

## Abstract

**Title:** Evaluating effects of training using the NeuroCam visual feedback training programme on postural stability of high-performance basketball players.

**Objectives:** The aim of the thesis is to compare effectiveness of two types of training programmes with visual feedback on postural stability of basketball players using the test „Limit of Stability “. Another goal is to evaluate the effect of the training programme using the „NeuroCom Smart EquiTest“ machine with visual feedback on postural stability of basketball players.

**Methods:** Quantitative research was carried out on 19 basketball players with the age of 13-16 ( $15,21 \pm 1,05$ ). Firstly, all participants went through an entry level physical examination of postural stability using the „NeuroCom Smart EquiTest“ (7 tests) and filled an anamnestic questionnaire. Players were then randomly divided into two groups – group A (n = 10) and group B (n = 9) and completed two types of training programmes with visual feedback on the NeuroCom Smart Equi Test machine lasting 6 weeks in total (each test lasted 3 weeks). After the first test a control physical examination was done to compare the effects of individual training programmes. The groups underwent the training programmes in different order. At the end of the 6 -week period an exit level physical examination was done. For statistical purposes of comparing effectivity of the training programmes, a two-option t-test with differentiating dispersion was selected, and to evaluate differences in all examined parameters obtained during the entry level and exit level physical examinations a coupled t-test was used. All hypotheses were tested on  $\alpha = 0,05$  level of significance.

**Results:** After undergoing a 6 week training programme with elements of proprioceptive training (unstable surface) with visual feedback, it was statistically determined ( $p < 0,01$ ), that an improvement of reaction speed was apparent via the Limits of Stability (LOS) tests, unlike the Motor Control test (MCT) ( $p=0,438$ ), in which no significant improvement was apparent. It is clear, that the athletes were using more of the information from the vestibular system and the visual apparatus instead of somatosensory informations, while undergoing the exit level physical examination (in comparison to the entry level physical examination). These differences were not confirmed via the statistic test ( $p = 0,060$  parameter VES;  $p= 0,139$  parameter VIZ;  $p = 0,293$  parameter SOM).

During the testing of lower limbs load in squatting there was no significant load symmetrization between the left and the right leg in the 6-week period. The effect of Limits of Stability (LOS) and Rhythmic Weight Shift (RWS) training programme on directional control was not proven. A continuous training programme was more effective in improving directional control in Limits of Stability (LOS) ( $p = 0,001$  parameter Directional Control). An interval-type training was more effective in improving movement speed ( $p = 0,004$  parameter MVL). During the exit level physical examination, a significant increase in the ability to shift the center of gravity of the body to greater distances was noted. Statistically comparing the effectivity of individual training programmes no significant difference was observed. In reality, basketball players along with their coaches can use both training programmes or they can select one programme in order to improve in certain areas (movement speed, reaction speed etc.).

**Key words:** visual feedback proprioceptive training, computerized dynamic posturography, basketball, competitive sports