

Pareidolic illusions in advanced non-demented Parkinson's disease

Elisabetta Belli, E. Del Prete, L. Tommasini, A. Francesconi, E. Benevento, R. Ceravolo

Neurology Unit, Clinical and Experimental Medicine Department, University of Pisa, Pisa, Italy

Introduction: Pareidolias are visual illusions of meaningful objects arising from ambiguous forms embedded in visual scenes. Pareidolias and visual hallucinations (VHs) have been suggested to have a common underlying neural mechanism; pareidolia tests have been investigated as marker of VHs in patients with cognitive impairment [1].

Objective: We investigated pareidolia in advanced non-demented Parkinson's disease (PD).

Method: Neuropsychological tests including MMSE, MOCA, incomplete letters (IL), semantic fluency, phonemic fluency and pareidolia battery [2] (scene and noise tests) were administered to PD patients and healthy controls (HCs). Pareidolia score was calculated for noise, for scene and as the total sum of illusory responses. For PD total MDS-UPDRS III, MDS-UPDRS 1.2 for VHs, Daily Levo-dopa Dose Equivalent Total (LEDD-T) and for Dopamine Agonists (LEDD-DA) at time of tests were evaluated, as well as side effects of DA, RBD and motor complications during disease course.

Results: Forty-nine subjects were recruited, 36 with PD (age 69.1 ± 10.6 years, mean disease duration 10.5 ± 7.3 years, MMSE 27.9 ± 0.5) and 13 HCs (age 67.5 ± 8.6 years). PD patients showed higher pareidolia scores ($p=0.036$), higher noise test scores ($p=0.006$) and worst performance in phonemic fluency ($p=0.001$) than HCs. Pareidolia total score was inversely correlated with MMSE ($r=-0.49$), MOCA ($r=-0.35$), LEDD-DA ($r=-0.33$), and directly with IL ($r=0.02$), LEDD-T ($r=0.48$), MDS-UPDRS 1.2 ($r=0.332$), and disease duration ($r=0.68$). Noise test showed direct correlation with LEDD-T ($r=0.50$) and disease duration ($r=0.69$). Four patients developed dementia one year after evaluation; they all produced illusory responses in pareidolia test.

Conclusions: This is the first study assessing both noise and scene pareidolia in advanced non-demented PD patients. Pareidolic illusions, especially noise ones, are more frequent in PD patients than HCs, and they correlates with disease duration, dopaminergic therapy and VHs. Longitudinal studies are needed to investigate the predictive role of pareidolia for dementia.

References

- [1] M Uchiyama, Y Nishio, K Yokoi et al. Pareidolias: Complex visual illusions in dementia with Lewy bodies. *Brain*. 2012;135(8): 2458-2469. doi:10.1093/brain/aws126.
- [2] Y Mamiya, Y Nishio, H Watanabe et al. The pareidolia test: A simple neuropsychological test measuring visual hallucination-like illusions. *PLoS One*. 2016;11(5). doi:10.1371/journal.pone.0154713.