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ORIGINAL ARTICLE

Association of the C47T polymorphism in superoxide dismutase gene 2 with noise-induced hearing loss: a meta-analysis☆

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KEYWORDS
Superoxide dismutase gene 2;
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Abstract
Introduction: Currently, there is limited information about the relationship between manganese superoxide dismutase (sod2) c47t polymorphism and susceptibility to noise-induced hearing loss (NIHL).
Objective: The aim of this meta-analysis was to clarify the association between SOD2 C47T polymorphism and NIHL.
Methods: A search in PubMed and Web of Science was performed to collect data. All full-text, English-written studies containing sufficient and complete case-and-control data about the relationship between SOD2 C47T polymorphism and NIHL were included. Three eligible studies, comprising 1094 subjects, were identified. pooled odds ratios (ORs) and 95% confidence intervals (CI) were calculated to evaluate the strength of the association between SOD2 C47T polymorphism and NIHL.
Results: No significant association between C47T polymorphism and risk of NIHL was found with the following combinations: T *vs.* C (OR = 0.83; 95% CI = 0.63–1.09); TT *vs.* CC (OR = 0.49; 95% CI = 0.22–1.09); CT *vs.* CC (OR = 0.54; 95% CI = 0.25–1.17); TT *vs.* CC + CT (OR = 0.82; 95% CI = 0.50–1.32); CC *vs.* TT + TC (OR = 0.49; 95% CI = 0.23–1.04). However, in subgroup analysis, a significant association was found for TT *vs.* CC + CT (OR = 0.77; 95% CI = 0.42–1.41) in the Chinese population.

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Conclusion: The present meta-analysis suggests that SOD2 C47T polymorphism is significantly associated with increased risk of NIHL in the Chinese population. Further large and well-designed studies are needed to confirm this association.

PALAVRAS-CHAVE
Gene da superóxido dismutase 2;
Polimorfismo;
Perda auditiva induzida por ruído;
Metanálise

Associação do polimorfismo C47T no gene da superóxido dismutase 2 com perda auditiva induzida pelo ruído: metanálise

Resumo
Introdução: Atualmente, são limitadas as informações acerca da relação entre o polimorfismo C47T de superóxido dismutase 2 (SOD2) dependente de manganês e suscetibilidade à perda auditiva induzida pelo ruído (PAIR).
Objetivo: O objetivo desta metanálise foi esclarecer a associação entre o polimorfismo C47T de SOD2 e PAIR.
Método: Foi realizadas buscas no PubMed e Web of Science para coleta de dados. Foram incluídos todos os estudos no idioma inglês, contendo dados suficientes e completos de casos e controles sobre a relação entre o polimorfismo C47T de SOD2 e PAIR. Foram identificados três estudos qualificados, abrangendo 1.094 indivíduos. Foram calculadas as razões das chances (*odds ratio*, OR) acumuladas e intervalos de confiança (IC) de 95% para que fosse avaliada a potência da associação entre o polimorfismo C47T de SOD2 e PAIR.
Resultados: Não foi encontrada uma associação significativa entre o polimorfismo C47T de SOD2 e risco de PAIR com as seguintes combinações: T *vs.* C (OR = 0,83, IC 95% = 0,63-1,09); TT *vs.* CC (OR = 0,49, IC 95% = 0,22-1,09); CT *vs.* CC (OR = 0,54, IC 95% = 0,25-1,17); TT *vs.* CC + CT (OR = 0,82, IC 95% = 0,50-1,32); CC *vs.* TT + TC (OR = 0,49, IC 95% = 0,23-1,04). Contudo, na análise de subgrupo, foi encontrada uma associação significativa para TT *vs.* CC + CT (OR = 0,77, 95% CI = 0,42-1.41) na população chinesa.
Conclusão: A presente metanálise sugere que o polimorfismo C47T de SOD2 demonstra associação significativa com maior risco de PAIR na população chinesa. Há necessidade de novos estudos de grande porte bem concebidos, para confirmação dessa associação.

Introduction

Noise-induced hearing loss (NIHL), one of the most common occupational diseases, is a form of sensorineural hearing impairment caused by the interaction between environmental factors (such as prolonged exposure to high levels of noise) and genetic factors.[1] According to statistical data, about one-third of all cases of hearing loss can be attributed to noise exposure,[2] and 10% of the world's population are at risk of developing NIHL.[3]

Currently, little is known about gene polymorphisms that may be involved in the susceptibility to NIHL. Ohlemiller et al.[4] demonstrated that noise can damage the cochlear sensorial epithelium by inducing the local release of free radicals. Consequently, genes involved in the regulation of releasing of free radicals were examined,[5] and manganese superoxide dismutase (SOD2) was identified.[6]

SOD2 is a homotetramer located within the mitochondrion and is an enzyme involved in the conversion of superoxide radicals to hydrogen peroxide.[7] Among the polymorphisms identified in the SOD2 gene, C47T is the most widely studied. C47T is located at position 16 in the mitochondrial targeting sequence and results in the replacement of an alanine with valine (V16A).[8,9] C47T has been studied in association with several diseases (heart disease,[10] diabetes,[11] and nonalcoholic fatty liver disease [NAFLD])[12] which include NIHL.[13] Fortunato et al.[6] previously showed that SOD2 polymorphisms could predispose to NIHL by exerting variable local tissue antioxidant roles, whereas Wang et al.[14] only showed a weak association between SOD2 polymorphisms and NIHL. The current individual studies provide limited information and do not produce a convincing conclusion. Therefore, in this study, a meta-analysis with a relatively large sample was conducted in order to generate a more reliable conclusion regarding the relationship between SOD2 C47T polymorphism and NIHL.

Methods

Literature search, selection, and data collection

Articles investigating SOD2 and NIHL that were published in PubMed and Web of Science before December 2014 were included in this meta-analysis. The following search