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Assessment of axial postural abnormalities in parkinsonism: automatic picture analysis software

Christian Geroin[1], C.A. Artusi[2,3], G. Imbalzano[2,3], S. Camozzi[1], S. Aldegheri[4], L. Lopiano[2,3], M. Tinazzi[1], N. Bombieri[4]

[1]Neurology Unit, Movement Disorders Division, Department of Neurosciences Biomedicine and Movement Sciences, University of Verona, Verona, Italy
[2]Department of Neuroscience "Rita Levi Montalcini", University of Turin, Turin, Italy
[3]Neurology 2 Unit, A.O.U, Città della Salute e della Scienza di Torino, Turin, Italy
[4]Department of Computer Science, University of Verona, Verona, Italy

Background: Software-based measurements of axial postural abnormalities in Parkinson's disease (PD) are the gold standard but may be time-consuming and not always feasible in clinical practice. An automatic and reliable software to accurately obtain real-time spine flexion angles according to the recently proposed consensus-based criteria would be a useful tool for both research and clinical practice.

Objective: We aimed to develop and validate a new software based on Deep Neural Networks to perform automatic measures of PD axial postural abnormalities.

Methods: A total of 76 pictures from 55 PD patients with different degrees of anterior and lateral trunk flexion were used for the development and pilot validation of a new software called AutoPosturePD (APP); postural abnormalities were measured in lateral and posterior view using the freeware NeuroPostureApp® (gold standard) and compared with the automatic measurement provided by the APP. Sensitivity and specificity for the diagnosis of camptocormia and Pisa syndrome were assessed.

Results: We found an excellent agreement between the new APP and the gold standard for lateral trunk flexion (ICC 0.960, IC95% 0.913-0.982, $p < 0.001$), anterior trunk flexion with thoracic fulcrum (ICC 0.929, IC95% 0.846-0.968, $p < 0.001$) and anterior trunk flexion with lumbar fulcrum (ICC 0.991, IC95% 0.962-0.997, $p < 0.001$). Sensitivity and specificity were 100% and 100% for detecting Pisa syndrome, 100% and 95.5% for camptocormia with thoracic fulcrum, 100% and 80.9% for camptocormia with lumbar fulcrum.

Conclusions: APP is a valid tool for spine flexion measurement in PD, accurately supporting the diagnosis of Pisa syndrome and camptocormia.

References:
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