https://doi.org/10.23925/2176-2724.2024v36i2e66466

Therapeutic resources used in vocal therapy: an integrative literature review

Recursos terapêuticos utilizados na terapia vocal: uma revisão integrativa de literatura

Recursos terapéuticos utilizados en terapia vocal: una revisión integrativa de la literatura

Ana Regina Silveira Maciel[1]
Ariane Damasceno Pellicani[1]
Aline Ferreira de Brito Mota[1]

Abstract

Objective: the objective of this study is to carry out an integrative review of the Brazilian literature on the resources that have been used in voice therapy in the last five years. **Method:** the SciELO, LILACS and MEDLINE databases were used to survey scientific articles written by Brazilian authors and produced in Brazil. For the selection of articles, the inclusion criteria were scientific articles found written by Brazilian authors and carried out in Brazil in Brazilian literature in the last five years, period 2018 – 2022, and exclusion criteria were Course Completion Works (TCC), dissertations master's degrees and doctoral theses. Then, the selected articles were read and analyzed in full using the title, keywords, summary and inclusion and exclusion criteria. The question that guided the research was: "*What are the therapeutic resources used in vocal therapies most cited in scientific articles, carried out by Brazilian authors and produced in Brazil, in the last five years?* ". **Results:** 18 articles were included in the integrative review, which were subsequently read in full and synthesized. **Conclusion:** the therapeutic resources found from the review were resonance tube, high-resistance straw, photobiomodulation, surface electromyographic biofeedback, surface hydration, respiratory encouragers, electrical stimulation and gamer. Among these, the most researched and used in clinical practice in voice were the resonance tube and the high-resistance straw, thus, photobiomodulation, electromyographic biofeedback and electrical stimulation still lack scientific studies on their effectiveness and better application in voice therapy.

Keywords: Voice; Voice Training; Speech Therapy; Dysphonia; Speech, Language and Hearing Sciences

[1] Universidade Federal de Sergipe, Lagarto, SE, Brazil.

Authors' contributions:
ARSM: conception, development, methodology, review, and finalization of the article;
AFBM: study conception, article outline, methodology, critical review, supervision;
ADP: intellectual review of the manuscript.

E-mail for correspondence: alinebrito.fono@gmail.com
Received: 05/06/2024
Accepted: 07/19/2024

Resumo

Objetivo: o objetivo deste estudo é realizar uma revisão integrativa da literatura brasileira sobre os recursos que vêm sendo utilizados na terapia vocal nos últimos cinco anos. **Método:** foram utilizadas as bases de dados SciELO, LILACS e MEDLINE para realizar o levantamento de artigos científicos realizados por autores brasileiros e produzidos no Brasil. Para a seleção dos artigos, foram delimitados como critérios de inclusão artigos científicos encontrados feitos por autores brasileiros e realizados no Brasil na literatura brasileira nos últimos cinco anos, período de 2018 – 2022, e de exclusão Trabalhos de Conclusão de Curso (TCC), dissertações de mestrado e teses de doutorado. Em seguida, os artigos selecionados foram lidos e analisados na íntegra através do título, palavras-chave, resumo e critérios de inclusão e de exclusão. A pergunta que norteou a pesquisa foi: "*Quais são os recursos terapêuticos utilizados nas terapias vocais mais citados em artigos científicos, realizados por autores brasileiros e produzidos no Brasil, nos últimos cinco anos?*". **Resultados:** foram incluídos na revisão integrativa 18 artigos, sendo, posteriormente, lidos integralmente e sintetizados. **Conclusão:** os recursos terapêuticos encontrados a partir da revisão foram tubo de ressonância, canudo de alta resistência, fotobiomodulação, *biofeedback* eletromiográfico de superfície, hidratação de superfície, incentivadores respiratórios, eletroestimulação e gamer. Dentre esses, os mais pesquisados e utilizados na prática clínica em voz foram o tubo de ressonância e o canudo de alta resistência.

