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Speech-Language Pathology production regarding voice in popular singing

Produção fonoaudiológica sobre voz no canto popular

ABSTRACT

Purpose: To present a literature review about the Brazilian scientific production in Speech-Language Pathology and Audiology regarding voice in popular singing in the last decade, as for number of publications, musical styles studied, focus of the researches, and instruments used for data collection. **Research strategy:** Cross-sectional descriptive study carried out in two stages: search in databases and publications encompassing the last decade of researches in this area in Brazil, and reading of the material obtained for posterior categorization. **Selection criteria:** The databases LILACS and SciELO, the Databasis of Dissertations and Theses organized by CAPES, the online version of Acta ORL, and the online version of OPUS were searched, using the following uniterms: voice, professional voice, singing voice, dysphonia, voice disorders, voice training, music, dysodia. Articles published between the years 2000 and 2010 were selected. **Data analysis:** The researches found were classified and categorized after reading their abstracts and, when necessary, the whole study. **Results:** Twenty researches within the proposed theme were selected, all of which were descriptive, involving several musical styles. Twelve studies focused on the evaluation of the popular singer's voice, and the most frequently used data collection instrument was the auditory-perceptual evaluation. The results of the publications found corroborate the objectives proposed by the authors and the different methodologies. **Conclusion:** The number of studies published is still restricted when compared to the diversity of musical genres and the uniqueness of popular singer.

RESUMO

Objetivo: Apresentar revisão bibliográfica sobre a produção científica brasileira da Fonoaudiologia na última década referente à voz no canto popular, quanto ao número de publicações, gêneros musicais estudados, enfoques atribuídos e instrumentos de coleta de dados utilizados. **Estratégia de pesquisa:** Estudo descritivo transversal realizado em duas etapas: levantamento em bases de dados e publicações, englobando a última década de pesquisas na área no Brasil, e leitura do material obtido para posterior categorização. **Critérios de seleção:** Foram utilizadas as bases de pesquisa LILACS e SciELO, o Banco de Dissertações e Teses da CAPES, a versão *online* da Acta ORL, e a versão *online* da OPUS. Foram empregados os seguintes unitermos: voz, voz profissional, voz cantada, disfonia, distúrbios da voz, treinamento da voz, música, disodia. Foram selecionados artigos publicados entre os anos 2000 e 2010. **Análise dos dados:** A classificação e a categorização das pesquisas foram realizadas a partir da leitura dos resumos e, quando necessário, do texto na íntegra. **Resultados:** Foram selecionadas 20 pesquisas com a temática proposta, todas do tipo descritivo, envolvendo diversos gêneros musicais. Doze estudos apresentavam enfoque na avaliação da voz do cantor popular e o instrumento de coleta de dados utilizado com maior frequência foi a avaliação perceptivo-auditiva. Os achados das publicações pesquisadas estão de acordo com os objetivos propostos pelos autores e as diferentes metodologias. **Conclusão:** O número de estudos publicados ainda é restrito quando comparado à diversidade de gêneros musicais e à singularidade do cantor popular.

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INTRODUCTION

Popular music in Brazil is one of the most diversified and spread forms of artistic expression. Every year new singers and/or bands launch their careers. This increasing population has particular characteristics which define their musical and social identity. One of these characteristics is the informal beginning of the career, with no guidance or studies, different from what is seen in singers of classical music⁽¹⁾. In a recently conducted research, that professional group was found to have an early interest in the activity, generally related to a musical familiar environment⁽²⁾. In addition, technical vocal preparation is not considered relevant for popular singers, and their general and vocal health habits are as well as preventive care are insufficient⁽²⁾.

The concept of “evidence-based practice”, which has been widely discussed, is fundamental to show the relevance of conducting systematic researchers in this area, once it enriches the integration of knowledge produced by these researches and the clinical practice. It has the purpose of subsidizing the decision-making process, ensuring the quality of services and help in the training of speech-language pathologists. Speech-Language Pathology is has not have enough knowledge base so that professionals chose the best practice only based on the literature⁽³⁾.

