

Correlation between olfactory disorder and cognitive function in Parkinson's disease patients

Tommaso Ercoli¹, C. Masala², I. Pinna², G. Orofino¹, C. Frau³, C.F. Bagella³, P. Solla³, G. Defazio¹

¹Department of Medical Sciences and Public Health, Institute of Neurology, University of Cagliari, Cagliari, Cagliari, Italy

²Department of Biomedical Sciences, University of Cagliari, Italy

³Department of Neurology, Institute of Neurology, University of Sassari, Sassari, Italy

Introduction: Parkinson's disease (PD) is a neurodegenerative disorder associated with motor symptoms such as bradykinesia, rigidity, tremor and postural instability. Moreover, PD is usually associated with non-motor symptoms (NMSs) such as olfactory dysfunction, sleep disorders, autonomic dysregulation and neuropsychiatric symptoms, like cognitive impairment, apathy, and anxiety [1]. Associations between olfactory dysfunction and cognitive impairment in PD patients are yet to be elucidated. The aim of the study was to evaluate correlations between the role of each single cognitive domain and the olfactory function in PD patients.

Methods: One hundred eighty-two patients (105 men and 77 women with a mean age of 70.2 ± 9.3) were recruited. Patients with cognitive impairment were excluded. Olfactory function was assessed with the Sniffin' Sticks Extended Test (SSET) which evaluated Olfactory Threshold (OT), Discrimination (OD), Identification (OI) and their sum Threshold-Discrimination-Identification (TDI) scores [2]. The cognitive ability was evaluated by the Montreal Cognitive Assessment (MoCA). Significant correlations between the role of each single cognitive domain and the olfactory function in PD patients were calculated.

Results: Significant correlation was observed between odor threshold versus naming ($r = 0.183$, $p < 0.05$) and attention ($r = 0.225$, $p < 0.01$), as well as between odor discrimination versus executive function ($r = 0.164$, $p < 0.05$) and abstraction ($r = 0.188$, $p < 0.05$).

Conclusion: The impairment of executive domain, abstraction and attention were significantly associated to worst scores in olfactory functions suggesting common pathways between cognitive decline and olfactory dysfunction in PD. Specific cognitive impairment in single domain were also related to particular subtests, suggesting distinctive patterns related to different type of odor dysfunctions.

References:

[1] Schapira AHV, et al. Non-motor features of Parkinson disease. Nat Rev Neurosci. 2017.

[2] Solla P, et al. Sex-related differences in olfactory function and evaluation of possible confounding factors among patients with Parkinson's disease. J Neurol. 2020.