Applicability of the Wall Goniometer in Parkinson's disease

Postural abnormalities are frequent and disabling motor complications of Parkinson's disease or atypical parkinsonism [1]. These impairment cause significant disability and may affect the quality of life [1]. Postural abnormalities include camptocormia, anterocollis, and Pisa syndrome, which may occur either isolated or combined [1,2]. Camptocormia is used to describe an involuntary and marked flexion of the thoracolumbar spine, characterized by a forwarding trunk bending of at least 30° at the lumbar fulcrum and/or at least 45° at the thoracic fulcrum [1,3]. Antecollis refers to forwarding flexion of the head and neck of at least 45° [1,2]. Pisa syndrome is defined as a marked lateral bending of the trunk of at least 10° [1,4,5]. The development of these postural abnormalities can cause severe and irreversible mechanical constraints (i.e., marked lateral and/or forward flexion), affecting postural stability and are associated with increased risk of falling [4,5]. Therefore, tools to evaluate these postural abnormalities can help clinicians and researchers in the diagnosis and goal-directed treatment of people with Parkinson's disease.

Postural abnormalities have been investigated using software-based measurements that are considered the gold standard for the analysis of these impairments in patients with Parkinson's disease [6,7]. Those gold standard measurements commonly involve the use of photos that need to be transferred to a computer for the calculus and determination of the degrees and interested measures through specific software [8]. These techniques are reliable and valuable in the research setting [6,7,9]. However, software-based measurements need a greater time-consuming during the analysis process and are more expensive, that difficult the use of software in the clinical practice. Another possibility to diagnostic the postural impairment is through the threshold angles [3]. Thus, a tool that allows a fast and efficient diagnostic would be useful in daily clinical practices [6,10]. One possibility to assesses postural abnormalities in patients with Parkinson's Disease recently highlighted is the Wall Goniometer. The Wall Goniometer could be performed in vertical surfaces where is positioned a graduated laminated paper that allows estimate quickly the postural abnormalities, expressed in degrees [2,3,10]. In addition, Wall Goniometer is highlighted because is inexpensive, quick and seems to be able to detect trunk deformities. Although studies indicated the use of this technique as a good option in clinical practices, it had not been validated in patients with Parkinson's disease [11].

Tinazzi and colleagues [11] in their manuscript published in the current issue of the *Parkinsonism and Related Disorders*, investigated the validity of the Wall Goniometer to detect postural abnormalities in patients with Parkinson's disease. The Wall Goniometer has been demonstrated as a good possibility to detect postural abnormalities, such as Pisa syndrome and camptocormia in patients with Parkinson's disease [7,10,12]. To validity the Wall Goniometer, this technique was compared to software-based measurements (gold standard) to detect the Pisa syndrome, camptocormia, and anterocollis in 283 patients with Parkinson's disease [11]. The Wall Goniometer demonstrated good to excellent agreement when compared to the gold standard and higher sensitivity to diagnosis of Pisa syndrome (100%), anterocollis (95.74%), upper and lower camptocormia (76.67% and 63.64%, respectively). However, lower camptocormia was underestimated in −8.7° by the Wall Goniometer. The findings of this study suggest that the Wall Goniometer indicated to be a valid tool to analyse postural abnormalities in patients with Parkinson's disease, mainly the Pisa syndrome and anterocollis. However, the author suggested that ~10° should be added for the camptocormia analysis to improve the postural abnormalities assessment/diagnosis [11].

The Wall Goniometer can be applied in both clinical and research settings. In the clinical practice, this tool may help the clinicians for diagnosing and quantifying the postural deformities, hence drive the goal-directed treatment. In the research area, the Wall Goniometer may be important for investigating the effect of pharmacological and non-pharmacological (i.e. Deep Brain Stimulation, physical exercise and surgery) interventions on postural impairments. In addition, due to it is a simple and inexpensive tool, the Wall Goniometer may be widely disseminated among clinicians and researchers worldwide. In conclusion, the Wall Goniometer may be suitable and an accurate assessment tool to identify postural abnormalities in patients with Parkinson's disease and may provide a better understanding of the specific effects of interventions.

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