Palavras-chave: Voz; Treinamento da Voz; Fonoterapia; Disfonia; Fonoaudiologia

Resumen

Objetivo: el objetivo de este estudio es realizar una revisión integradora de la literatura brasileña sobre los recursos que han sido utilizados en terapia de la voz en los últimos cinco años. **Método:** se utilizaron las bases de datos SciELO, LILACS y MEDLINE para el levantamiento de artículos científicos escritos por autores brasileños y producidos en Brasil. Para la selección de artículos, los criterios de inclusión fueron artículos científicos encontrados escritos por autores brasileños y realizados en Brasil en la literatura brasileña en los últimos cinco años, período 2018 – 2022, y los criterios de exclusión fueron Trabajos de Finalización de Cursos (TCC), disertaciones de maestría. y tesis doctorales. Luego, los artículos seleccionados fueron leídos y analizados en su totalidad utilizando el título, palabras clave, resumen y criterios de inclusión y exclusión. La pregunta que guió la investigación fue: "¿Cuáles son los recursos terapéuticos utilizados en terapias vocales más citados en artículos científicos, realizados por autores brasileños y producidos en Brasil, en los últimos cinco años? ". **Resultados:** Se incluyeron 18 artículos en la revisión integradora, los cuales posteriormente fueron leídos íntegramente y sintetizados. **Conclusión:** los recursos terapéuticos encontrados en la revisión fueron tubo de resonancia, pajita de alta resistencia, fotobiomodulación, biofeedback electromiográfico de superficie, hidratación de superficie, estimuladores respiratorios, estimulación eléctrica y gamer. Entre estos, los más investigados y utilizados en la práctica clínica en la voz fueron el tubo de resonancia y la pajita de alta resistencia, por lo que la fotobiomodulación, la biorretroalimentación electromiográfica y la estimulación eléctrica aún carecen de estudios científicos sobre su efectividad y mejor aplicación en la terapia de la voz.

Palabras clave: Voz; Entrenamiento de la Voz; Logopedia; Disfonía; Fonoaudiología

Introduction

The treatment of voice disorders relies on diagnostic accuracy, efficient vocal assessment, patient adherence to the proposed work, and the use of evidence-based vocal and non-vocal strategies and procedures, known as vocal rehabilitation.[1]

Vocal rehabilitation is understood as a dynamic and non-linear process aimed at improving the balance between the structures that produce voice and the vocal functionality processes, reducing vocal handicaps, and enhancing emission quality according to the personal, professional, and social needs of each individual.[2] Thus, speech-language therapy acts on vocal functionality, with a significant part of this action resulting from the employed techniques.[2]

Voice therapy consists of a combination of direct and indirect approaches. Direct voice therapy involves executing vocal exercises themselves, aimed at controlling and coordinating the aspects of the systems involved in phonation.[3,4] Indirect voice therapy is related to the management and maintenance of factors that contribute to good vocal quality, including counseling on voice care, stress control, and overall relaxation.[3,4]

Within the realm of direct voice therapy, there are traditional and modern techniques. Traditional techniques include approaches and methods that have been practiced for a long time and are supported by scientific evidence, such as the semi-occluded vocal tract exercises (SOVTE).[5] Modern techniques are interventions that often lack scientific evidence but have shown relevance in clinical practice, such as photobiomodulation and electrostimulation techniques in the voice field.[2]

The evolution of science and the need to offer modern tools that promote rapid clinical progress and greater patient adherence to the therapeutic plan has led to the inclusion of various therapeutic resources in vocal approaches. These resources aim to complement the techniques used and enhance clinical progress, facilitating both the patient during the execution of the technique and feedback and the therapist by providing even more consistent results from the exercises. Thus, the technological and scientific advancement of vocal clinics benefits the patient through the introduction of new therapeutic possibilities.[6]

Therefore, this study aims to conduct an integrative review of the Brazilian literature on the resources that have been used in voice therapy in the last five years.

Method

This research is an integrative literature review conducted between July and October 2023. It has six phases: formulation of the topic and guiding question; literature search through the definition of inclusion and exclusion criteria, descriptors, and databases used; data collection; critical analysis of the included studies; discussion of results; and presentation of the integrative review.

The research question was: "*What are the therapeutic resources used in voice therapies most cited in scientific articles conducted by Brazilian authors and produced in Brazil in the last five years*?" From this, the keywords "voice," "speech therapy," and "voice training" were selected from the Health Sciences Descriptors (DECS) and used with the Boolean operators "AND" and "OR" to aid in the search strategy: voice AND speech therapy, voice AND voice training, voice AND speech therapy OR voice training.

The following databases were used to select the articles: SciELO (Scientific Electronic Library Online), LILACS (Latin American and Caribbean Health Sciences Literature), and MEDLINE (Medical Literature Analysis and Retrieval System Online), focusing on scientific works in the national literature.

