that secondary and higher education teachers are still poorly studied. Considering the level of education and subjects taught makes it possible to know the vocal demand and adjust the collective intervention programs. Group interventions are generally developed through programs and actions aimed at vocal health and well-being through workshops that may involve direct and indirect vocal strategies.

A recently published study[13] developed a practice of continuing education in vocal health through[15] actions in a conversation circle format. It concluded, through teachers' reports that interventions in which strategies for vocal preparation are used contribute to the activity to allow the teacher better vocal performance.

Masson (2019)[15] in his study, which aimed to verify the immediate effects of a vocal warm-up and cool-down program with teachers of the

quasi-experimental type, was able to conclude that although there was no statistically significant difference between the experimental and control groups, the group submitted to the program (intervention) presented better vocal quality and decreased vocal and body discomfort.

Thus, through cooperative programs or individual speech therapy, it is possible to awaken in the teacher more excellent knowledge and skills to deal with their vocal apparatus. Preventive actions allow teachers to perceive the benefits of taking care of the voice and applying techniques to avoid possible vocal problems later, which is also helped through self-assessment protocols[19].

Ribas (2014)[24], in his intervention, observed that the actions aimed at promoting the vocal health of the teacher deserve to have an expanded perspective of the health-disease process, and there should be a greater understanding of the relationships that involve health, work and quality of life so that they are more effective.

The mapping made it possible to observe the existence of new modalities of intervention with teachers, such as courses in distance education format, to promote vocal well-being in the form of Distance Education[16]. The authors observed, through this intervention, the need to present conceptual content about the voice, before offering practices, so that the results are more effective.

The analysis of intervention practices with teachers allowed us to perceive, among the studies included, that there is a predominance of collective actions to promote vocal health and well-being. These actions point to beneficial results for the population studied, but also their limitations regarding the participation of teachers[16]. Research with qualitative approaches allows a better understanding of teachers' perceptions regarding their teaching practice and vocal illness.

Although qualitative studies are not considered strong evidence for clinical decision-making, they allow the exploration of the vocal process, the perception of experiences, knowledge and the meaning of voice-related problems, which must be analyzed in the rehabilitation process or in the planning of educational actions to promote vocal well-being.

In addition to the articles that presented educational actions as an intervention, studies that evaluated the effectiveness of specific exercises/techniques also stand out. These randomized and quasi-randomized experimental studies could prove the effectiveness of some exercises/techniques widely used in teacher vocal rehabilitation/training.

Among the exercises evaluated, phonation using a commercial straw and the FingerKazoo technique showed positive results in the vocal quality parameter and aspects involving phonatory comfort, which may be one of the techniques used in vocal training programs with teachers. The performance of brief intensive therapy with FingerKazoo benefits the teacher with hyperfunction dysphonia[21]. Souza (2017a)[19] states that the commercial straw phonation technique can be a protective measure for the teacher's voice.

Perilaryngeal manual massage allowed improving vocal production and reducing tension in the laryngeal muscles in the studied sample. However, there was no difference between the interventions regarding the vocal self-assessment questionnaire scores and the acoustic analysis. Therefore, since both can contribute to teachers' well-being and vocal quality, it is up to the speech therapist to decide which technique will be applied, according to the educator's complaints and vocal demand[25].

Given the analysis of studies that verified the vocal behavior of teachers after speech therapy, with a discharge period between four[22] and six months[17], it was evidenced that the speech therapy intervention is capable of positively impacting the teachers' voice about behavioral and occupational factors, reducing the number of vocal symptoms. When verifying if there were changes in vocal habits and better perception of the work environment, after the speech therapy discharge from the rehabilitation for behavioral dysphonia through speech therapy, teachers become more aware of the benefits of vocal exercises[17].

In general, the effects of interventions were evaluated through auditory-perceptual assessment, acoustic analysis and self-assessment protocols. Even if subjective, the predominance of auditory-perceptual assessment confirms its gold standard indicated in the literature[36,37]. Among the studies that used the auditory-perceptual assessment, three had the GRBASI Scale[15,18,25] as a parameter, the most used in national and international studies. Through this scale, it is possible to measure the degree and type of vocal deviation through the following aspects - G (grade) global verbal alteration; R (roughness) roughness; B breathiness; A (asthe-

nia) asthenia; S (strain) voltage; and I (instability) emission instability[15].

