



Voice Speech Therapy in the Aged: Exploratory Systematic Review of Literature.

Atuação Fonoaudiológica na Voz do Idoso: Revisão Sistemática Exploratória de Literatura.

Actuación Fonoaudiológica en la Voz de los Ancianos: Revisión Sistemática Exploratoria de la Literatura.

*Daniel Lucas Picanço Marchand**

*Andréa Wander Bonamigo ***

Abstract

Introduction: With world population life expectancy rising, comes the importance of conducting studies about aging-process which results in the decline of control mechanisms needed for daily life. The voice also suffers impacts with the progression of years, being known as presbyphonia. The Speech-Language Pathologist is the professional who has the knowledge to intervene in this process. **Objective:** Survey studies about speech therapy intervention on voice in the aged. **Methods:** Exploratory Systematic Review in the following data bases: LILACS, Medline and SciELO. The search was conducted using keywords related to the topic of study. Articles in Portuguese, English and Spanish were accepted, with periods between 2005 and 2014. Relevant articles were selected based on inclusion and exclusion criteria applied to the abstract and full text. **Results:** The electronic search ended with 1047 publications, of which 1025 were excluded in the analysis of the abstract and 15 were eligible for this study after the

**Bachelor in Speech Language Pathology and Audiology*

*** Ph.D. in Public Health*

Conflict of interests:

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Mailing address: Daniel Lucas Picanço Marchand. Rua Colômbia, 142 .CEP: 92130-720.Canoas/RS - Brasil.

E-mail address: danielmarchand@live.com

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complete reading of the content. **Discussion:** The studies that composed this review describe the speech therapy intervention in the promotion, evaluation and vocal rehabilitation processes in the aged. Some researchers have failed to characterize their samples. There was no consensus about the chronological marker of senescence in these studies. Several of the analyzed articles were published in journals without impact factor. Conclusion: Identified poor visibility due to the impact factor of publications, as well as low quality of evidence, highlighting the need for robust researches focused on speech therapy with the elderly in the voice field.

Keywords: Speech, Language Pathology and Audiology; voice; voice disorders; aging; aged.

Resumo

Introdução: Com o aumento da expectativa de vida da população mundial, surge a importância de estudos acerca do envelhecimento - processo que resulta no declínio de mecanismos de controle necessários para a vida diária. A voz também sofre impactos com a progressão dos anos, sendo esse processo conhecido como presbifonia e sendo o fonoaudiólogo o profissional apto a intervir nesse processo. **Objetivo:** Revisão sistemática de estudos sobre a atuação fonoaudiológica com voz de idosos. **Material e Métodos:** Revisão sistemática exploratória nas bases de dados LILACS, Medline e SciELO, com cruzamento de unitermos relacionados à temática do estudo. Foram aceitos artigos em português, inglês e espanhol, entre o período de 2005 e 2014. Os artigos relevantes foram selecionados a partir de critérios de inclusão e exclusão aplicados ao resumo e ao texto integral. **Resultados:** A busca eletrônica inicial apontou 1047 publicações, das quais 1025 foram excluídas na análise do resumo e 15 foram elegíveis para este estudo após a sua leitura completa. **Discussão:** Os estudos que compuseram esta revisão trataram da atuação fonoaudiológica nos processos de promoção, avaliação e reabilitação vocal do idoso. Algumas pesquisas falharam em caracterizar suas amostras. Não houve consenso quanto ao marco cronológico da senescência nesses estudos. Vários dos artigos analisados foram publicados em periódicos sem fator de impacto. **Conclusão:** Houve fraca visibilidade do assunto devido ao fator de impacto dos periódicos, além de baixa qualidade de evidência, destacando-se a necessidade de pesquisas robustas voltadas à atuação fonoaudiológica com idosos na área da voz.

Palavras-chave: Fonoaudiologia; voz; distúrbios da voz; envelhecimento; idoso..