Although it is a traditional object of studies in Speech-Language Pathology, the category of singing voice was, for many years, researched prioritizing issues regarding the voice in classical singing, as well as music and singing schools which are historically dedicated to classical music. In spite of the popular singing being a recognized professional activity in Brazil⁽⁴⁾ and the increasing demand for these singers who seek vocal improvement or management for already established changes, the investment in controlled research with popular singers remains scarce.

A survey on scientific productin in Speech-Language Pathology regarding singing voice showed 117 publications from 2005 to 2007. The most researched population was that of choir singers and there were 27 studies with popular singers. Most studies was presented in conference proceedings, found only in seven studies⁽⁵⁾ published in Speech-Language Pathology journals at that time.

Due to historical elements on the appearance of popular music in Brazil and its particular sound characteristics, which lead to the consolidation of a social image of the singer profession in the Brazilian culture, it is important to highlight only the scientific production in our country. Thus, with the purpose of distinguishing and enriching the increasing number of popular singers in Brazil, in their diversity and singularity, we suggest verifying a scientific investment targeting them, and thus ensuring the social relevance of the current research.

The scientific importance of the research lies in surveying studies carried out and published, both as scientific papers in journals and as theses and dissertations. The availability of researches in a controlled format, i.e., peer reviewed or accepted by a examiners (such as papers published in journals and also theses and dissertations, respectively) is fundamental to allow

access to new information and the technical-scientific advance of Speech-Language Pathology. In addition, analyzing the scientific production regarding voice in popular singing and its points of interest allows a deeper reflection on new themes which may improve the knowledge in this area.

OBJECTIVES

The objective of the present study was to analyze the Brazilian scientific production in Speech-Language Pathology in the last decade regarding voice in popular singing, as for the number of publications, musical genres studied, focuses attributed and tools used to collect data.

RESEARCH STRATEGY

This is a documental descriptive study, which analyzed Brazilian publications in journals and database of theses/dissertations on voice of popular singers conducted by speech-language pathologists, from 2000 to 2010. The study was carried out in two phases: first the survey of publications, and then, studies were categorized as for the musical genre, the tupe of research and the focus attributed and the tools used to collect data.

SELECTION CRITERIA

The survey on studies published from 2000 to 2010 was carried out by accessing the LILACS and SciELO databases, the *Banco de Dissertações e Teses* (a database on dissertations and theses) organized by *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES), the online version of the *Acta ORL Técnicas em Otorrinolaringologia* journal (Techniques in Otolaryngology), and the online version of *OPUS* (journal of *Associação Nacional de Pesquisa e Pós-graduação em Música – ANPPOM*). Although the last two journals were not indexed, they were included in the search as the onine version of *Acta ORL* publishes studies from health professionals, gathering publications of interest in the area surveyed, and the online version of *OPUS* publishes studies from post-graduation programs in music, regarding the theme of this research, in addition to accepting studies from speech-language pathologists who are researchers.

Descriptors used, isolatedly or combined in pairs (all possible associations) were: voice, professional voice, singing voice, dysphonia, voice disorders, voice training, music and dysodia. Selection was based on titles of articles and then their respective abstracts. Only publications which included a speech language therapist among the authors were considered.

The second phase of the research – reading and classifying the material – was carried out based on the material surveyed.

DATA ANALYSIS

Initially, titles were organized in a single database. Publications which were repeated in LILACS and SciELO, as well as studies whose objectives were not compatible with the theme of our review were excluded.

Afterwards, studies were analyzed qualitatively and categorized based on the reading of the published material. Most studies were read thoroughly. This procedure is not always possible regarding theses and dissertations, since some of them do not have the complete text in the Internet. In these cases, only information available in the abstracts is considered. Categorization was performed using the technique of content analysis⁽⁶⁾. This technique aims to objectively and systematically describe the content of the material surveyed. The procedure involves organizing the research material with a general reading of the articles, breaking up the text in units of register and organizing information into categories, which may be previously or posteriorly designed.