The present review made it possible to know the scenario of Brazilian publications in the teacher's voice that address intervention strategies. It also verified that many are focused on collective vocal health and well-being programs, involving educational actions with both theoretical and practical content. A systematic review of the literature indicated that the combination of direct and indirect vocal interventions is more effective[38]. Thus, the mapped studies confirm these findings when it comes to voice professionals, such as teachers However, there is still a lack of studies with more significant evidence and robustness regarding the results of interventions in the teacher's voice.

The present review may have had limitations impacted by the search strategy, which may have excluded some other critical studies from composing the sample.

Conclusion

The number of articles published per year ranged from one to three, with a predominance of observational and descriptive studies, demonstrating the need for more controlled studies in the area. Publications of studies eligible for the sample in the country's Northern region were not identified, with most of the research concentrated in the southeast region. Studies focused on vocal health and well-being are still the most developed, as well as those aimed at identifying the results of specific techniques/exercises before and after their application.

Analyzing the interventions adopted is essential to understand the strategies to promote vocal health and prevent and rehabilitate vocal alterations in this population. It is up to the speech therapist to define the interventions that will be used, based on an expanded view of the health-disease process and the patient's vocal demands.

References

1. Medeiros AM de, Vieira M de T. Ausência ao trabalho por distúrbio vocal de professores da Educação Básica no Brasil. Cad Saude Publica [Internet]. 2019; 35. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2019000505001&tlng=pt

2. Ministério da Saúde (Brasil).Distúrbio de Voz Relacionado ao Trabalho – DVRT. Brasília (DF). 2018.Disponíel em: https://bvsms.saude.gov.br/bvs/publicacoes/disturbio_voz_relacionado_trabalho_dvrt.pdf

3. Cielo CA, Portalete CR, Ribeiro VV, Bastilha GR. Perfil vocal, ocupacional e de saúde geral de docentes de Santa Maria/RS. Rev CEFAC [Internet]. 2016 Jun;18(3):635–48. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-18462016000300635&lang=pt

4. Coelho TT, Castilho LCF. Professor: a voz da educação. In: Ribas A, Pazini S, editors. Fonoaudiologia e educação: uma parceria necessária. Curitiba: UTP; 2010. 93–113.

5. Salema L, Mendes A, Rodrigues A. Prevalência dos problemas de voz em professores dos segundo e terceiro ciclos do ensino básico e do ensino secundário. Rev Port Otorrinolaringol e Cir Cabeça e Pescoço. 2006; 44(4): 379–97.

6. Marçal CCB, Peres MA. Alteração vocal auto-referida em professores: prevalência e fatores associados. Rev Saude Publica [Internet]. 2011 Jun; 45(3): 503–11. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102011000300008&lng=pt&tlng=pt

7. Simões M, Latorre M do RD de O. Prevalência de alteração vocal em educadoras e sua relação com a auto-percepção. Rev Saude Publica [Internet]. 2006 Dec; 40(6): 1013–8. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102006000700008&lng=pt&tlng=pt

8. Dragone MLS. Voz do professor: interfaces e valor como instrumento de trabalho [dissertação]. Araraquara (SP): Universidade Estadual Paulista. Faculdade de Ciências e Letras; 2000. Disponível em: https://repositorio.unesp.br/bitstream/handle/11449/90345/dragone_mlos_me_arafcl.pdf?sequence=1&isAllowed=y

9. Dragone MLS, Ferreira LP, Giannini SPP, Simões-Zenari M, Vieira VP, Behlau M. Voz do professor: uma revisão de 15 anos de contribuição fonoaudiológica. Rev da Soc Bras Fonoaudiol [Internet]. 2010; 15(2): 289–96. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-80342010000200023&lng=pt&tlng=pt

10. Penteado RZ, Ribas TM. Processos educativos em saúde vocal do professor: análise da literatura da Fonoaudiologia brasileira. Rev da Soc Bras Fonoaudiol [Internet]. 2011 Jun; 16(2): 233–9. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