Resumen

Introducción: Con la esperanza de vida cada vez mayor de la población mundial, surge la importancia de los estudios sobre el envejecimiento - proceso de la disminución de los mecanismos de control necesarios para la vida diaria. La voz también sufre impactos con la progresión de los años, siendo conocido este proceso como presbifonia y siendo el fonoaudiólogo el profesional capaz de intervenir en este proceso. **Objetivo:** Revisión sistemática de los estudios sobre la actuación fonoaudiológica con la voz de adultos mayores. **Material y Métodos:** Revisión sistemática exploratoria en las bases de datos LILACS, Medline y SciELO, con cruce de palabras clave relacionadas con el tema de estudio. Se aceptaron artículos en portugués, inglés y español, el período entre 2005 y 2014. Los artículos pertinentes fueron seleccionados en base a criterios de inclusión y exclusión aplicados al resumen y al texto completo. **Resultados:** La búsqueda electrónica inicial mostró 1047 publicaciones, de las cuales 1025 fueron excluidos en el análisis del resumen y 15 fueron elegibles para este estudio después de su lectura completa. **Discusión:** Los estudios que compusieron esta revisión abordaron la intervención fonoaudiológica en los procesos de promoción, evaluación y rehabilitación de voz en adultos mayores. Algunas investigaciones han fallado en caracterizar sus muestras. No hubo consenso cuanto al marcador cronológico de la senescencia en estos estudios. Varios artículos analizados fueron publicados en revistas sin factor de impacto. **Conclusión:** Hubo poca visibilidad del asunto debido al factor de impacto de los periódicos, además de la baja calidad de evidencia, destacando la necesidad de investigaciones robustas centradas en la actuación fonoaudiológica con adultos mayores en el área de la voz.

Palabras clave: Fonoaudiología; voz; trastornos de la voz; envejecimiento; anciano.

Introduction

Changes arising from the normal aging process have been a constant focus of various studies. According to the definition from the World Health Organization (WHO), aging is a continuous process that begins at puberty. It can be determined socially, from the cultural pattern of each society, economically, through retirement, and chronologically, by age. There is no consensus in relation to the nomenclature “elderly” and chronological age, with some authors using 60 years of age as the reference point for senescence and others, 65 years of age¹.

Worldwide, there has been a gradual decline in recent decades in mortality rates and, more recently, in fertility rates as well. These associated factors promote the aging of the population, with the process being observed on a less accentuated scale in developed countries. The transition from a situation of high mortality and high fertility to one of low mortality and, gradually, low fertility, as can be observed in Brazil, is reflected in an increase in average life expectancy of the population and in an increase, in absolute and proportional terms, in the number of people reaching advanced age². Life expectancy in Brazil, in 2010, came to 73.48 years, an increase of 3.03 years over the 2000 indicator. For 2020, the projected life expectancy is 76.1 years³. This increase in life expectancy brings with it a need for studies pertaining to aging and its impact on the individual and on society.

Aging is a process that results in a progressive decline in multiple control mechanisms necessary for daily life⁴. Various organs are affected, and these changes can be prevented or minimized through physical activity, diets, and lifestyle. This reflects differences between the chronological and biological ages of an individual, and two individuals may have distinct anatomical and physiological characteristics, despite having similar chronological ages⁵. Thus, the functional capacity must be observed when dealing with the health of the elderly because, despite the prevalence of diseases, many elderly have perfectly normal routines through control of their illnesses, reflecting in individual processes of senescence.⁶

The voice also undergoes changes in senescence – presbyphonia - occurring in parallel with the changes in other body functions. The period of maximum vocal efficiency is classified as the period between 25 and 45 years of age, and after

this age, there is a series of structural changes in the larynx, with greater or lesser vocal impact. The onset of presbyphonia, its development, and the degree of vocal deterioration depend on each individual, their physical and psychological health, as well as constitutional, racial, hereditary, social, and environmental factors. It should be noted that presbyphonia is part of the natural process of aging, not being considered a vocal disorder, although there is a fine line between what is considered a normal vocal process of aging and what is considered an established vocal disorder.

