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ORIGINAL ARTICLE

Hearing handicap in patients with chronic kidney disease: a study of the different classifications of the degree of hearing loss☆

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KEYWORDS
Chronic kidney disease;
Hearing loss;
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Abstract
Introduction: The association between hearing loss and chronic kidney disease and hemodialysis has been well documented. However, the classification used for the degree of loss may underestimate the actual diagnosis due to specific characteristics related to the most affected auditory frequencies. Furthermore, correlations of hearing loss and hemodialysis time with hearing handicap remain unknown in this population.
Objective: To compare the results of Lloyd's and Kaplan's and The Bureau Internacional d'Audiophonologie classifications in chronic kidney disease patients, and to correlate the averages calculated by their formulas with hemodialysis time and the hearing handicap.
Methods: This is an analytical, observational and cross-sectional study with 80 patients on hemodialysis. Tympanometry, speech audiometry, pure tone audiometry and interview of patients with hearing loss through Hearing Handicap Inventory for Adults. Cases were classified according to the degree of loss. The correlations of tone averages with hemodialysis time and the total scores of Hearing Handicap Inventory for Adults and its domains were verified.
Results: 86 ears (53.75%) had hearing loss in at least one of the tonal averages in 48 patients who responded to Hearing Handicap Inventory for Adults. The Bureau Internacional d'Audiophonologie classification identified a greater number of cases ($n = 52$) with some degree of disability compared to Lloyd and Kaplan ($n = 16$). In the group with hemodialysis time of at least 2 years, there was weak but statistically significant correlation of The Bureau Internacional d'Audiophonologie classification average with hemodialysis time ($r = 0.363$). There were moderate correlations of average The Bureau Internacional d'Audiophonologie classification ($r = 0.510$) and tritone 2 ($r = 0.470$) with the total scores of Hearing Handicap Inventory for Adults and with its social domain.

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Conclusion: The Bureau Internacional d'Audiophonologie classification seems to be more appropriate than Lloyd's and Kaplan's for use in this population; its average showed correlations with hearing loss in patients with hemodialysis time $\geq$ 2 years and it exhibited moderate levels of correlation with the total score of Hearing Handicap Inventory for Adults and its social domain ($r = 0.557$ and $r = 0.512$).

PALAVRAS-CHAVE
Doença renal crônica;
Perda auditiva;
Audiometria

O Handicap auditivo em pacientes com doença renal crônica: um estudo das diferentes classificações do grau da perda auditiva

Resumo
Introdução: A associação entre perda auditiva e doença renal crônica e hemodiálise tem sido bem documentada. Porém, a classificação utilizada para o grau da perda pode subestimar o real diagnóstico devido a características específicas em relação às frequências auditivas mais acometidas. Além disso, correlações da perda auditiva e do tempo de hemodiálise com o handicap auditivo permanecem desconhecidas nessa população.
Objetivo: Comparar os resultados das classificações de Lloyd e Kaplan e A Classificação do Bureau Internacional d'Audiophonologie em pacientes com doença renal crônica e correlacionar as médias calculadas por suas fórmulas com o tempo de hemodiálise e com o handicap auditivo.
Método: Estudo analítico, observacional e transversal com 80 pacientes em hemodiálise. Todos os pacientes foram submetidos a timpanometria, logoaudiometria, audiometria tonal limiar, e os pacientes com perda auditiva foram entrevistados através do *Hearing Handicap Inventory for Adults*. A classificação dos casos foi feita de acordo com o grau da perda. Foram verificadas as correlações das médias tonais com o tempo de hemodiálise e com as pontuações totais do *Hearing Handicap Inventory for Adults* e seus domínios.
Resultados: 86 orelhas (53,75%) apresentaram perda auditiva em pelo menos uma das médias tonais em 48 pacientes que responderam ao *Hearing Handicap Inventory for Adults*. A Classificação do Bureau Internacional d'Audiophonologie identificou maior número de casos (n = 52) apresentando algum grau de deficiência do que a classificação de Lloyd e Kaplan (n = 16). No grupo com tempo de hemodiálise a partir de 2 anos, houve correlação fraca mas estatisticamente significante da média A Classificação do Bureau Internacional d'Audiophonologie com o tempo de hemodiálise (r = 0,363). Houve correlações moderadas das médias A Classificação do Bureau Internacional d'Audiophonologie (r = 0,510) e tritonal 2 (r = 0,470) com pontuações total do *Hearing Handicap Inventory for Adults* e com seu domínio social.
Conclusão: A Classificação do Bureau Internacional d'Audiophonologie mostra-se mais adequada que a de Lloyd e Kaplan nesta população, sua média apresentou correlações com perdas auditivas em pacientes com tempo de hemodiálise $\geq$ 2 anos e manteve níveis moderados de correlação com a pontuação total do *Hearing Handicap Inventory for Adults* e seu domínio social (r = 0,557 e r = 0,512).

Introduction

Currently, there are several classification scales of the degree of hearing loss and their formulas consider different hearing frequencies to calculate the tone average. There is not yet consensus on which scale better fits the pattern of hearing loss occurring in patients with chronic kidney disease (CKD) and hemodialysis (HD).

The best-known association between CKD and hearing loss is Alport Syndrome which has a genetic cause.[1] However, most hearing losses that occur in CKD are not genetic, and are due to anatomical, physiological, pathological and pharmacological similarities between the nephron and vascular stria of the cochlea.[2] The prevalence of hearing impairment is greater in CKD than in the general population,[3] even in children,[4–7] and is the most severe and sensorineural in type at high frequencies.[8–10]

The worldwide prevalence of CKD has increased in recent decades. In 2013, 2.5 million patients were on dialysis in the world, and this number is expected to reach 6.5 million in 2030.[11] In 2014, the estimated total number of dialysis patients in Brazil was 112,004, with 91.4% being on HD, and 8.6% on peritoneal dialysis.[12]

Hearing loss can affect quality of life and limits activity or restricts participation in daily activities; according to the World Health Organization (WHO), ''hearing handicap''