

10. Abstract

Introduction: The scientific literature identifies stroke as one of the most serious challenges facing modern rehabilitation, and achieving patient independence and functional recovery as the primary goal of therapy. An analysis of the available literature provides many protocols for physiotherapeutic management, while highlighting a gap regarding the impact of proprioceptive knee joint training using rehabilitation robots on improving gait, balance, proprioception and functional status among this group of patients.

Aim of the study: Evaluation of the effectiveness of proprioceptive training in improving gait, balance and functional status of patients in the early post-stroke period.

Material and methods: The study included 56 patients up to 3 months after ischaemic stroke, allocated to 2 groups: a control group (n=28) following a standard rehabilitation programme and an experimental group (n=28) following a standard rehabilitation programme supported by additional proprioceptive training on a LUNA EMG device. Patients were assessed twice, before and after the 3-week rehabilitation period. To assess the effects of the interventions, the PABLO device's inertial sensors and Wisconsin scale were used to assess gait, the ALFA stabilometric platform, the “Stand up and walk” test and Berg scale were used to assess balance, the LUNA EMG device was used to assess proprioception of the knee joint, and the FAC and Barthel scale were used to assess functional status.

Results: A highly statistically significant improvement was obtained in gait speed ($p<0.001$) in the experimental group, with an effect size of change of $d_z=-0.90$. Also in gait cycle length and cadence, a more measurable benefit of therapy combined with proprioceptive training was observed. In contrast, temporal gait parameters in Study II showed no differences in either the support ($p=0.101$) or transfer ($p=0.090$) phase between the two groups. Functional balance assessment showed improvement in both groups with a greater benefit in the experimental group on the Berg scale ($p=0.032$) and TUG ($p=0.002$), respectively. A limited effect of the applied therapies on the proprioception parameter was found recording a statistically significant change only in the control group in one test task. At the same time, a highly statistically significant improvement was obtained in the Barthel scale ($p<0.001$ for both groups) and FAC ($p=0.001$ for the study group and $p<0.001$ for the control group).

Conclusion: The use of additional proprioceptive training has a beneficial effect on improving key gait parameters of patients in the early post-stroke phase, further improving their dynamic balance and functional performance. Further research should focus on refining the protocol for the use of proprioceptive training in this patient group.