Speech and dental prosthesis: integrative review

Abstract

Speech is affected by the loss of teeth and the installation of dentures, it has been considered in the prosthetic oral rehabilitation process. There is scarcity of studies in the literature that address speech pathology or dental treatment outcome in the speech, though. The purpose of this study was to investigate how the speech in denture users is reported in the literature to contribute to the clinical practice by emphasizing the scientific evidence on the subject. The integrative review was elected as a searching methodology. The bibliographical survey was conducted on PubMed, LILACS, Scopus and Cochrane, from May to June, 2013, through the following combination of descriptors in Brazilian Portuguese and English: speech, phonetics and speech therapy with dental prosthesis, dentures and dental implants. In the total, 5,426 studies were found. Inclusion and exclusion criteria were applied regarding titles and abstracts, 13 articles were selected. In the speech approach, phonetic was used for the prosthesis molding, and the phoneme [s] was cited for the detection and adjustments of speech disorders and vertical dimension of occlusion. The palatal contour and rugaemolding was also highlighted to improve speech. The studies’ level of evidence was low, highlighting the scarcity of controlled and randomized clinical studies or experimental studies in this area. No article cited the adequacy of speech with phonetic training in speech therapy. Thus, we conclude that speech in individuals undergoing prosthetic oral rehabilitation is

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addressed in the literature through phonetic tests and modifications in the prosthesis performed by dentists.

**Keywords:** Aged; Speech; Dental Prosthesis; Rehabilitation.

**Resumo**

A fala pode ser afetada com a instalação de próteses dentárias, sendo que as características fonoarticulatorias resultantes da reabilitação oral têm sido consideradas para mensuração do sucesso do tratamento odontológico. Embora a fala seja citada no processo de adaptação das próteses dentárias, há escassez de estudos na literatura que abordam o resultado do tratamento fonoaudiológico ou odontológico na fala. Assim, o objetivo do estudo foi verificar como a fala em usuários de prótese dentária é abordada na literatura, de modo a contribuir com a prática clínica ao destacar evidência científica sobre o tema. A revisão integrativa foi eleita como metodologia de busca. O levantamento bibliográfico foi realizado nas bases de dados PubMed/MEDLINE, LILACS, Scopus, e Cochrane, no período de maio a junho de 2013, pela combinação dos seguintes descritores, nas línguas portuguesa e inglesa: fala, fonética e fonoterapia com prótese dentária, dentaduras e implantes dentários. No total, foram encontrados 5.426 estudos nas bases de dados. Critérios de inclusão e exclusão foram aplicados no título e nos resumos, sendo selecionados 13 artigos, os quais foram analisados criteriosamente. Na abordagem da fala, a fonética foi utilizada para moldagem da prótese, sendo o fone [s] citado para detecção e ajustes das alterações de fala e da dimensão vertical de oclusão. A moldagem dos contornos e das papilas palatinas também foi destacada para melhorar a fala. O nível de evidência dos estudos foi baixo, salientando a falta de estudos clínicos controlados e randomizados ou experimentais nesta área. Nenhum artigo citou a adequação da fala com treino fonético na terapia fonoaudiológica. Desta forma, pode-se concluir que a fala em indivíduos submetidos à reabilitação oral protésica é abordada na literatura por meio de testes fonéticos e modificações nas próteses, realizados por odontólogos.

**Palavras chave:** Idoso. Fala. Prótese dentária. Reabilitação.

**Resumen**

El habla puede verse afectada por la instalación de prótesis dental, y las características phonoarticulatorias resultantes de la rehabilitación oral ha sido considerado para medir el éxito del tratamiento dental. Aunque se menciona el habla en el proceso de adaptación, existen pocos estudios que destacan el resultado del tratamiento fonoaudiológico o odontológico en el habla. Por ello, el objetivo de este estudio fue verificar como el habla en usuarios de prótesis dental es abordada en la literatura, con el fin de contribuir a la práctica clínica, mediante la evidencia científica sobre el tema. El método de búsqueda seleccionado fue una revisión integradora.

La búsqueda bibliográfica se realizó en las bases de datos PubMed/MEDLINE, LILACS, Scopus y Cochrane para el período mayo-junio de 2013, por la combinación de los siguientes descriptores en portugués e inglés: habla, fonética, logoterapia con prótesis dental, dentaduras e implantes dentales. En total, se encontraron 5426 estudios en las bases de datos. Después de aplicar los criterios de inclusión y exclusión se seleccionaron 13 artículos que fueron analizados cuidadosamente. En enfoque del habla, la confeción de las próteses fue realizada mediante la fonética, utilizando el fonema [s] para la detección y ajustes de las alteraciones del habla y de la dimensión vertical de la oclusión. La moldura de los contornos e de las papilas palatinas también fue destacada para mejorar el habla. El nivel de evidencia de los estudios fue bajo, destacando la falta de estudios clínicos controlados aleatorios o experimentales en esta área. Ningún artículo citó el entrenamiento fonético para la adecuación del habla en la terapia fonoaudiológica. Por lo tanto, podemos concluir que el habla en pacientes sometidos a rehabilitación oral protésica es abordada en la literatura por medio de pruebas fonéticas y modificaciones en las prótesis, realizadas por odontólogos.

