



ORIGINAL ARTICLE

Speech recognition in individuals with sensorineural hearing loss^{☆,☆☆}



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KEYWORDS

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Abstract

Introduction: Hearing loss can negatively influence the communication performance of individuals, who should be evaluated with suitable material and in situations of listening close to those found in everyday life.

Objective: To analyze and compare the performance of patients with mild-to-moderate sensorineural hearing loss in speech recognition tests carried out in silence and with noise, according to the variables ear (right and left) and type of stimulus presentation.

Methods: The study included 19 right-handed individuals with mild-to-moderate symmetrical bilateral sensorineural hearing loss, submitted to the speech recognition test with words in different modalities and speech test with white noise and pictures.

Results: There was no significant difference between right and left ears in any of the tests. The mean number of correct responses in the speech recognition test with pictures, live voice, and recorded monosyllables was 97.1%, 85.9%, and 76.1%, respectively, whereas after the introduction of noise, the performance decreased to 72.6% accuracy.

Conclusions: The best performances in the Speech Recognition Percentage Index were obtained using monosyllabic stimuli, represented by pictures presented in silence, with no significant differences between the right and left ears. After the introduction of competitive noise, there was a decrease in individuals' performance.

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PALAVRAS-CHAVE

Audição;
 Testes de
 discriminação de
 fala;
 Testes auditivos;
 Percepção auditiva

Reconhecimento de fala em indivíduos com perda auditiva neurossensorial**Resumo**

Introdução: A perda auditiva pode influenciar negativamente o desempenho comunicativo e estes indivíduos devem ser avaliados com material adequado e em situações de escuta próximas às observadas no cotidiano.

Objetivo: Analisar e comparar o desempenho de indivíduos com perda auditiva neurossensorial de grau leve a moderado em testes de reconhecimento de fala apresentados no silêncio e no ruído segundo as variáveis orelha e tipos de apresentação do estímulo.

Método: Participaram do estudo 19 indivíduos destros com perda auditiva neurossensorial bilateral simétrica de grau leve a moderado, submetidos ao teste de reconhecimento de fala com palavras em diferentes modalidades e ao teste de fala com ruído branco com figuras.

Resultados: Não houve diferença significativa entre as orelhas direita e esquerda para nenhum dos testes realizados. A média de acertos no teste de reconhecimento de fala com figuras, viva voz e monossílabos gravados foi 97,1%; 85,9% e 76,1%, respectivamente, e 72,6% de acertos no teste com ruído.

Conclusões: O melhor desempenho no Índice Percentual de Reconhecimento de Fala foi obtido utilizando como estímulos monossílabos representados por figuras apresentados no silêncio, sem diferenças significantes entre as orelhas direita e esquerda. Com a introdução do ruído competitivo, houve decréscimo no desempenho dos indivíduos.

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Introduction

Hearing is one of the most important senses for humans, considering that the entire human culture is based on communication, with most of it consisting of sound patterns or forms that represent them.¹

When damage occurs to the peripheral auditory system, such as permanent sensorineural hearing loss, changes can occur in the patterns of excitatory responses of auditory neurons, as well as changes in the tonotopic maps of the central auditory nervous system (CANS).²

These structural alterations may hinder sound information processing, especially for complex information, such as speech sounds. To assess speech recognition, it is necessary to use higher-threshold measures that will allow the investigation of the communication performance in ideal listening situations and in unfavorable environments.

Speech recognition assessment in silence and with noise can be performed using stimuli presented live or through recordings. The analysis of these tests should be carried out with caution in patients with sensorineural hearing loss (SNHL), as the involvement of the inner ear sensory cells can affect the performance of individuals in speech recognition tasks, especially if the frequencies of 500 Hz, 1000 Hz, and 2000 Hz are impaired.³

Considering that the peripheral hearing loss and the type of stimulus used in the assessment can influence the communication performance of individuals in different everyday environments,⁴ whether in favorable or unfavorable listening situations, it is hypothesized that individuals with sensorineural hearing loss show better speech recognition when exposed to linguistic stimuli of great redundancy associated with other sensory modalities and worse performance in activities involving auditory closure skills.

Thus, this research aims to analyze and compare the performance of individuals with mild-to-moderate sensorineural hearing loss in speech recognition tests carried out in silence and with noise, according to the variables: ear (right and left) and types of stimulus presentation (live, recorded monosyllables, and pictures).

Methods

The study was registered at Plataforma Brasil, and analyzed and approved by the Research Ethics Committee, under No. 06654913.5.0000.5505.

A cross-sectional, observational, survey study was conducted; the sample was selected based on the analysis of medical records of patients treated at a service that provides hearing aid devices located in a teaching hospital, in the period between January 2009 and December 2012.

The study inclusion criteria consisted of the following: age between 13 and 59 years (both genders); native speaker of Brazilian Portuguese; preference for the right hand; fluent reading, regardless of the level of education; mild-to-moderate sensorineural hearing loss (mean of the pure tone auditory thresholds at the frequencies of 500 Hz, 1000 Hz, and 2000 Hz up to 55 dB HL)⁵ acquired in the post-lingual period; difference between hearing thresholds of the right and left ear ≤ 10 dB in all the assessed sound frequencies; tympanometric curve type A; presence of I, III, V waves at 80 dB nHL in the brainstem auditory evoked potential with absolute latencies and inter-peak intervals within the normal range; absence of middle ear disorders; negative history of otological and/or neurological surgeries; absence of emotional and/or neurological disorders; no previous experience with hearing aid devices; absence of reading, speech, and

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