Abstract

Thesis title: Pathological consequences of hypokinesis in paraplegic patient and their identification by TVS method

The thesis focus: The focus of the thesis was to identify and classify differences of mechanical properties of axial systems between paraplegic patient and people from healthy population. Secondary focus of the thesis was to identify and classify changes of mechanical properties of axial system in paraplegic patient depending on physiotherapeutic intervention.

The research methods: Three people, one paraplegic person and two healthy people were measured with TVS (Transfer Vibration Through Spine) method. Paraplegic person was measured twice, before and after one hour long physiotherapeutic intervention (PI). Healthy people were measured once, without PI. TVS method is a diagnostic apparatus that enables qualitative and quantitative classification of properties of axial skeleton and its segments. It is based on fact that velocity of mechanical waves and density of mechanical energy transmitting through axial skeleton is affected by properties of this system. Thus we were able to analyze and identify mechanical properties of measured axial systems according to differences of input and output values of acceleration on particular spinous processes.

The results: When we compared frequency dependency of global attenuation of individual spinal columns, we found out that global attenuation increases linearly over frequencies of 40 Hz, in both cases, in healthy and pathological axial systems. Interesting fact is that we found out that global attenuation of pathological spinal column exposed to low resonance frequencies has different pattern that overall attenuation of healthy spinal column. In the case of lower frequencies, the attenuation of pathological spinal column has decreasing pattern and its highest point is around 35 Hz. Based on mechanical properties of axial skeleton connected to one hour physiotherapeutic intervention in paraplegic patient, we found out that used PI mostly affected long muscles of axial system. The most noticeable change of sturdiness was achieved at lower resonance frequencies.

Key words: axial system, spinal cord injury, vibration, TVS