11. Peters M, Godfrey C, McInerney P, Munn Z, Trico A, Khalil H. Chapter 11: Scoping Reviews. In: Aromataris E, Munn Z, editors. JBI Manual for Evidence Synthesis [Internet]. Autralia: JBI; 2020. Disponível em: https://wiki.jbi.global/display/MANUAL/Chapter+11%3A+Scoping+reviews

12. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med [Internet]. 2018 Oct;169(7): 467–73. Disponível em: http://annals.org/article.aspx?doi=10.7326/M18-0850

13. Macêdo Filho VF de, Sousa PLA de. Educação Permanente em Saúde: preparação vocal para o professor. Distúrbios da Comun [Internet]. 2020 Sep; 32(3): 517–22. Disponível em: https://revistas.pucsp.br/index.php/dic/article/view/46495

14. Dornelas R, Silva K da, Santos TA dos, Ruas ACN, Ribeiro VV, Guedes-Granzotti RB, et al. Efeito imediato do exercício de sucção de ar na qualidade vocal e autoavaliação de professoras com queixas vocais: estudo-piloto. Audiol - Commun Res [Internet]. 2020; 25. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2317-64312020000100703&tlng=pt

15. Masson MLV, Fabbron EMG, Loiola-Barreiro CM. Aquecimento e desaquecimento vocal em professores: estudo quase-experimental controlado. CoDAS [Internet]. 2019; 31(4). Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2317-17822019000400309&tlng=pt

16. Ferreira LP, Souza RV de, Souza AR, Burti JS, Pereira MM, Giannini SPP, et al. Intervenção fonoaudiológica com professores: análise de uma proposta realizada à distância. Distúrbios da Comun [Internet]. 2019 Jul; 31(2): 234–45. Disponível em: http://revistas.pucsp.br/dic/article/view/40862/29261

17. Nogueira B de FM, Medeiros AM de. Comportamento vocal e condições de trabalho de professores após fonoterapia para tratamento de disfonia comportamental. Audiol, Commun res [Internet]. 2018; 23.Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

18. Cavalcanti NR, Souza BO, Gama ACC, Medeiros AM de. Efeito do programa integral de reabilitação vocal em professoras com disfonia comportamental. CoDAS [Internet]. 2018 Ago; 30 (4). Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

19. Souza RC de, Masson MLV, Araújo TM de. Efeitos do exercício do trato vocal semiocluído em canudo comercial na voz do professor. Rev CEFAC [Internet]. 2017; 19(3): 360–70. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-18462017000300360&lng=pt&tlng=pt

20. Souza BO, Tonon IG, Souza EVS, Nogueira BDFM, Silva SP da, Ribeiro K, et al. Adesão e satisfação de professores participantes do Programa Integral de Reabilitação Vocal. Distúrbios da Comun [Internet]. 2017 Jun; 29(2): 284. Disponível em: https://revistas.pucsp.br/index.php/dic/article/view/30345

21. Christmann MK, Cielo CA, Scapini F, Lima JP de M, Gonçalves BF da T, Bastilha GR. Ensaio clínico controlado e randomizado de terapia breve e intensiva com finger kazzo em professoras: estudo preliminar. Audiol - Commun Res [Internet]. 2017 Nov; 22. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

22. Santos SM de M, Medeiros J da SA, Gama ACC, Teixeira LC, Medeiros AM de. Impacto da voz na comunicação social e emoção de professoras antes e após fonoterapia. Rev CEFAC [Internet]. 2016 Abr;18(2): 470–80. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-18462016000200470&lng=pt&tlng=pt

23. Cruz AD da, Silvério KCA, Ribeiro VV, Jacob RT de S. Impacto do sistema de campo livre dinâmico na voz do professor: estudo de caso. Rev CEFAC [Internet]. 2016 Oct;18(5):1260–70. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

24. Ribas TM, Penteado RZ, García-Zapata MTA. Qualidade de vida relacionada à voz: impacto de uma ação fonoaudiológica com professores. Rev CEFAC [Internet]. 2014;16(2): 554–65. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