The main changes in the larynx resulting from the normal process of aging are:

- Calcification and ossification of the laryngeal cartilages, significantly reducing their mobility;
- Atrophy of the intrinsic muscle, with lower efficiency of the structures of this system, including reduction in the excursion of the arytenoid cartilages and in the thickness of the vocal fold;

The vocal changes become more evident after 60 years of age, but studies have not been able to describe exclusive vocal markers of senescence⁷.

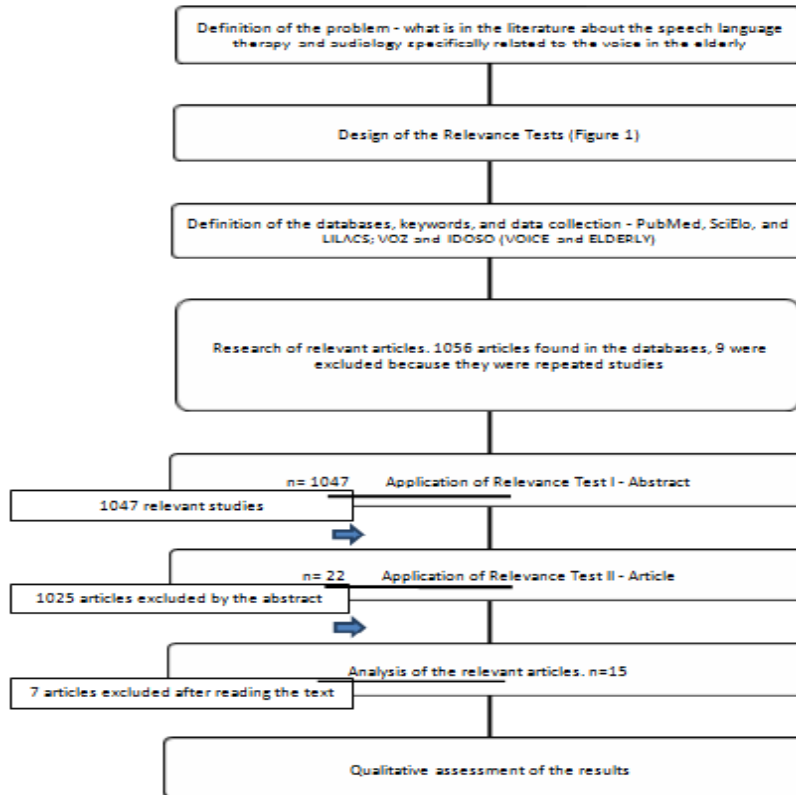
With aging, physiologic changes occur, which may require the intervention of a speech language pathologist to best ensure quality of life: changes in the voice arising from presbyphonia; hearing difficulties due to presbycusis; changes in oral, written, or expressive communication; swallowing disorders. Thus, the speech language therapy work with the elderly has an emphasis on the promotion of health, with a focus on healthy/active aging, prevention of diseases, and rehabilitation when the elderly person requires it.

The objective of this study is to conduct a survey of studies pertaining to speech language therapy intervention in relation specifically to the voice of the elderly person, through a systematic exploratory review of the literature.

Material and methods

As a research strategy, the systematic exploratory review⁸ was used, a method used to search for existing scientific evidence regarding a health research problem. The research problem question for this study is: what is there in the literature regarding speech language therapy relating specifically to the voice of the elderly?

Figure 1 – Outline flowchart of the systematic exploratory review



To respond to this question, articles were selected in the following databases: LILACS, Medline (Via PubMed) and SciELO. Consultation of the terminologies to be used in the survey of publications in the databases searched was done beforehand. Some descriptors were tested (voice, voice quality, voice training, voice disorders, quality of life, elderly, health of the elderly, aging, aging of the population), but the best cross-referencing was obtained with the keywords ‘voice’ and ‘elderly’ and their correspondents in Portuguese and Spanish.

Articles were accepted in English, Portuguese, and Spanish. The publication period was delimited between 2005 and 2014, targeting the analysis of current articles.

