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Poster P21

Static and Dynamic Stabilometric Evaluation and Rehabilitation in Peripheral Neuropathy

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Objectives

This study aims to evaluate the effectiveness of the GeaMaster stabilometric platform (GMSP) in detecting balance impairments and supporting rehabilitation in individuals affected by Charcot-Marie-Tooth (CMT) disease.

Materials

The full study plans to enroll 40 patients with genetically confirmed CMT and 60 healthy controls (HC), aged between 18 and 80 years. At this stage, preliminary data are available from 15 patients and 25 HC. Eligibility criteria required the absence of significant comorbidities, recent orthopedic surgery, and a pain score below 3 on the Visual Analogue Scale (VAS<3).

Methods

All participants underwent balance assessments using the GMSP in static (Eyes Open [EO], Eyes Closed [EC]) and dynamic conditions (Eyes Open Toes Up Small Perturbation [EOTUS], Eyes Open Backward Stimulation [EOBWS]). Dynamic trials were paired with surface electromyography to assess activation in the tibialis anterior and soleus muscles. The CMT group also performed functional tests: Berg Balance Scale, Modified Barthel Index, Tinetti Scale, 10-Meter and 6-Minute Walking Tests. Patients were randomized to either traditional physiotherapy or GeaMaster-based rehabilitation, both delivered 30 daily 1-hour sessions.

Results

No significant test-retest differences were found in HCs, confirming platform reliability. In patients, significant post-treatment improvements were observed in Sway Area and Sway Path during static EO and EC trials ($p = 0.01$). Dynamic testing showed reduced muscle activation delay in the tibialis anterior during EOTUS ($p = 0.001$) and in the soleus during EOBWS ($p < 0.001$) from baseline (T0) to post-treatment (T1). Although functional scores improved, changes were not statistically significant ($p > 0.05$). Correlation analysis revealed significant associations between Sway Area and activation times of the tibialis anterior ($r = 0.65$, $p = 0.03$) and soleus ($r = 0.72$, $p = 0.01$). Due to the current sample size, no statistical comparison between platform-based and traditional rehabilitation has been performed. Results reflect the general rehabilitation effect in CMT patients, without group differentiation. Further analysis will follow upon full enrollment.

Discussion

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The GMSP reliably detected functional deficits and post-rehabilitation changes. Static tests were more sensitive to balance alterations, while dynamic trials better captured muscular responses. The platform offers objective, individualized data that complement clinical scales and may detect subtle changes not otherwise observable.

Conclusions

The combination of traditional assessments with quantitative metrics enhances sensitivity to small functional variations. Since the study is still in progress, more comprehensive results and interpretations will follow upon completion of the study.

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