As for the types of researches, the categorization was performed considering what was previously designed: exploratory (first approaching the theme searching for a familiarity with the fact or the phenomenon), descriptive (survey of characteristics of the well-known fact/phenomenon) and explanatory (identifying factors which determine the occurrence or how facts/phenomena occur)⁽⁷⁾. The material was read and categorized by two researchers and posteriorly compared in order to define agreement.

Focus of the researches was also categorized from the content analysis, however, categories were theme groups emerging from the texts along the analysis of the material.

RESULTS

First, 18 publications were located based on LILACS, 12 publications based on SciELO, four articles from Acta ORL journal, seven dissertations and three theses from CAPES thesis database, totalizing 44 publications. No publications were identified from OPUS journal. It is important to highlight that Acta ORL journal provides only publications carried out from 2003.

After the initial survey, ten articles were excluded as they were repeated in LILACS, SciELO databases and in the CAPES thesis database. Afterwards, other seven articles⁽⁸⁻¹⁴⁾ and two theses^(15,16) were excluded as they were not conducted with popular singers, but with choir singers and/or choir conductors. One article was excluded as it deals with a case study with the purpose of reflecting on the mother-baby relationship, by means of body therapy associated to the singing voice production, whose participant had experience with classical music⁽¹⁷⁾. Three articles and one dissertation were located and excluded because they were conducted with singers of gospel music⁽¹⁸⁻²¹⁾. Thus, there were 20 publications on popular singing (Chart 1).

Some of the articles included in the present study were conducted with singers of particular musical genres, such as: rock⁽²²⁾, dance music⁽²³⁾, Brazilian country⁽²⁴⁾, samba^(25, 26), bossa nova⁽²⁶⁾, pagode⁽²⁷⁾, Japanese popular music⁽²⁸⁾, regional music^(29,30), singer of the night⁽³¹⁾. A research was conducted with recordings of ballads⁽³²⁾. Three articles were conducted with teachers of popular singing or speech language therapists, without diverting from the theme of popular singing⁽³³⁻³⁵⁾. In a research regarding juvenile singers, although authors make considerations on choir singing, it is not evident the style of music they refer to, whether popular or classical⁽³⁶⁾. Thus, it

was considered as a general study, and therefore, appropriate for popular singing. The other researches were not restricted to a single musical genre, referring only to popular singers⁽³⁷⁻⁴¹⁾.

All researches analyzed were descriptive. Some studies had an exploratory design. Therefore, no research was explanatory, which makes the scientific production of speech language therapy on the theme "popular singer". The most relevant scientific information come from explanatory researches as they advance the knowledge beyond the first impressions and make the researchers assume more responsibility⁽⁶⁾.

Different focuses have been observed in researches and in the content analysis allowed the identification of the following categories:

1. Vocal techniques: involved three studies with a theoretical perspective. One aimed to define respiratory support by singing teachers and speech language therapists, as well as their work strategies and the benefits of their application⁽³⁴⁾. Another article, on literature review, reflected the respect for differences and benefits of muscle stretching, relaxing and warm-up⁽³⁷⁾. Other article aimed to verify metaphorical expressions ("images") used as teaching tools to work on vocal resonance by singing teachers (including popular singing), the possible physiological correspondence and reasons to use each metaphor⁽³⁵⁾.
2. Voice assessment: corresponded to the most expressive category. Out of 20 researches, 12 focused on assessing the singer's voice, whether on researching aspects of voice quality, of vocal techniques or of laryngeal or vocal adjustments^(22-26,28-32,39-40). As examples, we may mention a research which investigated laryngeal adjustments of ball singers while imitating the classical style⁽²³⁾ and a study carried out in order to characterize the vibrato in classical and Brazilian country genders⁽²⁴⁾.
3. Assessment of the singer: comprises two researches which focused on the Singer, besides the voice, that is, also investigated aspects of the singer's history and his/her career. One was carried out with rock singers⁽²²⁾ and the other one was conducted with a group of singers of the night⁽³¹⁾. It is highlighted that both were included in category 2.
4. Vocal well-being: three researches had the purpose of investigating aspects of popular singers' vocal well-being. One research compared habits of vocal well-being among classical and popular singers⁽⁴¹⁾, another described vocal well-being of pagode singers⁽²⁷⁾ and the third one investigated the vocal well-being of Cururu singers⁽²⁹⁾.
5. Speech-Language Pathology: two researches focused on Speech-Language Pathology investigating criteria and procedures directed towards popular singers. One research investigated information on recently-graduated speech-language pathologists regarding the relation they had with assisting popular singers⁽³³⁾, another aimed to discuss proposals of vocal assessment in juvenile singers⁽³⁶⁾.
6. Dysphonia: only one research, of literature review, had the purpose of investigating the most common vocal changes in the population of popular singers⁽³⁸⁾.