The studies were evaluated following the criteria of inclusion and exclusion through Relevance Test I, which was applied only to the abstracts of the articles. The articles considered relevant continued on to Relevance Test II, applied to the article in its entirety. The relevance tests above were utilized because they are the most appropriate strategy for this study.

Figura 2 – Formulários de aplicação dos Testes de Relevância I e II

APPLICATION FORM FOR RELEVANCE TEST I		
Inclusion criteria:	YES	NO
- Does the study address speech language therapy for the elderly?		
Exclusion criteria:		
- Is it an editorial, letter, review, dissertation, or thesis?		
APPLICATION FORM FOR RELEVANCE TEST II		
Inclusion criteria:	YES	NO
- Does the study address speech language therapy treatment exclusively on the voice in the elderly?		
Exclusion criteria:		
- Does it investigate speech language therapy in language, hearing, swallowing, and orofacial motor function in the elderly?		

The studies included were those which approached the speech language therapy on the voice of the elderly, including data regarding the vocal aging and procedures for promotion, evaluation, and vocal rehabilitation of this target group.

Results

In the total of the electronic search, 1056

publications were obtained, including: Medline (n=877), SciELO (n=7) and LILACS (n=172). Of these, 9 repeated studies were identified, which were excluded. 1047 abstracts were submitted to Relevance Test I, of which 22 articles were eligible. After application of Relevance Test II, 15 articles met the inclusion criteria for the review.

Table 1 pertains to characterization of the studies, with predominance of Brazilian studies, but without an impact factor.

Table 1 – characteristics of the studies included, n=15.

Authors and year of publication	Journal and impact factor	Type of publication	Country	Language
Graças et al. (2012)	ArqNeuropsiquiat (0.827)	Cross-sectional case-control study	Brazil	Portuguese
Daivids et al (2012)	Laryngoscope (1.979)	Retrospective cohort study	USA	English
Siracusa et al (2011)	J SocBras Fonoaudiologia	Cross-sectional study	Brazil	Portuguese
Gampel et al (2010)	CienSaude Colet	Cross-sectional study	Brazil	Portuguese
Mau et al (2010)	Laryngoscope (2.096)	Retrospective cohort study	USA	English
Schneider et al (2011)	Gerontology	Cross-sectional study	Germany	English
Plank et al (2010)	JournalofVoice (1.108)	Cross-sectional study	Germany	English
Gama et al (2009)	Pró-fono Rev. De Atualização Científica	Cross-sectional study	Brazil	Portuguese
Gorman et al (2008)	Laryngoscope (1.877)	Cross-sectional study	USA	English
Berg et al (2006)	JournalofVoice (0.754)	Retrospective case-control study	USA	English
Costa and Matias (2005)	Rev. BrasOtorrinolaringol	Cross-sectional prospective cohort study	Brazil	Portuguese
Mifune et al (2007)	Rev. CEFAC	Cross-sectional study	Brazil	Portuguese
Santos et al (2014)	AudiolCommun Res.	Cross-sectional prospective randomized clinical trial	Brazil	Portuguese
Menezes and Vicente (2007)	Rev. CEFAC	Cross-sectional study	Brazil	Portuguese
Soares et al. (2007)	Rev. CEFAC	Cross-sectional study	Brazil	Portuguese

Table 2 depicts aspects related to the sample of the studies selected for this review. Among the studies, the age of the patients varied from 53 to 103 years, with a total sample of 1522 participants, of which 4 of the publications (26.6%) failed to characterize the gender of the participants. Of the other studies, a sample composed of 576

participants (37.8%) was identified, this total including 449 (77.9%) of the female sex and 127 (22.1%) of the male sex.