25. Anhaia TC, Klahr P da S, Ourique AAB, Gadenz CD, Fernandes RA, Spagnol PE, et al. Efeitos de duas intervenções em professores com queixas vocais. Audiol - Commun Res [Internet]. 2014 Abr; 19(2): 186–93. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

26. Xavier IA de LN, Santos ACO dos, Silva DM da. Saúde vocal do professor: intervenção fonoaudiológica na atenção primária à saúde. Rev CEFAC [Internet]. 2013 Ago; 15(4): 976–85. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-18462013000400027&lng=pt&tlng=pt

27. Servilha EAM, Arbach M de P. Avaliação do efeito de assessoria vocal com professores universitários. Distúrb comun [Internet]. 2013; 25(2). Available Disponível em: http://revistas.pucsp.br/index.php/dic/article/view/16474/12371

28. Luchesi KF, Mourão LF, Kitamura S. Efetividade de um programa de aprimoramento vocal para professores. Rev CEFAC [Internet]. 2012; 4(3): 459–70. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-18462012000300010&lng=pt&nrm=iso&tlng=pt

29. Gama ACC, Bicalho VS, Valentim AF, Bassi IB, Teixeira LC, Assunção AÁ. Adesão a orientações fonoaudiológicas após a alta do tratamento vocal em docentes: estudo prospectivo. Rev CEFAC [Internet]. 2012 Set;14(4): 714–20. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-18462012000400015&lng=pt&tlng=pt

30. Kasama ST, Martinez EZ, Navarro VL. Proposta de um programa de bem estar vocal para professores: estudo de caso. Distúrb comun [Internet]. 2011; 23(1): 35–43. Disponível em: http://www.pucsp.br/revistadisturbios/artigos/Artigo_750.pdf

31. Vieira VP,Atallah NA. Tratamento dos distúrbios da voz baseado em evidências. Diagn. Tratamento [Internet]. 2009; 14(1): 19–21. Disponível em: https://pesquisa.bvsalud.org/portal/resource/pt/lil-552524

32. Miranda VSG de, Marcolino MAZ, Rech RS, Barbosa L de R, Fischer GB. Fonoaudiologia baseada em evidências: o papel das revisões sistemáticas. CoDAS [Internet]. 2019; 31(2). Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2317-17822019000200201&tlng=pt

33. Medeiros AM, Assunção AÁ, Lanna M dos AL e, Barreto SM. Distúrbios da voz: representações sociais por professores em tratamento fonoaudiológico. Distúrb comun [Internet]. 2016; 28(3): 434–43. Disponível em: https://revistas.pucsp.br/index.php/dic/article/view/28110/20849

34. Morais EPG de, Azevedo RR, Chiari BM. Correlação entre voz, autoavaliação vocal e qualidade de vida em voz de professoras. Rev CEFAC [Internet]. 2012; 14(5): 892–900. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

35. Anhaia TC, Klahr P da S, Cassol M. Associação entre o tempo de magistério e a autoavaliação vocal em professores universitários: estudo observacional transversal. Rev CEFAC [Internet]. 2015 Fev; 17(1): 52–7. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&amp

36. Aragão AN, Couto TE, Camargo ZA de, Santos MAR, Gama ACC. Análise da qualidade vocal antes e após o uso profissional e social da voz. Audiol - Commun Res [Internet]. 2014 Set; 19(3): 209–14. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2317-64312014000300209&lang=pt

37. Cielo CA, Ribeiro VV, Bastilha GR, Schilling N de O. Qualidade de vida em voz, avaliação perceptivoauditiva e análise acústica da voz de professoras com queixas vocais. Audiol - Commun Res [Internet]. 2015 Jun; (2): 130–40. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2317-64312015000200009&lng=pt&tlng=pt

38. Anhaia TC, Gurgel LG, Vieira RH, Cassol M. Intervenções vocais diretas e indiretas em professores: revisão sistemática da literatura. Audiol - Commun Res [Internet]. 2013 Dez; 18(4): 361–6. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2317-64312013000400019&lng=pt&tlng=pt