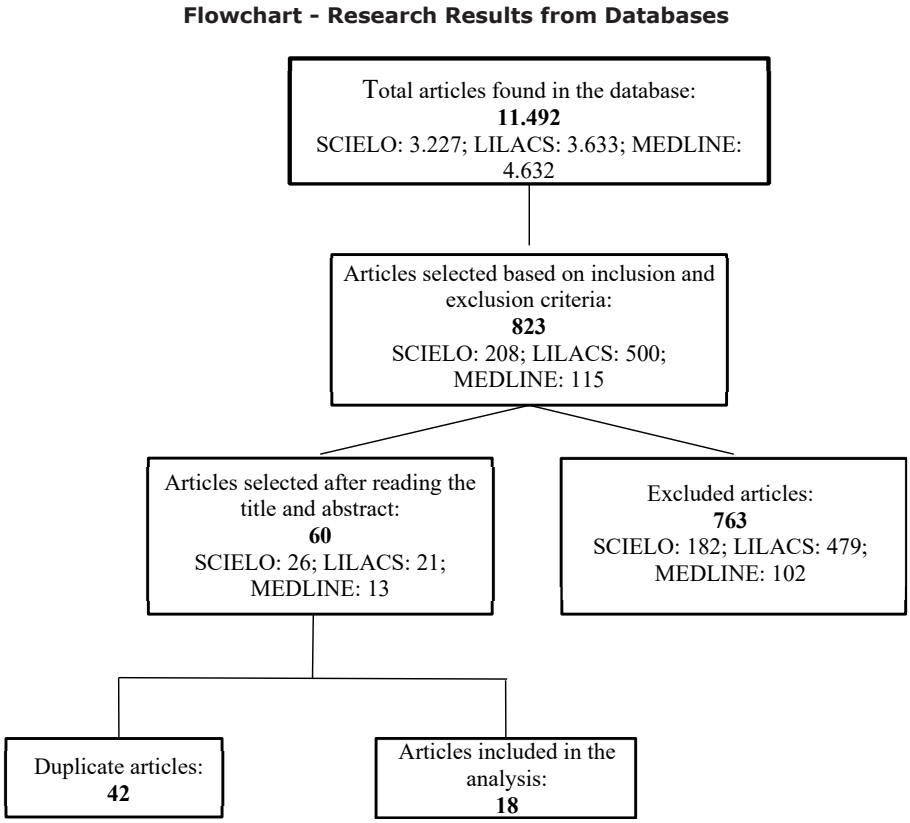
The inclusion criteria were scientific articles authored by Brazilian researchers, conducted in Brazil, and published in the selected databases within the last five years, from 2018 to 2022. Exclusion criteria included undergraduate theses, master's dissertations, and doctoral theses, as they were not published in the selected databases.

Following the literature search, the articles were analyzed and selected based on title, keywords, abstract, and established inclusion and exclusion criteria. The selected articles were read and analyzed in total. Duplicate articles in the databases and those that did not answer the research question were excluded.

Finally, one researcher fully read and analyzed the selected studies, considering the year of publication, research design, objective, and therapeutic resource addressed, and subsequently reviewed them by another researcher. No disagreements were found between the researchers.

Results

Initially, 11,492 articles were identified in the selected databases. After applying the inclusion and exclusion criteria, this number was reduced to 823. Only 18 articles were included in the analysis during the selection process, as illustrated in Figure 1. Articles that did not meet the objective, did not answer the research question, or were duplicated in the databases were discarded.



Source: Maciel, 2024

Figure 1. Flowchart of the integrative review

Chart 1 presents the 18 selected articles, summarized by title, authors, year of publication, study design, location, sample, objective, therapeutic resource, and conclusion.

Chart 1. Description of the Studies Included in the Integrative Literature Review