Table 2 – characterization of the samples of the articles analyzed, n=15

Study	Age of the sample	Size of the sample
Graça et al. (2012)	62-74 years	46 (46F)
Davids et al (2012)	65-99 years	775 (NE)
Siracusa et al (2011)	65+ years	33 (14M, 19F)
Gampel et al (2010)	65-83 years	47 (19M, 28F)
Mau et al (2010)	56-91 years	67 (33M, 34F)
Schneider et al (2011)	66-94 years	107 (31M, 76F)
Plank et al (2010)	65+ years	107 (NE)
Gama et al (2009)	60-103 years	103 (103F)
Gorman et al (2008)	60-78 years	19 (NE)
Berg et al (2006)	60+ years	25 (12M, 13F)
Costa and Matias (2005)	60-87 years	50 (50F)
Mifune et al (2007)	60-77 years	8 (4M, 4F)
Santos et al (2014)	62-93 years	42 (12M, 30F)
Menezes and Vicente (2007)	57-93 years	48 (2M, 46F)
Soares et al (2007)	53-99 years	45 (NE)

Table 2 Key:

M – male;

F – female;

NE – not specified

Table 3 shows the mode of speech language therapy intervention employed in these studies. The eligible studies for this review were concentrated on the evaluative/therapeutic approach, with only 2 studies (13.3%) with some activity directed at

the promotion of vocal health in the elderly, 4 studies (26.6%) present proposals aimed at vocal rehabilitation, and 15 studies (100%) have an evaluative nature.

Table 3 – mode of speech language therapy present in the articles analyzed, N=15.

Study	Promotion	Type of Promotion	Assessment	Assessment Instrument	Rehabilitation	Technique Used
Graças et al (2012)			Technique Used	CAA / PHA	-	
Davids et al (2012)	-		+	VRQOL	-	
Siracusa et al (2011)	-		+	CAA / PHA	+	Vocalized breath with semi-occluded vocal tract
Gampel et al (2010)	-		+	VRQOL	-	
Mau et al (2010)	-		+	FCM	+	Exercises for resonance and air flow
Schneider et al (2011)	-		+	VRQOL / DSI	-	
Plank et al (2010)	-		+	VRQOL / SF-36	-	
Gama et al (2009)	-		+	VRQOL / PHA	-	
Gorman et al (2008)	-		+	MPT	+	Vocal functional exercises
Berg et al (2006)	-		+	VRQOL	-	
Costa and Matias (2005)	-		+	SF-36 / VHI	-	
Mifune et al (2007)	-		+	PHA	-	
Santos et al (2014)	+	Given guidance on vocal hygiene	+	PHA / VC	+	Finnish resonance tubes
Menezes and Vicente (2007)	-		+	PHA	-	
Soares et al (2007)	+	Given guidance on vocal hygiene	+	*	-	

Table 3 Key:

CAA – Computerized acoustic analysis;

PHA – Perceptive/hearing analysis;

VRQOL – Voice-Related Quality of Life;

FCM – Functional Communication Measures for Voice;

DSI – Dysphonia Severity Index;

SF-36 – Medical Outcomes Study 36 – Item Short-Form Health Survey;

MPT – Maximum Phonation Times;

VHI – Vocal Handicap Index;

VC – Vital Capacity;

* -Own Questionnaire.

In the studies which addressed the promotion of vocal health, there was the participation only of control groups, in which the participants were part of workshops on vocal health and health voice habits, not being the focus of these publications. Both studies highlight the benefits of vocal health promotion activities aimed at reduction of symptoms of vocal deterioration, coupled with speech language therapy interventions in cases where a vocal pathology has taken hold.^{21,23}

The focus on the vocal assessment of the elderly, present in all the studies conducted was due to the characterization of the sample and the aging of the voice of the participants. There were three types of assessment: proper analysis of the voice through computerized acoustic analysis, perceptive/hearing analysis, Functional Communication Measures (FCM), and Dysphonia Severity Index (DSI); assessment of the impact of the voice on the life of the participants in tests such as that for Voice-Related Quality of Life (VRQOL), that for Vocal Handicap Index (VHI), and Medical Outcomes Study 36 – Item Short-Form Health Survey (SF-36); and complementary evaluations, such as maximum phonation times and vital capacity. The most frequent evaluation instruments in the studies carried out were the VRQOL protocol, used in 6 studies (40%), followed by the perceptive/hearing analysis, described in 5 studies (33.3%).

