

## SUMMARY

In the study „The relationship between postural stability and physical activities“, we focused on determining the level of postural stability and the possibility of influencing by appropriate means of exercise intervention in people with increased physical activity and persons with physical limitations. Persons with increased physical activity were top players and players competing in various sports (football, handball, volleyball, golf) and those with physical limitations, patients suffering from diseases that have a negative impact on postural stability (Friedrich's ataxia, autosomal dominant spinocerebellar ataxia, Charlot-Marie-Tooth).

Upright posture in stance and movement is a fundamental prerequisite for human bipedal locomotion. Postural stability is the ability to maintain an upright posture, which advises the motor and coordination skills, and its meaning is close to equilibrium abilities. Maintaining an upright posture is ensured by muscle activity, which is controlled by the central nervous system based on information from internal and external environment. Control of postural stability is the primary prerequisite for successful movement and as such it can be developed on the basis of appropriate physical activities.

All methods of measuring static and dynamic postural stability can be summarized under the term posturography, which is commonly used objectification method for determining the level of postural stability in sport and in clinical practice. Posturography in a relatively static positions (standing position) offers us a different variety of standardized tests, compared to the measurement of dynamic postural stability which depends to some extent on the type of study, the characteristics of the study sample, etc.

In our work, we used standardized tests of static postural stability to determine the level of postural stability in subjects with increased physical activity even in people with physical limitations, and we tried to find out whether it is possible for both groups to differentiate the level of postural stability of varying difficulty of the test. In our study, we used tests of wide-based in terms of open and closed eyes in both groups and groups with increased physical activity also took advantage of a narrow-based test in terms of open and closed eyes and the batter stands on one leg.

The impact of health status on dynamic postural stability, we checked by the test of calf raises started in wide-based stand in atactic patients and a control group of healthy population. In determining the level of dynamic postural stability in physically active populations, we evaluated the repeatability of implementation of a specific motor task, the

golf swing, based on kinetic and kinematic parameters using 3D kinematic analysis. The influence of the movement intervention (whole-body vibration training) to increase the level of static postural stability were evaluated in male and female players of beach volleyball and influence of the movement intervention (rehabilitation program) on dynamic postural stability, we examined a patient suffering from hereditary neuropathy based on an assessment of selected kinematic parameters during walking motion task.

In our study, we found higher level of static postural stability in individuals with increased physical activity and higher level of dynamic postural stability in general population compared to the patients. We also managed to verify the possibility of using posturography in identifying the type of the disease and determine the degree of disability in atactic patients. We confirmed the negative effect of removing visual control to the level of postural stability in both groups, whereas the effect of narrowing the base was observed only in fluctuations in the left-right direction. For golfers, we have found a high degree of repeatability of execution, but for too many other factors we can't generalize these findings to determine the level of dynamic postural stability. Effect of locomotor intervention program to the level of static postural stability in individuals with increased physical activity was not confirmed, although we found a significant positive impact on the performance of the test while standing on one leg. In a patient suffering from hereditary neuropathies, we confirmed the effect of the intervention exercise program based on substantive significance.

Posturography is an appropriate form of determining the level of postural stability in physically active populations and people with physical limitations, and is also a suitable method of objectification of the effects of intervention on postural stability. Seems appropriate option to use a combination of posturography and 3D kinematic analysis for determining the level of dynamic postural stability. Appropriate physical intervention program may have positive effects on postural stability in individuals with increased physical activity even in people with physical limitations.

Keywords: postural stability, posturography, kinematic analysis, motion intervention program, disability, physical activity