Title	Author / Year	Design	Sample	Objective	Therapeutic Resources	Conclusion
Biofeedback Electromyography for Behavioral Dysphonia in Adults: A Systematic Review	Ribeiro et al (2018)	Systematic literature review	Clinical Trials, Cochrane Library, Embase, LILACS, PubMed, and Web of Science databases	To systematically review the literature and analyze the effectiveness of surface electromyographic biofeedback in the rehabilitation of adults with behavioral dysphonia.	*Surface Electromyographic Biofeedback*	The available literature does not allow for conclusive evidence of the effectiveness of electromyographic biofeedback compared to other direct interventions in the rehabilitation of adult subjects with behavioral dysphonia.
Biofeedback in dysphonia - progress and challenges	Amorim et al (2018)	Systematic literature review	Scielo, Lilacs, PubMed, and Web of Sciences databases	To present evidence of the application of biofeedback (biofeedback) for treating vocal disorders, emphasizing muscle tension dysphonia.	*Electromyographic Biofeedback*	There is evidence that electromyographic biofeedback promotes changes in neural networks responsible for speech and can alter behavior for vocal emissions with quality.
Vocal and Self-Perception Effects of Straw Phonation Practice	Paixão et al. (2021)	Cross-sectional	30 women	To evaluate the acoustic and self-perception modifications of the voice in women with and without vocal symptoms after one, three, five, and seven minutes of straw phonation practice.	Straw Phonation	It did not provide acoustic modifications or self-perception of the voice in women with and without vocal symptoms. In the comparison between groups, women with symptoms presented lower GNE and more noise than those without symptoms after one minute of straw phonation practice.
Self-Perception of the Effect of Direct Hydration on Vocal Quality in Teachers: An Intervention Study	Santana et al (2018)	Interventional	27 teachers	To evaluate the effects of surface hydration on vocal quality according to the self-perception of teachers.	Surface Hydration with Saline Solution	Surface hydration with saline solution promoted a self-reported improvement in the vocal quality of teachers.
Immediate Vocal Effects Produced by the Shaker® Device in Women With and Without Vocal Complaints	Siqueira et al (2021)	Cross-sectional, experimental, analytical	27 women	To evaluate the acoustic and self-perception modifications obtained after the first, third, fifth, and seventh minute of the high-frequency sound oscillation technique performed with the Shaker® device.	Shaker® Device	The technique with the Shaker® showed positive results in individuals with and without vocal symptoms.
Functional Electrical Stimulation Associated with Phonation in Women Without Vocal Alterations	Romansina et al (2021)	Prospective, descriptive, experimental	20 normophonic adult women	To verify the immediate effect of the excitomotor electrical current known as FES on vocal quality, maximum phonation time (MPT), and possible discomforts in women without vocal alteration with application at maximum tolerated intensity (MTI) and associated with phonation.	Functional Electrical Stimulation	The FES current at MTI associated with phonation did not generate an immediate change in the vocal quality or MPT, nor did it cause self-reported discomforts in women without vocal alteration, even with a gradual increase in the stimulus.

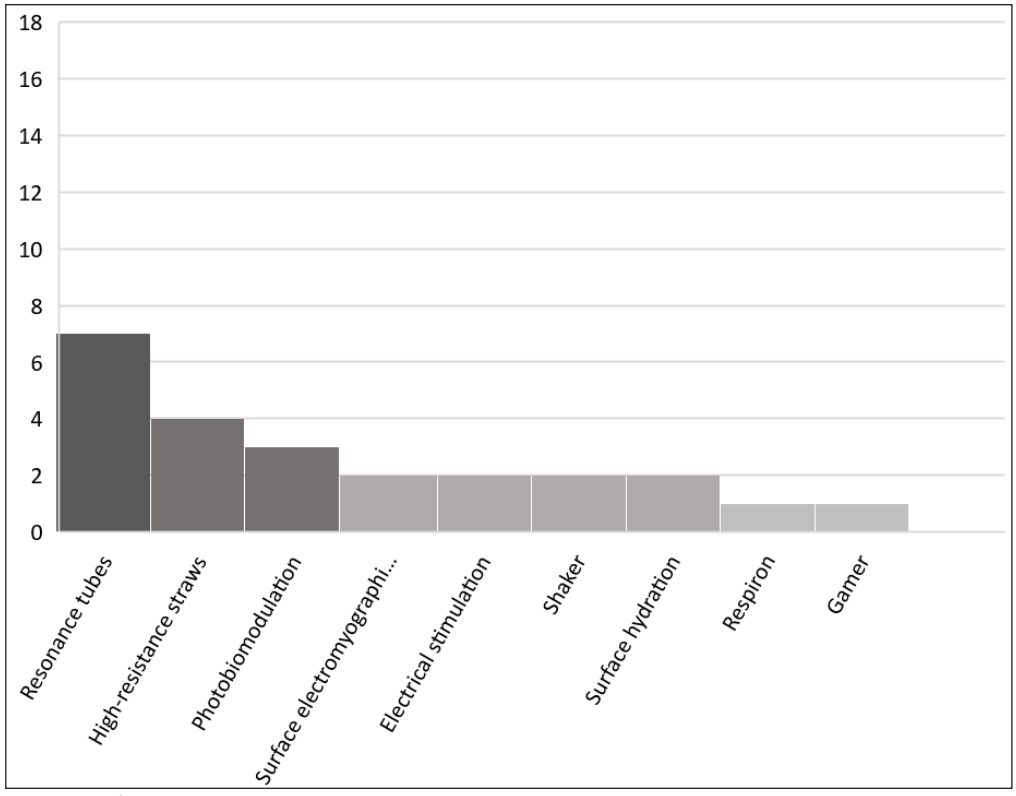
Title	Author / Year	Design	Sample	Objective	Therapeutic Resources	Conclusion
Therapeutic Effects of Photobiomodulation in Speech-Language Pathology: An Integrative Literature Review	Bacelete et al (2021)	Integrative literature review	Cochrane Library, Virtual Health Library, Medline via PubMed, and Web of Science/ ISI databases	To conduct a literature review on the therapeutic effects of photobiomodulation applicable to Speech-Language Pathology.	Photobiomodulation	Photobiomodulation benefits various disorders treated by speech-language pathologists; however, there is excellent methodological diversity and a lack of specific protocols for the ideal dosimetry for each disorder.
Immediate Effect of Different Exercises on the Vowel Space of Women With and Without Vocal Nodules	França et al (2022)	Analytical and interventional	24 women	To investigate the immediate effect of tongue vibratory exercise (TVE), high resistance straw (HRS), and overarticulation (OA) on the vowel space of vocally healthy women (VHW) and women with vocal nodules (WVN).	Tongue Vibratory Exercise (TVE), High Resistance Straw (HRS), and Overarticulation (OA)	TVE reduced the vowel space in the WVN group. HRS reduced the vowel space in the VHW group. WVN showed smaller vowel space compared to VHW before and after HRS. There was a reduced vowel space in WVN compared to WVN after TVE.
Immediate Effects of Semi-Occluded Vocal Tract Exercises on Low and High Voices: A Study on Self-Perception	Martinho et al (2020)	Quantitative, interventional	26 choir singers	To observe the immediate effects of three semi-occluded vocal tract exercises: phonation in a flexible latex tube, finger kazoo, and high resistance straw on the self-perception of participants. To compare self-perception results between groups with low and high voices.	Flexible Latex Tube, Finger Kazoo, and High Resistance Straw	The latex tube was preferred by participants with low voices and rated as less beneficial by singers with high voices. The high resistance straw was preferred by participants with high voices and rated as less beneficial by those with low voices.
Immediate Effect of Phonation in a Silicone Tube on Gospel Singers	Gonçalves et al (2019)	Prospective, analytical	40 singers without vocal complaints	To investigate the immediate effect of phonation in a silicone tube on the self-assessment and vocal quality of gospel singers.	Silicone Tube	Phonation in a silicone tube promoted an immediate positive effect on the self-assessment of voice and phonatory comfort of gospel singers. There was no significant difference in the perceptual-auditory evaluation pre and post-exercise of phonation in a silicone tube in gospel singers.
Immediate Effect of Laryngeal Surface Hydration Associated with the Tongue Vibratory Technique in Amateur Singers	Pereira et al (2021)	Interventional, cross-sectional, prospective	30 singers	To analyze the immediate effect of laryngeal surface hydration associated with the tongue vibratory technique (TVT) in singers.	Laryngeal Surface Hydration	Laryngeal surface hydration does not potentiate the effect of TVT in singers in natural hydration conditions with 3ml nebulization. For voice professionals with high vocal demand, surface hydration can be introduced during voice use to maintain vocal quality without loss of quality.