In view of a larger number of researches focusing on the vocal analysis of the singer, it is noteworthy the importance

Chart 1. Publications on popular singing carried out from 2000 to 2010

Author(s)	Publication (source/year)	Objectives	Main findings*
Gonçalves A, Amin E, Behlau M ⁽²²⁾	Revista Pró-Fono, 2010.	Analyzing the voice of rock singers as for the global degree of vocal deviation and as for the tension degree, comparing those parameters in three pieces of music.	50% of sample refer to a vocal complaint; 53.8% cared for their voice; 69.2% reported singing more than one sub-style of rock; 57.7% reported a perceived a deterioration of the voice after shows and rehearsals. Rock style is related to an extensive use of tension of the voice. This does not necessarily impose a negative impression to the voice.
Zampieri SA, Behlau M, Brasil OOC ⁽²³⁾	Rev Bras Otorrinolaringol, 2002.	Verifying laryngeal adjustments conducted by professional popular singers while imitating a classical style singing.	While imitating a classical style singing, there is a vocal quality change, an increased vibrato and an increased vocal volume, a better vocal resonance and articulatory precision. There is an absence of the singer's formant in all cases. Laryngeal adjustments comprised an increased median and anterior-posterior constriction.
Bezerra AA ⁽²⁴⁾	CAPES Thesis database [dissertation], 2006	Characterizing vibrato in classical and Brazilian country genders; comparing them from the point of view of vibrato acquisition, perceptive-auditive and acoustic analysis.	In the classical gender, values of vibrato rate varied from 4.55 to 6.25 Hz and the vibrato range varied from 0.54 to 1.66 semitones, whereas the Brazilian country gender has values of vibrato rate varied from 5.0 to 6.56 Hz and of vibrato range varied from 0.54 to 0.95 semitones. In the spectrogram there was a regularity regarding oscillation frequency in the classical gender whereas there was no regularity in the Brazilian country gender.
Andrada e Silva MA ⁽²⁵⁾	CAPES thesis database [thesis], 2001	Categorizing "singing voice" according to several genders of samba in Brazilian popular music, based on foundations of the theory of communication, of semiotics and speech language therapy.	The most common vocal characteristics were: low and medium to low pitch, smooth vocal attack, with no projection, chest record, appropriate loudness restricted tessitura, opaque, accurate articulation, balanced resonance or laryngeal-pharyngeal with a discreet nasal focus and absence of a significant vocal quality. Samba, samba de breque, carnival samba and samba exaltação have the most common vocal parameters within each particular gender. But samba- canção and samba choro have a lot of variation within their own gender.
Alves KLN ⁽²⁶⁾	CAPES thesis database [dissertation], 2006	Describing differences of configurations in vocal tract in particular situations of habitual phonation and of Brazilian popular singing (considering bossa nova and samba).	The way the vocal tract behaved, when compared to speech was: larynx had an increased stability; pharynx maintained its uniformity; veil had a slower and smoother movement; and the jaw moved more vertically. In the computerized acoustic analysis, a greater intensity and a better definition of harmonics. In a perceptive-auditive evaluation, a better use of resonance as well as a better projection and a larger timbre richness were perceived.
Rosa PP, Goulart BNG, Costa EF, Capp E ⁽²⁷⁾	Revista Pró-fono, 2000	Analysis of the vocal health of professional pagode singers in the municipality of Porto Alegre.	48% of individuals have sung for 1 to 2 years; 31% have sung for 4 to 8 years; 21% have sung for over 10 years. 47% of individuals sing from 9 to 15 hours a week; 5% present an allergic condition. None of the interviewees were submitted to previous vocal guidance or phonotherapy.
Nishimura CM, Camargo Z, Cordeiro GF, Pinho SMR ⁽²⁸⁾	Rev CEFAC, 2006	Comparing vocal characteristics of the Japanese enka and mute enka singing genders from a perceptive-auditive point of view.	In the enka style, kobushi, vibrato and crescendos and decrescendos were present in 100% of vocal samples; encontrou-se 80% of metal, 90% of nasality and register change and 70% of breathiness. In the mute enka style, crescendos and decrescendos were present in 100% of vocal samples; 70% of breathiness, 90% of vibrato, 50% of register change, 40% of metal and 20% of nasality and kobushi were found.
Penteado RZ, Rosa CB, Barbosa LAP ⁽²⁹⁾	Distúrb Comun, 2008	Characterizing the vocal profile and the vocal health conditions of Cururu singers from Piracicaba (SP).	Individuals with a low level of education, with no formation in musical singing, use their voice in day-by-day and work contexts with no professional use. Most of them presented a positive vocal image and did not refer to vocal complaints/symptoms. Care with vocal health was not enough, mixing aspects of the popular and the scientific knowledge. Changed parameters of breathing and articulation. It is required to improve the facial and body posture and expressivity.
Da Silva EGF, De Luna CLC ⁽³⁰⁾	Rev CEFAC, 2009	Evaluating the voice of singers of the night of the of the cheesy music in Recife with a perceptive-auditive way.	Reduced time of phonation was observed. When comparing spoken and singing voice, we notice modifications in pitch, loudness and resonance, maintaining an abrupt vocal attack. A mixed modal register in the habitual voice and head modal in professional voice. A clear vocal quality predominated on the spoken voice and appropriate patterns of modulation, projection and articulation of the singing voice.

