Abstract

Title: Measurement of lower extremities spasticity in patients with cerebral palsy

Objectives: The aim of the theoretical part of this thesis is to evaluate possibilities of lower extremities spasticity measurement in adult patients with cerebral palsy. The main focus was given to the concept of French professor J.-M. Gracies: *Five-step clinical assessment in spastic paresis.* This unique concept presents differentiation of three main factors of motor impairment that emerge as a result of a lesion to central motor pathways: stretch sensitive paresis, soft tissue contracture and muscle overactivity. Ability to distinguish these factors is crucial for specific treatment indication. Finding a correlation between the Five-step clinical assessment in spastic paresis and muscle activity in gait measured with polyEMG was the main objective in the practical part of the thesis.

Methodology: This thesis has a theoretical-empirical character. The theoretical part is in a form of a research on the topic of spasticity diagnosis, focused on cerebral palsy patients. The empirical part of the thesis has a form of pilot quantitative research, which was attended by 6 participants with cerebral palsy (4 men and 2 women; average age 29 years). There were 2 independent measurement made for each of them. Each measurement consists of a unique examination protocol Five-step clinical assessment. Four variables were gained from the first two steps of the protocol: the passive range of motion (PROM), the coefficients of muscle shortening (step 1), the spasticity angle and coefficient of spasticity (step 2). Correlation between those four variables and the mean polyEMG muscle activity was determined by using the Pearson coefficient. Three muscle groups were measured: m. triceps surae (TS), m. rectus femoris (RF) and hamstrings (HS).

Results: The correlation coefficient (r) for the variables PROM and mean polyEMG activity shows a weak to moderate positive relationship in 2 of 3 sensed muscles ($r_{TS} = 0.39$, $p_{TS} = 0.10$, $r_{HS} = 0.30$, $p_{HS} = 0.17$). Among the variables coefficient of shortening and average polyEMG muscle activity, the correlation

coefficient shows weak to moderate negative realtionship in 2 of 3 muscles (r_{TS} = 0.39, p_{TS} = 0.10, r_{HS} = 0.30, p_{HS} = 0.17). Between the spasticity angle and the average polyEMG amplitude is the positive relationship only in 1 of 3 muscles (r_{TS} = 0.42, p_{TS} = 0.08). Between the spasticity coefficient and the average polyEMG muscle activity is positive realtionship only for 1 muscle (r_{TS} = 0.45, p_{TS} = 0.07).