Title	Author / Year	Design	Sample	Objective	Therapeutic Resources	Conclusion
Bridging the Gap Between Science and Clinical Practice: Lessons from Academia and Professional Practice – Part B: Traditional Vocal Therapy Techniques and Modern Techniques of Electrical Stimulation and Photobiomodulation Applied to Vocal Rehabilitation	Behlau et al (2022)	Scoping review	Speech-language pathologists gathered at the Scientific Session of the Mara Behlau Merit Room, XXVIII Brazilian Congress of Speech-Language Pathology, organized by the Brazilian Society of Speech-Language Pathology – SBFa.	To present the primary data on traditional vocal rehabilitation techniques followed by consideration of two recently suggested approaches as adjuncts and employed in vocal clinics: electrical stimulation and photobiomodulation.	Resonance Tube, Straw, Photobiomodulation, and Electrical Stimulation	Scientific evidence with clinical applicability, mainly related to clinical observations by clinicians, highlights the benefits of these resources in the treatment of various voice disorders, vocal warm-up, and vocal training of healthy professional voice users.
Reduzindo o gap entre a ciência e a clínica: lições da academia e da prática profissional – parte B: técnicas tradicionais de terapia vocal e técnicas modernas de eletro -estimulação e fotobiomodulação aplicadas à reabilitação vocal	Behlau et al (2022)	Revisão de escopo	Fonoaudiólogos reunidos na Sessão Científica da sala Mérito Mara Behlau, XXVIII Congresso Brasileiro de Fonoaudiologia, organizado pela Sociedade Brasileira de Fonoaudiologia – SBFa	Principais dados das técnicas tradicionais de reabilitação vocal, seguidos de consideração sobre duas abordagens recentemente sugeridas como adjuvantes e empregadas na clínica vocal, a eletroestimulação e a fotobiomodulação	Tubo de ressonância, canudo, fotobiomodulação e eletroestimulação	As evidências científicas com as técnicas tradicionais são reconhecidas mundialmente. Novas frentes de evolução, como o uso da eletroestimulação ou fotobiomodulação em voz parecem ser promissoras como abordagens coadjuvantes.
Development and Application of a Game on Vocal Health and Hygiene in Adults	Roza et al (2019)	Cross-sectional	293 adults, including 204 women and 129 voice professionals	To evaluate and compare the immediate effects of high-frequency oral oscillation (HFO) and resonant breathing with a resonance tube on the self-perception of vocal/laryngeal symptoms and vocal quality in elderly women.	VoxPedia game on vocal health and hygiene	The game facilitated the study of the relationships between knowledge of vocal care and vocal self-assessment. It was concluded that individuals with greater knowledge of vocal care have a better self-assessment of their voice; participants with poorer vocal self-assessment do not perceive vocal problems, and those who perceive vocal problems do not necessarily seek professional care.
Comparison of the Immediate Impact of High-Frequency Oral Oscillation with Resonance Tube and Resonant Breathing with Resonance Tube on Vocally Healthy Elderly Women:	Piragibe et al (2020)	Quasi-experimental, within-subject comparative	14 elderly women.	To evaluate and compare the immediate effects of high-frequency oral oscillation (HFO) and resonant breathing with a resonance tube on the self-perception of vocal/laryngeal symptoms and vocal quality in elderly women.	Resonance tube and New Shaker®.	Resonant breathing with a resonance tube improves vocal quality in elderly women. Additionally, both exercises exhibited similar effects on the self-perception of vocal/laryngeal symptoms and sensations, suggesting that HFO is safe and can be used in voice therapy for this population.