Chart 1. Publications on popular singing carried out from 2000 to 2010 (continuation)

Author(s)	Publication (source/year)	Objectives	Main findings*
Andrada e Silva MA, Ferreira LP, Costa HO ⁽³¹⁾	Acta ORL/Técnicas em Otorrinolaringologia, 2008	Characterizing a group of 30 singers of the night complaining on singing voice, evaluated at the otorinolaryngology ambulatory of Santa Casa de Misericórdia in São Paulo.	Individuals: 18 men and 12 women with an average age of 56 years. Most of them had more than 5 years in their profession. Twelve singers had some kind of singing class. Three singers did phonotherapy. MPB (Brazilian popular music) style was sung by 26 singers. All singers sang at least three times a week, generally in bars and night clubs (57%), with amplification in 77% of cases, standing (83%) and with a band with three or more instruments (94%). Difficulty in reaching high tones was complained by 25 singers.
Oliveira SC ⁽³²⁾	CAPES thesis database [dissertation], 2007	Analyzing the voice of the singer Roberto Carlos by means of a perceptive-auditive evaluation, as well as an acoustic analysis and also the opinion of the public.	The most referred parameters in four decades regarding perceptive-auditive analysis of voice were: appropriate pneumophonoarticulatory coordination, median to high pitch, appropriate loudness, accurate articulation, smooth vocal attack, laryngeal-pharyngeal resonance with a compensatory nasal focus, modal chest register, voice with brightness and projection, predominantly absent vibrato, median tessitura and adjusted vocal quality. The quality of recording was reported as reasonable and characteristics related to recording varied. Acoustic analysis indicated hormones with a larger variation for the song Emoções. G1 poll proved statistically that 70.38% of individuals like the singer. Regarding higher education levels and income, individuals classified the singer's voice negatively. G2 poll has shown there was no statistical significance for these variables, however, it was significantly verified that this group presented levels of education and income higher than those of G1.
Castilho LC ⁽³³⁾	Banco de Teses da CAPES [dissertação], 2001	Investigating information that recently graduated speech language therapists from four universities in the south of Brazil about assisting popular singers and reviewing the literature as for differences of the spoken and singing voice, the popular singing and the differences regarding other musical styles, vocal changes in popular singers, singing teachers' and speech language therapists' work with popular singing.	The theme was addressed in most of the population, while the form they acquired the information was very varied. Regarding the work, there was more information as for more general aspects of assistance. In the literature, the speech language therapists' work with popular singers does not occur by means of pre-established methods, but by building knowledge, encompassing their characteristics and needs, in order to provide assistance corresponding to their demand.
Gava Júnior W, Ferreira LP, Andrada e Silva MA ⁽³⁴⁾	Rev CEFAC, 2010	Analyzing the definition of respiratory support, such as work strategies and benefits of their application, according to the perspective of singing teachers and speech language therapists.	Definition of support was related to the participation of the diaphragm and intercostal muscles; the most appropriate type of support is intercostal and diaphragmatic; the most mentioned work strategies to adapt the support were body proprioception, awareness of the muscles involved, air flow balance, tension relief and posture correction. The greatest benefit of the respiratory support is the relief of laryngeal tensions and the improvement of pneumophonoarticulatory coordination. There was little concordance on the beneficial action of the support, mainly as for improving the singing emission.
De Sousa JM, Andrada e Silva MA, Ferreira LP ⁽³⁵⁾	Rev Soc Bras Fonoaudiol, 2010	Verifying whether singing teachers of different musical genders used metaphorical expressions ("images") as a teaching tool to work on vocal resonance, whether there is a physiological correspondence aimed to each metaphor employed and the reasons for using that.	90% of the teachers interviewed used images in their work with resonance for teaching technical and musical reasons; 88.8% of them said they use them and that they had associated physiological purposes did not describe or objectively distinguish them from musical and proprioceptive purposes.
