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Integration of clinical and objective measurements of upper limb function to assess the effectiveness of a nabiximols-based treatment for spasticity

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Introduction:

It has been estimated that 50 to 80% of people with Multiple Sclerosis (pwMS) also complain of upper limb (UL) dysfunctions, which are multifactorial in nature and include weakness, spasticity, ataxia, tremor, sensory loss, and pain. In particular, it is noticeable that the management of UL spasticity, despite the non-negligible number of pwMS who suffer from it, appears challenging and mostly unexplored, and specific evidence on the effectiveness of treatments based on the recommended anti-spasticity oral therapies on UL function is limited and only rarely supported by quantitative biomechanical assessments

Objectives/Aims:

To propose an integrated approach based on clinical and objective instrumental measurements (the latter based on the use of wearable sensors and motion capture systems) able to assess the effectiveness of 4-week treatment with nabiximols on UL motor function in pwMS

Methods:

Twenty pwMS considered eligible for using nabiximols based on their clinical history, were included in the study. Baseline assessment included spasticity severity from pwMS perspective through a 0–10 NRS, gross and fine manual dexterity (through Box and Block test, BBT and Nine-Hole Peg test, 9HPT). Participants also underwent a kinematic evaluation of the UL function during the execution of the "Hand-to-Mouth" (HTM) task using a 8-camera motion capture system. After 4 weeks of stable treatment, they were called to undergo a second visit during which EDSS, 0–10 NRS, and UL function were retested. Overall mobility and quality of sleep were also assessed for 7 consecutive days, before and after the treatment using two wrist-worn tri-axial accelerometers.

Results:

After the treatment, pwMS reported a significant decrease in spasticity symptoms (4.5 vs. 6.6 NRS, $p<0.001$) and better performance in terms of BBT (50 vs. 46 blocks, $p<0.05$) and 9HPT (38 vs. 42 s, $p<0.05$). Speed and smoothness of the HTM movement also improved, particularly as regards the going and return phase. The overall mobility did not improve significantly, but improvement in quality of sleep was also detected in terms of sleep efficiency and number and length of awakenings.

Conclusion:

The integration of clinical and objective measurements provides a detailed and accurate view of the possible changes in UL motor functionality associated with 4-week treatment of nabiximols in pwMS with moderate-severe spasticity. In particular, the kinematic measures of the HTM task can effectively quantify of the degree of transferability of the therapy to actual activities of daily living.

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