Title	Author / Year	Design	Sample	Objective	Therapeutic Resources	Conclusion
Multidimensional Voice Assessment: Immediate Effects of Lax Vox® in Singers with Vocal Complaints	Matta et al (2021)	Quasi-experimental, within-subject comparative	30 singers, comprising 13 men and 17 women	To evaluate, from a multidimensional perspective, the effect of the Lax Vox® vocal technique on singers with vocal complaints.	Lax Vox® resonance tube	The Lax Vox® vocal technique increased fundamental frequency in male singers with dysphonia. In terms of aerodynamic parameters, it led to increased airflow and aerodynamic power in both sexes.
Vocal and Respiratory Conditioning Program (CVR): An Intervention Proposal for Voice Professionals	Ferreira et al (2021)	Pilot study	3 participants, including one sports announcer, one impersonator, and one singer	To present a speech-language pathology and physiotherapy intervention proposal, Vocal and Respiratory Conditioning (CVR), developed for voice professionals.	Commercially available straws, resonance tube, and Respiron Classic® airflow inducer	The presented program shows potential for recording positive effects.
Photobiomodulation in Speech-Language Pathology: The Profile of Professional Practice and the Level of Information Among Brazilian Speech-Language Pathologists	Correia et al (2021)	Observational, cross-sectional, and quantitative	261 speech-language pathologists, of both genders	To understand the profile of Brazilian speech-language pathologists and their level of information regarding the use of Low-Level Laser Therapy (LLLT) in photobiomodulation.	Photobiomodulation	The speech-language pathologists participating in the study demonstrated knowledge about photobiomodulation with LLLT and its applications. However, this resource is still not widely used among professionals.

Source: Maciel, 2024

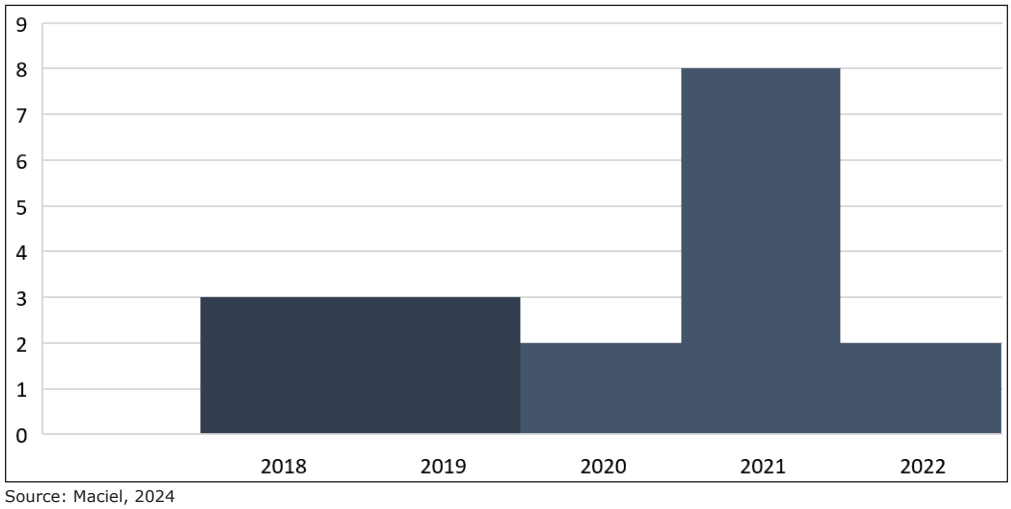
Figure 2 presents the therapeutic resources in the analyzed literature: resonance tube, high-resistance straw, photobiomodulation, surface electromyographic biofeedback, surface hydration, Shaker® device, electrostimulation, glass tube, game, and Respiron®. Some studies included more than one therapeutic resource.