Souza DP, Silva AP, Jarrus ME, Pinho SMR ⁽³⁶⁾	Rev CEFAC, 2006	Discussing and substantiating aspects regarding proposals of vocal evaluation in juvenile singers.	Aspects prioritized for phonoaudiological evaluation as for juvenile singers were: posture, structures involved, articulation, resonance, vocal height, type of voice and vocal attacks, perceptive-auditive evaluation in singing, rhythm and intensity.

Chart 1. Publications on popular singing carried out from 2000 to 2010 (continuation)

Author(s)	Publication (source/year)	Objectives	Main findings*
Mello EL, Andrada e Silva MA ⁽³⁷⁾	Rev CEFAC, 2008	Reflecting on the difference among stretching, relaxing and warm-up and their benefits to singers.	Warm-up and stretching exercises complement singers' preparation. Warm-up prevents lesions favors stretching and ensures a better vibration of vocal folds. Stretching helps maintaining chest posture and opening. Relaxing is disuaded in the singer's preparation because it may compromise motor control. Vocalizing is an excellent warm-up exercise and of stretching of vocal folds, however, it should be preceded by the body warm-up.
Mota LAA, Santos CMB, Barbosa KMF, Neto JRN ⁽³⁸⁾	Acta ORL/Técnicas em Otorrinolaringologia, 2010	Describing, based on the literature review, scientific findings as for vocal and laryngeal changes which affect singers.	Problems caused by the excessive use of voice in singers have varied symptoms, with a possible mild pain, hem, cervical tension, fatigue and hoarseness. Organic disorders that these symptoms trigger may involve mild hypotension of vocal folds, nodules, polyps, ulcers, thick vocal folds, monocordite, vascular dysgenesias and chronic laryngitis. In addition, a variability if the referred signs and symptoms was detected according the the singing style performed.
Hanayama EM ⁽³⁹⁾	CAPEs thesis database [dissertation], 2003	Studying the metallic voice, considering the physiological and acoustic point of view aiming to provide additional data to describe and understand it.	In the metallic voice, there was no significant change neither in the frequency nor in the range of F1; there was a significant increase in the range of F2, F3 and F4 and also in the frequency of F2; metallic voice was perceived as stronger when significantly correlated to the increased range of F3 and F4; consistent adjustments of the vocal tract were observed such as palate lowering, medialization of pharyngeal walls, laryngeal elevation, aryepiglottic and lateral constriction.
Cervi G ⁽⁴⁰⁾	CAPEs thesis database [dissertation], 2008	Studying the adjustments of the vocal tract and the diaphragm movement in the emission of a high sound with variations in the intensity and the mouth opening, as well as a perceptive-auditive analysis of these sounds.	A larger displacement of the cricoid cartilage was observed in a situation of a high /e/; smaller area of the pharynx with emissions with the same mouth opening and the same intensity, and a larger area in habitual emission; distance between the root of the tongue and posterior pharyngeal wall was very varied; larger range of anterior mouth opening occurred in the emission of the high /e/; increased diaphragm movement when compared with the habitual tone with the high sound. In the perceptive-auditive analysis of high tones, brightness and projection was more perceived in the emission of a high /e/; a better vocal quality was noticed in the emission of the high /e/ with the same moth opening.
Dassie-Leite AP, Duprat AC, Busch R ⁽⁴¹⁾	Rev CEFAC, 2011	Comparing vocal well-being habits between classical and popular singers.	Classical and popular singers have similar diet, smoking, alcoholism and drug use habits. Popular singers have fewer hours of sleeping/rest a day and most of them have another occupation with a Professional use of the spoken voice. Classical singers have a larger working hours with the singing voice and a larger use of resources considered as myths to improve the voice. Popular singers know less about the phonoaudiological work. Classical singers warm up their voice more often. Both groups do not warm up their voice systematically.

