Abstract

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Title: Effect of sensomotoric insoles on postural stability in children with cerebral palsy

Objectives: Objectively assess the effect of sensomotoric insoles on children with cerebral palsy (CP) via COP (Centre of Pressure) parameters recorded on Kistler force plate.

Methods: This thesis is designed as an experimental study. Selected paramaters of static postural balance were recorded via force plate to assess the effect of sensomotoric insoles. Five subjects (average age 7.2 years) with diagnosis of cerebral palsy were enrolled into the study. Data collection was carried out in two separated sessions – first before therapy and second after using the insoles for one month. The validity of the data was supported by three repetitions for each modification – upright plain stand with open eyes, upright stand with feet together and upright plain stand with closed eyes. Monitored parameters were: total trajectory of COP, amplitude of mediolateral displacement of COP, amplitude of anteroposterior displacement of COP and mean velocity of movement of COP. The data were analyzed in MATLAB® version R2019b. The statistical analysis was performed including the outliers elimination. The normality of data was checked by Lilliefors´ test. In the case of normality a two-sample Student´s t-test was used. The analysis of non-normal data distribution was performed via nonparametric Kruskal-Wallis test. The results for three different instructions were analyzed by ANOVA (Analysis of Variance).

Results: Statistically significant values could be seen in third modification – stance with eyes closed, for which the proprioception plays the main role. The greatest improvement has been achieved in the parameter trajectory of COP (lower values in three of five subjects – in third modification by 29 mm for subject 2, 20 mm for subject 5; in first modification by 40 mm for subject 3 and by 20 mm for subject 5) and COP sway in ML direction (drop by more than 10% for two subjects in every modification). Hypothesis no. 2 – assumption of highest values for the third modification (stand with closed eyes) could only be considered confirmed for one subject (no. 5), where all of assessed parameters have dropped significantly.

Conclusion: Results showed improvement in static stability parameters, especially in group of older subjects (age of 8 and 11). It may be concluded that neuromotor control is not mature enough in younger children with CP (under 8 years old), and therefore the assessement of

influence of the parameters of static balance via sensorimotor therapy is limited. Nevertheless, this study included only limited number of subjects with different diagnosis and clinical condition. The research needs to be extended by measured data to confirm the effect of sensorimotor insoles.

Keywords: COP, trajectory, oscillation, balance, sensorimotor, proprioception, postural stability, insoles, pressure