Source: Maciel, 2024

Figure 2. Graph presenting the therapeutic resources found in Brazilian literature from 2018 to 2022.

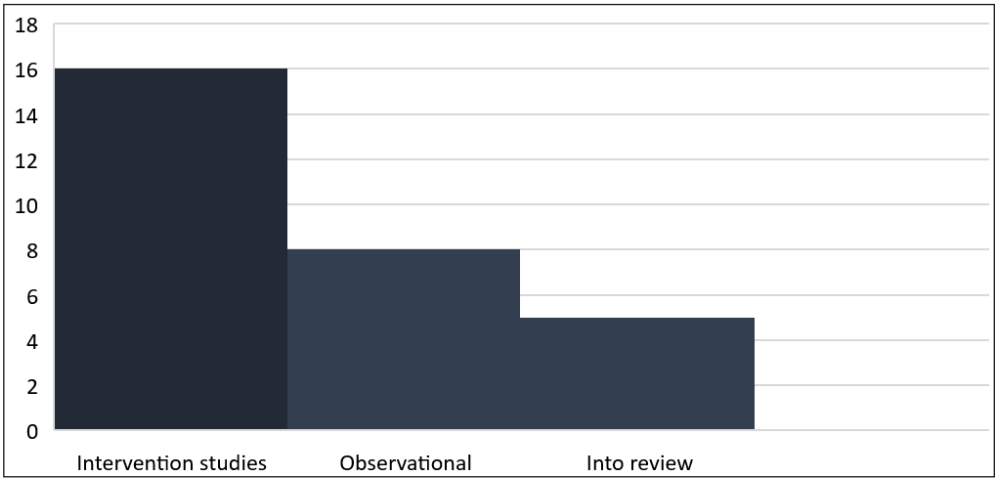
Regarding the articles' publication year, out of the 18 analyzed, 3 were published in 2018, 3 in 2019, 2 in 2020, 8 in 2021, and 2 in 2022. Thus, in the last five years, 2021 was the year with the most Brazilian articles published on resources used in voice therapy.



Source: Maciel, 2024

Figure 3. Graph demonstrating the number of articles found by year of publication.

Variations in the study design were observed according to the research objective (Figure 4). Additionally, the analyzed studies have distinct designs, varying according to the research objective; they were classified into review, observational, and intervention studies. Five review studies, 16 observational studies, and 8 intervention studies were conducted and published between 2018 and 2022.



Source: Maciel, 2024

Figure 4. Graph presenting the study design of the analyzed research.

Discussion

Speech-language pathology, particularly in the area of voice, has been improving with the use of technologies associated with traditional therapy, as the benefits of implementing new resources and therapeutic techniques for the effectiveness of voice therapy are increasingly being observed.[7]

Among the various existing resources for interventions in the area of voice, recent Brazilian literature identified studies involving resonance tubes, glass tubes, high-resistance straws, photobiomodulation, surface electromyographic biofeedback, surface hydration, Shaker® device, electrostimulation, game, and Respiron®.

Notably, there is a prevalence of research involving resonance tubes and an observational methodological design. Furthermore, most articles found and analyzed in this integrative review were published in 2021.

The resonance tube is a widely used therapeutic resource for performing semi-occluded vocal tract exercises (SOVTE). Various types of tubes, such as glass, latex, silicone, and plastic tubes, with different diameters and lengths, are used, but generally, they act as an artificial extension of the vocal tract.[8]

Seven articles were found using resonance tubes in voice therapy. Three of these reported positive results in singers, noting improvements in voice self-perception and phonatory comfort.[9-11]

Among these articles, a scoping review by Behlau et al.[2] confirmed the findings of other studies on the resonance tube, indicating its applicability in cases of vocal hyperfunction, behavioral dysphonias, and vocal conditioning.[2,12] In only one article, the resonance tube did not improve voice treatment, specifically using a glass tube.[13]

Thus, the resonance tube was the most studied therapeutic resource in the last five years, with most studies presenting positive results and significant changes in vocal quality.

