Visual attention and Pisa Syndrome: simple correlation or cause-effect relationship?

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Background and Aims: Pisa Syndrome (PS) is a highly disabling postural deformity, with a strong impact on patients' quality of life. However, it can be reversible if diagnosed and treated at an early stage. The neuropsychological profile is characteristic: reduced performance on visuospatial abilities, attention and language. This study aims to analyze PS from a different perspective: the ocular behavior, through the Eye Tracking methodology. The ultimate goal is to shed light on the association between PS and visuospatial and attention impairment functions, looking into clinical predictors of PS evolution.

Methods: This cross sectional study compared the behavior reactions and the pattern of visual scanning in a group of pwPD – with (PS+)(n=34), or without (PS-)(n=22) trunk postural deviation - and a group of healthy age-matched people (HC)(n=11). To this scope, the Benton Judgment of Line Orientation Test (BJLOT) was used to create a set of stimuli consecutively presented on the screen, while tracking patients' gaze, by means of the eye tracker EyeLink 1000.

Results: PS+ subjects show significantly worse performances on the BJLOT and MoCA tests. Congruent, they show a characteristic pattern of visual scanning, which is significantly different from the one exhibited by PS- subjects and age-matched healthy subjects, with special impairment in the ability to process stimuli in the left hemifield. On a logistic regression analysis, the performance on the BJLOT is significantly ($p<.0001$) related to the severity of attention deficit (e.g. latency of first fixation of the visual stimulus and MoCA subitem score) and the severity of axial symptoms (e.g. UPDRS-III posture and freezing subitem scores).

Conclusions: We confirm the association between visuospatial and attention disorders and PS; the role of cognitive disorders as early predictors of the risk for developing severe trunk abnormalities is to be sought in prospective studies on large cohorts of pwPD.