

Systematic Review and Meta-Analysis of Sniffin Sticks Test performance in different countries.

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Abstract

Introduction: Olfaction impairment occurs in about 90% of patients with Parkinson's Disease. The Sniffin Sticks Test is a widely used instrument to measure olfactory performance and is divided into three subtests that assess olfactory threshold, discrimination and identification. However, cultural and socioeconomic differences can influence test performance. **Objectives:** We performed a systematic review and meta-analysis of the existent data about Sniffin Sticks Test performance of Parkinson's Disease patients and healthy controls in different countries and investigated if there are other cofactors which could influence the olfactory test results. A subgroup analysis by country was performed as well as a meta-regression using age, gender and air pollution as covariates. **Results:** Four hundred and thirty studies were found and sixty-six articles were included in the meta-analysis. Parkinson's Disease patients showed significantly lower scores on the Sniffin Sticks Test and all its subtests than healthy controls. Overall, the heterogeneity among studies was moderate to high as well as the intra-country heterogeneity. The subgroup analysis, stratifying by country, maintained a high residual heterogeneity. **Conclusion:** The meta-regression showed a significant correlation with age and air pollution in a few subtests. A high heterogeneity was found among studies which was not significantly decreased after subgroup analysis by country. This fact signalizes that maybe cultural influence has a small impact on the Sniffin Sticks Test results. Age and air pollution have influence in a few olfactory subtests.

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