Four articles were found that used the high-resistance straw in studies with various types of straws, with different diameters and materials, to test its efficacy in voice treatment. In two articles, no perceptible change in vocal quality was noted. At the same time, the other two demonstrated limitations in their use, being more suitable for high-pitched voices when applied in a vocal conditioning program.[9,14,15,16]

Only three articles on photobiomodulation were found, likely due to its recent introduction in speech therapy and the limited number of studies. Its use involves the application of light in the visible and/or near-infrared spectrum to a biological system, increasing the synthesis of adenosine triphosphate (ATP), providing energy for cellular activity, and the metabolism of muscle cells. [2,17]

Of the three studies found, only two addressed the therapeutic effects of this resource in voice therapy, both showing positive results for vocal fatigue and accelerating the tissue healing of laryngeal lesions. However, all studies highlighted the lack of research on the efficacy of photobiomodulation in voice treatment, especially in Brazil, which was consistent with the findings of a few articles on this topic in the last five years.[2, 7, 18]

According to Amorim et al.[19], surface electromyography can be used to facilitate the learning of behavioral and muscular changes by utilizing it as biofeedback.[19]

Two studies were found on the use of surface electromyographic biofeedback, both showing positive results in patients with and without dysphonia. Therefore, this resource is promising in the direct approach to voice treatments. However, it still lacks significant scientific evidence, particularly from research conducted in Brazil, as confirmed by this review study.[19, 20]

Another resource with limited scientific production in Brazil over the past five years is electrotherapy applied in voice therapy, with only two studies found. This practice involves using an electrical current to produce a desired therapeutic effect involving musculature and innervation.[21]

Both articles presented electrotherapy positively for increasing vocal endurance and promoting relaxation.[2,22] However, more research is needed on the changes in vocal quality following application, particularly to ensure its use in clinical practice.

Respiratory trainers are devices used for muscle strength training, increasing the strength of inspiratory and expiratory muscles. [23] In Brazil, the most commonly used by speech therapists are the Shaker® and Respiron® devices due to their low cost.[23]

Three articles were found on using respiratory trainers and their effects on the voice, two with the Shaker® (an expiratory trainer) and one with the Respiron® (an expiratory trainer). All articles reported positive results for voice treatment, especially in improving vocal and respiratory performance.[12,14,24] However, further research is needed on their use in speech therapy practice, particularly in the voice area, as these devices are widely used and proven effective in respiratory physiotherapy.

The literature review found only two studies using surface hydration as a resource in voice therapy, both using saline solution. Both studies obtained the same result: reducing mucus viscosity and maintaining vocal quality.[25, 26] Despite the positive results, both from a proprioceptive perspective and in vocal quality, more studies are needed to explore current application methods, considering the influence of Brazil's variable climate. For example, more studies are needed to test the differences between using water or saline solution, different durations, and equipment power levels.

With advancements in technology within speech-language pathology, it is possible to use software resources in voice therapy, particularly for indirect approaches to promote the learning and maintenance of techniques and voice care.[27] One article confirmed the efficacy of this type of resource for the indirect approach to voice treatment, contributing to the process of awareness, guidance, and changing inappropriate vocal habits.[27] This article incentivizes the creation of new software that enhances and amplifies speech-language pathology voice therapy.

This integrative literature review observed that the resonance tube was the most commonly found therapeutic resource in the literature. Additionally, more research is needed on the new technologies emerging in speech-language pathology and their use in voice therapy to ensure that new resources are applicable in treating dysphonias and aim for the best therapeutic intervention for individual cases.

Therefore, future research could associate voice therapy with photobiomodulation, electrostimulation, surface electromyographic biofeedback, and software development with applications in therapy to expand the treatment options and therapeutic resources employed in voice clinics.

Conclusion

Based on the findings, the most researched and utilized therapeutic resources in clinical voice practice in recent years were resonance tubes, high-resistance straws, photobiomodulation, surface

electromyographic biofeedback, surface hydration, Shaker® and Respiron® respiratory trainers, electrostimulation, and glass tube. Among these, the resonance tube and high-resistance straw were the most cited in the literature, confirming their effectiveness for vocal rehabilitation. In contrast, phototobiomodulation, electromyographic biofeedback, and electrostimulation, resources increasingly used in voice clinics, still lack extensive scientific studies on their efficacy and optimal application in voice therapy.

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