

**Kinematic analysis of mild bradykinesia features in frail elderly people**

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*Introduction:* Mild Parkinsonian signs, including bradykinesia, commonly occur in elderly people with a prevalence ranging from 15% to 95% [1].

*Objective:* To kinematically characterize the possible bradykinesia features in elderly people in relation to their overall frailty.

*Methods:* We enrolled 41 healthy subjects (25 F, mean age  $\pm$  1 SD: 63.9 $\pm$ 8.91, range 46-83 years). The kinematic analysis of bradykinesia included repetitive finger-tapping analysis. We measured the number of movements, as well as rhythm (coefficient of variation - CV), amplitude, velocity, and amplitude decrement (sequence effect) of repetitive movements. Along with demographic and clinical data collection, including the Mini-Mental State Examination (MMSE) and the Frontal Assessment Battery (FAB), we evaluated the frailty status of all participants using a 40-item Frailty Index (FI). The possible relationships between demographic and clinical data and kinematic movement features were assessed by Spearman's correlation test.

*Results:* First, we found a significant positive correlation between the CV and the FI ( $r= 0.42$ ,  $p<0.01$ ), i.e. the higher the CV (more altered movement rhythm) the higher the subject frailty. Second, we found that the sequence effect positively correlated with the age of subjects ( $r=-0.34$ ,  $p<0.05$ ), i.e. the greater the sequence effect during finger-tapping, the older the subject.

*Discussion:* The kinematic analysis of finger tapping allows an objective assessment of bradykinesia features in frail elderly people. The correlation between altered movement rhythm and the overall frailty of the subject possibly reflects a frontal dysfunction (given previous studies suggesting a relationship between altered movement rhythm and executive dysfunction as well as between executive dysfunction and frailty). The correlation between the sequence effect and the age of the subject possibly reflects altered network dynamic and synaptic plasticity alterations primarily due to aging.

*Conclusions:* The preliminary data emphasize the importance of the quantitative assessment of bradykinesia features in the frail elderly population, which are possibly underestimated and likely reflect distinct pathophysiological mechanisms. The present results require confirmation on a larger sample of healthy subjects.

**References:**

[1] Buchanan SM, Richards M, Schott JM, Schrag A. Mild Parkinsonian Signs: A Systematic Review of Clinical, Imaging, and Pathological Associations. *Mov Disord.* 2021 Nov;36(11):2481-2493. doi: 10.1002/mds.28777. Epub 2021 Sep 25. PMID: 34562045.