Vocal rehabilitation in the elderly occurred in four studies. One of these studies (25%) verified the immediate effect of semi-occluded vocal tract exercises on the vocal quality of the elderly¹¹, while other three (75%) analyzed the consequences of the speech language therapy intervention in an interval of greater time (from 6 to 12 weeks), employing techniques that promote improvement of the air flow and vocal resonance^{13,17,21}. The four studies presented data that demonstrates the effectiveness of the speech language therapy intervention in relation to the vocal changes in the elderly, but they point out that there is little data that relates the effects of aging and the benefits of the vocal therapy.

Discussion

All the studies which composed this systematic exploratory review sought to characterize the speech language therapy exclusively in the voice of elderly people. Many of the studies excluded

from the analysis described medical interventions, comparative analysis between different age groups, or questioning related to other areas of Speech Language Pathology and Audiology.

Presbyphonia, since it is not a pathological process, is not commonly investigated purely, because the population affected seeks treatment only when other vocal problems are established. Thus, vocal therapy is the main form of rehabilitation for presbyphonia, but there is little data in relation to its indication due to factors such as the effect of age, degree of atrophy of the laryngeal structures, and other co-morbidities.¹³

The vocal assessment, focus of all the studies presented, is important for analyzing the vocal aging process and accumulating data regarding presbyphonia. To this end, it is necessary to conduct an investigation using longitudinal studies with robust samples of the elderly population, both with individuals who have vocal complaints and those without changes in their voices.

Many of the assessments employed in the studies measured the impact of the voice on the quality of life of the elderly person or analyzed the vocal quality of the sample without vocal intervention, emphasizing the importance of works that describe the effects of vocal rehabilitation and the effectiveness of the speech language therapy intervention in this target group.

With regard to the vocal rehabilitation in cases of presbyphonia, the treatment indicated involves the reduction of the supraglottic hyperfunctional compensation and the development of better respiratory support for speaking. Studies indicate that vocalized breath exercises with a semi-occluded vocal tract in elderly people with vocal complaints are effective for improving the quality of the voice, to favor glottic coaptation and balance between aerodynamic forces and myoelastic of the larynx. These exercises have an immediate beneficial effect and their use over time favors maintenance of the results.^{11,13,17,21}

With regard to the reference point for old age, three of the publications (20%) considered the starting point to be 55 years of age^{13,22,23}, seven studies (46.6%) identifies 60 years as the starting point of advanced age^{9,16-21}, and 5 (33.3%) identified 65 years^{10-12,14,15}, highlighting the lack of consensus with regard to the start of senescence.

In terms of relevance, we highlight the study done by Santos²¹ as the only Randomized and Controlled Clinical Study, because it is the mode of scientific study that proves the effectiveness of an intervention. This study showed that there is vocal improvement after the use of the Finnish technique of resonance tubes in a group of elderly people who have signs and symptoms of aging of the voice.

Only 6 of the articles (40%) were published in periodicals with any impact factor, pointing to the low visibility of the subject addressed in this review of the scientific literature.

Conclusions

It is concluded that in the literature, there is a predominance of studies that approach the Speech Language Pathology and Audiology assessment of the voice in the elderly, reinforcing the need for studies linking assessment and vocal rehabilitation in elderly and presbyphonia.

Only two studies presented data regarding the promotion of vocal health, in which the participants demonstrated vocal benefits after receiving guidance about vocal health.

In the studies found, the use of semi-occluded vocal tract exercises in vocal rehabilitation in the elderly was shown to be effective for improving the vocal quality and softening the effects arising from aging of the voice, presenting immediate positive results which can be maintained if carried out over time.

It is notable that 9 of the studies (60%) are recorded in journals with a focus on Speech Language Pathology and Audiology, in which there is currently no impact factor, demonstrating weak visibility of the subject among the publications. There was also poor evidence quality in the studies found, thus highlighting the need for robust studies focusing on speech language therapy with the elderly in the area of the voice.

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