Abstract

Title: Evaluation dynamic postural stability of javelin throwers

Objectives: The aim is to evaluate whether the regular active performance of the javelin discipline has an effect on dynamic postural stability in comparison with individuals who do not actively engage in javelin throwing. Furthermore, to find out whether there is a relationship that would clarify the dominance of the lower limbs in the relationship between the front and hind leg of the spearman in the assessment

Methods: This quantitative observable cross-sectional study involved 20 probands (n=20, age=20,45 ± 2,49). The experimental group consisted of the 10 male javelin thrower and 10 female javelin thrower. Measurement of dynamic postural stability took place in the Laboratory of Applied Kinesiology, Charles University FTVS on the Neurocom SMART EquiTest device. These batteries were chosen. Sensory Organization Test (SOT), Motor Control Test (MCT)**,** Adaptation Test (ADT), Limits of Stability (LOS), Rhythmic Weight Shift (RWS), Weight Bearing Squat (WBS), Unilateral Stance (US). Then the measured data was processed by program Neurocom Balance Manager Software. The results of the experimental group were compared with the control group. The control group values are available in the NeuroCom SMART EquiTest software and correspond to the age interface of the experimental group. Further was the measured data between group of male (n = 10, age=19,76 ± 1,31) and female (n=10, age=23,73 ± 2,85) javelin throwers mutually compered. Last but not least was examined if there is a significant difference between balances of both lower limbs. A normal distribution of all obtained data was not assumed, so the Welch t-test was used to compare the statistical difference. The level of statistical significance for the evaluation of the performed tests is considered to be the level $\alpha = 0,05$.

Results: The group of javelin thrower achieved significantly better results in ADT (TUP-1 p=0,032; TDN p=0,000), SOT (EQL-4 p=0,001), MCT (LLT-F-M p=0,007; LLT-F-L p=0,046; RLT-F-M p=0,000) and RWS (FB-V-S p=0,044) tests compared to the values of the control group. On the contrary, a comparison of (LR-DC-S p=0,002; LR-DC-M p=0,001; FB-DC-S p=0,000; FB-DC-M p=0,001) parameters showed a statistically significantly worse result for the research group. The

difference between the group of male javelin throwers and the group of female javelin throwers was confirmed in MCT, ADT (TUP-1 p=0,012, TUP-2 p=0,008, TDN-1 p=0,000) and SOT SOT (STRA- 2, 5, 6 (p=0,049), (p=0,001), (p=0,039)). The success of the group of women prevailed in ten parameters of MCT MCT (LLT-B-S p=0,033; LLT-B-M p=0,030; LAM-B-S p=0,022; LAM-B-L p=0,042; LAM-F-S p=0,034; LAM-F-M p=0,003; RAM-B-M p=0,041; RAM-F-S p=0,012; RAM-F-M p=0,009; RAM-F-L p=0,007), in contrast, the group of men did not dominate in either of the parameters of MCT. In the remaining tests, statistically significant results were relatively balanced between the group of women and men. The results of the Weight Symmetry Parameter of the MCT test didn't demonstrate a higher load on either of the lower limb, although the resulting Weight Symmetry MCT values indicated an uneven load in favor of the dominant reflex lower limb. The results of the WBS test (flexion 0 ° in the knee joint), (p=0,021) statistically significantly confirm a higher load on the reflex lower limb in javelin thrower.

Keywords: Dynamic postural stability, Neurocom SMART EquiTest, dynamic posturography, athletics, javelin thrower