**Palabras clave:** Anciano. Habla. Prótesis dental. Rehabilitación.
Introduction

Aging, a biological and intrinsic process that begins at the age of 60, has been increasing among the world population and has been leading to modifications in the stomatognathic system and, consequently, in its related functions\(^1\), with a decrease of tone and strength of the orofacial muscles\(^2\).

Modifications deriving from age can be maximized by the loss of teeth\(^3\). The lack of dental elements can modify the speech production due to changes occurred in the morphology and muscles of the oral cavity\(^4\-^6\) since the teeth participate in the production of sounds by blocking the airway\(^6\).

One of the solutions to teeth loss is the prosthetic oral rehabilitation, with partial, total dentures or dental implants\(^7\). To people who need removable dentures, age advance can hinder the ability to effectively control the prosthesis during oral function\(^7\). Individuals who do not use dentures, or use poorly fitting dentures present losses in speech, and problems associated with this function can occur when the prosthesis is used by the first time or when it is replaced by a new one\(^6\).

The prosthesis that modifies the position of the teeth or the palatal contour can interfere or affect speech intelligibility and articulation\(^8\). The phonemes often affected are the linguodental and the alveolar\(^9\), lip and tongue projection are the most common\(^10\), besides the bilabial\(^8\).

A decrease in the mandibular movements can also occur as a compensatory mechanism to ensure the prosthesis stability\(^11\), in addition to the alteration in the articulatory pattern (locked or exaggerated articulation), reduction of lip movements and absence of saliva control\(^11\).

Quality of speech production has been considered as a success or failure criteria of oral rehabilitation\(^12\). In the prosthesis adjustment process, the phonetic aspect has been approached\(^8\), it has been proposed the repositioning and the recontouring of the teeth, the establishment of the occlusal vertical dimension (OVD), the freeway space and the closest speaking space, besides the prosthesis palate remodeling. Thus, modifications or adjustments in the prosthesis have been proposed depending on the type of alteration verified in speech\(^13\).

The difficulty the elderly have to adjust to using a denture has also been highlighted through the speech evaluation, in which it was verified that the speech was not adequate four months after the new denture had been installed\(^14\). Therefore, the myofunctional therapy can help in the adjustment process of dentures, enabling the performance of stomatognathic functions in a balanced and consistent manner with the prosthesis installed in the oral cavity\(^8\).

Although the function of speech is mentioned in the adjustment process of the dental prosthesis, no studies were found in the literature addressing the result of the speech pathology or dental intervention in the patient's speech production. Thus, the objective of this study is to verify how the speech in dental prosthesis users is reported in the literature in order to contribute to clinical practice by highlighting scientific evidence on the theme.

Methods

The integrative review was specified as a literature review methodology, following six development phases: identification of the theme and development of the hypothesis or guiding question, search in the literature, data collection, critical analysis of the studies included, discussion and interpretation of the results and presentation of the integrative review\(^15\-^16\).

As keywords, the combination of the following descriptors in Brazilian Portuguese and English were used: (1) speech (fala) and dental prosthesis (prótese dentária), (2) speech (fala) and dentures (dentaduras), (3) speech (fala) and dental implants (implantes dentários), (4) phonetics (fonética) and dental prosthesis (prótese dentária), (5) phonetics (fonética) and dentures (dentaduras), (6) phonetics (fonética) and dental implants (implantes dentários), (7) speech therapy (fonoterapia) and dental prosthesis (prótese dentária), (8) speech therapy (fonoterapia) and dentures (dentaduras), (9) speech therapy (fonoterapia) and dental implants (implantes dentários).

In the bibliographic survey, a search for scientific articles was carried out on the PubMed/MEDLINE, LILACS, Scopus, and Cochrane databases.

The search was carried out online from May to June, 2013 and the presentation of the data was made descriptively.

