



ORIGINAL ARTICLE

Diagnostic value of combined assessment of olfaction and substantia nigra hyperechogenicity for Parkinson's disease ☆,☆☆



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Abstract

Introduction: Hyposmia and substantia nigra hyperechogenicity (SN+) are characteristic markers of Parkinson's disease (PD), although their diagnostic value in isolation may be limited. We evaluated the combined prevalence of both disorders in patients diagnosed with PD and assessed their diagnostic yield compared to a sample with essential tremor (ET) and another group of healthy subjects.

Methods: Patients diagnosed with PD and ET and treated in our outpatient clinic were enrolled. Olfaction was assessed using the "Sniffin Sticks" odour identification test (SS-12) and hyperechogenicity of the substantia nigra (SN+) was assessed by transcranial duplex ultrasound.

Results: A total of 98 subjects were analysed, comprising 30 with PD, 21 with ET, and 47 controls. The respective prevalence rates of hyposmia (SS-12 < 8) and SN+ (area > 0.24 cm²) were 70% and 83.3% in PD, 33.3% and 9.5% in ET, and 17% and 10.6% in controls. Both markers were present in 63% of patients with PD, none of the patients with ET, and only 2 of the controls.

Conclusions: Combined use of substantia nigra sonography and olfactory testing with SS-12, two rapid, safe, and accessible tests, was more specific than each isolated marker for distinguishing patients with PD from patients with ET and control subjects. Since both markers have been described in very early phases of PD, combined use may be helpful in providing early diagnosis of PD.

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PALABRAS CLAVE

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sustancia negra

Valor de la evaluación combinada de olfacción e hiperecogenicidad de sustancia negra en el diagnóstico de la enfermedad de Parkinson**Resumen**

Introducción: La hiposmia y la hiperecogenicidad de la sustancia negra (SN+) son marcadores característicos de la enfermedad de Parkinson (EP), aunque su valor diagnóstico de forma aislada puede ser limitado. Se evalúa la prevalencia combinada de ambos marcadores en pacientes diagnosticados de enfermedad de Parkinson (EP) y su rentabilidad diagnóstica frente a una muestra con temblor esencial (TE) y otra de sujetos sanos.

Métodos: Se incluyó a pacientes con diagnóstico de EP y TE procedentes de nuestra consulta externa. La olfacción se evaluó con el test de identificación de olores Sniffin Sticks test (SS-12) y la evaluación de la sustancia negra mediante dúplex transcraneal.

Resultados: Se evaluó a 98 individuos, 30 con diagnóstico de EP, 21 con TE y 47 controles. Las prevalencias de hiposmia (SS-12 < 8) e hiperecogenicidad de SN (área > 0,24cm²) fueron del 70 y el 83,3% en EP, el 33,3 y el 9,5% en TE y el 17 y el 10,6% en los controles, respectivamente. La combinación de ambos marcadores estaba presente en el 63% de los pacientes con EP y en ninguno de los pacientes con TE y solo en 2 de los controles.

Conclusiones: La evaluación combinada de la evaluación olfativa mediante el SS-12 y de la sustancia negra mediante ecografía, 2 test rápidos, inocuos y accesibles, mejora la especificidad aislada que cada marcador tiene en el diagnóstico de la EP frente a pacientes con TE o controles. Dado que ambos marcadores se han descrito en fases muy precoces de la EP, su aplicación podría ayudarnos en su diagnóstico precoz.

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Introduction

Parkinson's disease (PD) is one of the most common neurodegenerative diseases and affects approximately 2% of all adults older than 60 years.¹

Recent decades have witnessed significant advances in the process of diagnosing PD. Nevertheless, diagnosis of this disease is still based on clinical criteria except within the research setting. Especially when PD is in its early stages, it can be quite difficult to distinguish the disease from other processes, including essential tremor (ET), multisystem atrophy, progressive supranuclear paralysis, and vascular or drug-induced parkinsonism.²

Furthermore, results from such diagnostic procedures as the apomorphine test, radiotracer studies, and other neuroimaging techniques are not always conclusive, and findings may remain normal until the patient is in a more advanced stage of PD.^{3,4}

For the above reasons, researchers express a growing interest in developing biological markers to improve the accuracy of PD diagnoses. Olfactory dysfunction and substantia nigra hyperechogenicity on the transcranial ultrasound (SN+) are markers that are frequently associated with PD. Not only are they present in early phase, they remain constant throughout the course of the disease,⁵⁻⁹ and the procedures for assessing them are simple and inexpensive, cause no discomfort, and can be performed by any neurologist.

Nevertheless, we should recall that these changes are not specific to PD, and they have only limited diagnostic value when they are present without other signs. A combined analysis of both markers may increase the diagnostic specificity.

With this in mind, our aim is to assess the sensitivity, specificity, and positive predictive value of the presence of SN+ detected with transcranial duplex ultrasound, and of olfactory alteration detected with the Sniffin Sticks test (SS-12), in a sample of patients with PD compared to a sample of patients with ET and another of healthy controls.

Patients and methods

This observational study was carried out in the neurology department at Hospital IMED Levante (Alicante, Spain). It included patients clinically diagnosed with PD or ET one year previously or more, based on accepted diagnostic criteria.^{10,11}

Healthy controls were recruited among patients' companions and other patients seen in the neurology department who had no clinical signs or personal or family history of movement disorders.

Subjects were excluded from the analysis if they lacked a suitable acoustic window or had prior olfactory anomalies (rhinitis, nasal surgery) that might interfere with an olfactory study.

The study was conducted between May 2011 and May 2012. After obtaining informed consent from all participants, they underwent olfactory testing and a transcranial ultrasound study carried out by the same researcher.

Olfactory study

Olfaction was assessed using the SS-12 test (Burghart Messtechnik, Wedel, Germany). We chose this identification

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