* The main findings refer to results obtained from abstracts written by authors from the studies. Because of the difficulties to understand the main findings in abstracts of a thesis⁽²⁵⁾ and of a paper⁽³¹⁾ those data were obtained from the complete text.

of new investigations in which considerations are made. Understanding the nature of the activity of popular music singers requires considering other aspects, such as the social-cultural context, the working environment, the importance attributed to the voice by singers, among others. No research was located, for example, involving evaluation *in loco*, which is extremely important to identify habits, postures, working conditions and aspects of the environment which directly interfere in the voice and in the life of popular singers.

Tools to collect data used in the researches were: perceptive-auditive evaluation, used in 12 studies^(22-26,28-32,39-40); questionnaires, used in seven researches^(22,23,27,32,33,35,41); acoustic analysis, used in five studies^(23,24,26,32,39); imaging evaluation, included videolaryngoscopy, nasofibrolaryngoscopy and videofluoroscopy,

used in five studies^(23,26,31,39-40); interviews in two studies^(29,34); and a literature review, used in four studies researched^(33,36-38).

However, the perceptive-auditive evaluation is the main tool for data collection used in researches on this theme. As it has a subjective character, and it does not have high costs, it is still the most accessible tool for speech-language pathologists. Acoustic analysis, an important complementary tool, was little used in researches involving popular singing. Four out of five studies which used the acoustic analysis corresponded to master's degree dissertations, conducted in higher education institutions with the required apparatus, with a prolonged duration (generally two years), revealing that access to this type of tool is still limited and little explored in other contexts.

CONCLUSION

The investigation on the scientific production in Speech-Language Pathology in Brazil regarding the voice in popular singing reveals the diversity of the researches with an academic and particular interest. However, the number of studies developed on the theme is limited, when compared with the diversity of musical genders, and with the singularity of popular singing. It should also be considered that most studies published do not refer to a single style of popular music. Thus, particular characteristics of each style are not thoroughly explored.

Results from the studies researched are in accordance with the purposes proposed by authors and different methodologies. However, publications analyzed had a descriptive character and few intervention orientations. Focus on vocal evaluation was more frequent, limiting the global understanding of the phenomenon. The most common procedure used in the researches was perceptive-auditive evaluation, keeping in mind that this is also the most frequent evaluative form in clinical practice. However, the importance of complementary tools such as the acoustic analysis is highlighted to enrich data from researches.

New researches are suggested to be developed considering other aspects in addition to the singer's voice, such as general health habits, vocal well-being habits, working conditions and aspects of social identity. Advance in controlled researches is an essential aspect for Speech-Language Pathology credibility as an area of knowledge and to develop new evidence-based practices.

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