The inclusion criteria for the selection of the articles were: full articles available electronically
without time limit, published in Brazilian Portuguese or English, addressing the speech in rehabilitation with dental prosthesis and including the elderly in the casuistry. The exclusion criteria were: articles related to palatal prosthesis in cases of velopharyngeal dysfunction, an approach of satisfaction and quality of life of the users regarding the prosthesis and a casuistry consisting of neurogenic, oncologic population, with syndromes, deformities or malformations. Such criteria were initially applied in the title and, later, in the abstracts selected.

For data collection and critical analysis of the studies, which were made by only one researcher, a tool was used with information on identification, type of publication, methodological features of the study, including level of evidence, and evaluation of the methodological rigor regarding the clarity in the identification of the whole methodological stage of the study, as well as limitations.

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<th>Table 1 – studies found on the databases with the descriptors listed</th>
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<td>Descriptors</td>
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<td>Speech + Prosthesis</td>
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<td>Speech + Denture</td>
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<td>Speech + Dental implant</td>
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<td>Phonetics + Prosthesis</td>
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This review final sample was composed of 13 articles, according to the criteria established. The selection process can be verified in the Figure 1.
Os artigos selecionados foram lidos na íntegra, avaliados conforme instrumento de coleta de dados e submetidos a análise crítica, sendo que os dados coletados encontram-se apresentados na Figura 2.
In this review, most of the studies (papers number 3, 4, 5, 9, 10, 11 and 13) mentioned in the title the aspect of speech as a guide in the rehabilitation process. Speech was listed as a method of making the prosthesis, as well as the target of dental procedures. Among the authors studied, two of them (Palmer JM and Pound E) were responsible for the publication of more than one article. Most of the authors are dentists, there is only one speech-language pathologist (author of the studies 9 and 11). Recent studies were found, three of them had been published in the last five years. Most are older, though. They are more often from the seventies. Regarding the objectives presented, there was a prevalence of description, discussion or proposal of techniques or procedures for making and adjusting the prosthesis considering the speech. Only one study (number 6) aimed to compare techniques.

For speech investigation, different ways of prosthesis impression were addressed, not only teeth positioning but also palatal contour. The most frequent one was the use of phonetics (studies 2, 4, 5, 6, 8, 9, 10, 12 and 13), and the repetition of isolated sounds, words and sentences was requested. The phoneme /s/ was the most mentioned sound to detect and adjust speech alterations (studies 5, 6, 8 and 12), as well as to determine the vertical dimension of occlusion (studies 9, 10 and 13). Besides that, the molding of the palatal contour and the palatal rugae was listed for obtaining an improvement in speech (studies 1, 3, 7, 8 and 11). In the evaluation of speech intelligibility with the prosthesis, if distortions occur such as anterior lisp or whistle, adjustments of the prosthesis are carried out.

For some authors, the phonetic training and the adequate tongue positioning should...
be established as a procedure of the construction and installation of complete dentures21.

According to the authors’ remarks, the result of speech was the goal the molding techniques reached. Addition of technology and the use of palatogram were proposed in the rehabilitation process, as well as the insertion of sound production training to obtain a better retention and stability of the prosthesis. The mandibular movements and the phonetic positioning of the incisors during speech, besides serving as a functional result, represent a way to restore the occlusion. The use of palatogram has been considered as a communication facilitator between the dentist and the speech language pathologist during the evaluation of the patient25.

To some authors, the making of the palatal and rugae contour of the prosthesis can eliminate the need of speech training after the installation of the prosthesis in the oral cavity4. However, other authors, only the presence of rugae wouldn’t be enough to improve speech since patients can keep presenting difficulties in the speech production with prosthesis24. In this process, the performance of a specialized speech-language pathologist can help in the location and efficiency of the change of the nonanatomic papilla26.

The anatomical and physiological aspects of the sound production were described to help in the dental practice when analyzing the speech sounds, it is recommended to ask for the opinion of a speech-language pathologist whenever in doubt. Speech evaluation before the prosthesis installation was considered since distortions can be present before the placement of the prosthesis for a long period of time. This evaluation should be carried out with and without the new prosthesis. If necessary, changes regarding teeth positioning, correction of the vertical dimension of occlusion and an adequate tongue space should be considered firstly26.

Although the studies proposals of speech evaluation before and after the installation of prosthesis, the molding based on phonetics and adjustments through speech production, no article described speech adequacy with phonetic training in speech therapy.

The prevalent level of evidence of the studies analyzed was of 5, which refers to evidences deriving from experience or case reports. Such level is considered low and reflects the scarcity of controlled and randomized clinical studies or experimental studies in this area.

Conclusion
Speech in individuals subjected to prosthetic oral rehabilitation is addressed in the literature through phonetic tests and modifications in the prosthesis carried out by dentists, which evidences the need of clinical studies focused on the role of the speech-language pathologist in this population.

References