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Impaired postural control of women with low back pain under various dynamic conditions

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Keywords: low back pain, dynamic balance, center of gravity

Many studies have been conducted on the static balance evaluation of different conditions such as low back pain. However, there is a little interaction on the dynamic balance impairments. The objective of this study was to compare the utilizations of the center of gravity (COG) of LPB patients with the healthy subjects under various dynamic conditions.

Thirty low back pain patients and 30 healthy females between 20 to 40 years of age voluntarily participated in this experiment. A dynamic stability platform system (BIODEX) was used to evaluate the anterior-posterior (AP) and medio-lateral (ML) directions.

The COG sway during upright standing and standing with 45° trunk flexion postures. These tests were repeated with and without shoes as well as on stable and unstable foot platforms. A multivariate analysis of variance was used for statistical analysis.

Results showed that in all the evaluations the COG sway was greater in LPB patients. In stable foot platform, COG sway in patients with LPB was affected more in AP direction than in ML. Instability of the foot platform resulted in more abnormalities of COG sway among patients (p<0.01). Flexed posture decreased the body sway in both groups. These differences were more obvious when studying the unstable bases of support. There was no interaction between instability of base of support, posture and back pain factors.

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Comparative study on able-bodied and disabled freestyle swimmer

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Keywords: swimming of disabled, movement analysis, PSO

In able swimming the movement analysis is very important to judge the movement coordination of athletes. This approach allows statements about the current motion behavior and the level of movement coordination. Due to the variety of functional influences regarding to the impairments of disabled swimmers we can not transmit without further ado the results of able-bodied athletes.

One disabled swimmer (right 1A1) and one able-bodied swimmer (athlete 2-A2) were examined and performed a "stop test" in freestyle in a swimming flume with constant velocity. The fluence velocity corresponded with the currently existing competition results and can be taken as optimal velocity of each swimmer. For 2-D video recording a camera was outstanding installed. Using the software SIMI MotionC the evaluative area including the body point was confronted out. The swim movement was characterized using the model of swimming phases by Jahnig et al. (1973). For the results of both athletes we used the step son where swim movement isn't influenced by the fluence (Schega et al., 1997). The horizontal velocity of the hip of A1 was compared to A2. Differences were also determined by the examination of the cycle frequency. To characterize the movement efficiency in dependence on the increasing load we used the "Phase Structure Quotient" (PSQ) by Blaser et al. (1993) as quotient of the main phase and the sum of initiating, linking and preparing phases. The average PSQ for A1 was significantly higher than for A2 (Friedmann-test).

The described values of the swim movement are more favourable of A2 compared to A1. The fact because the swimmer the smaller the better effective is the swim movement. A possible different structure of propulsion caused by the functional impairment of A1 influences the swim movement.


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Considerations about the fractures of the metacarpal bones

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Keywords: metacarpal bone, finite element method, fracture

The metacarpal bones are the longest and the least mobile but at the same time they are also the bones of the hand. This is why the fractures of these bones are very high.

The study material was represented by 24 metacarpal cases of the hands bones studied at the Doli County Hospital during a period of 5 years.

The authors used the finite element method for the spatial model of the metacarpal bone. The geometric and mechanical properties natural variability of the bone system from one to the other is a big problem which makes test difficulties in the biomechanical researches. It must be watched so the idealized structure should be the best solution to many problems concerning the number of the junctions and of the elements, the types of elements, the number and side of the loading forces. The authors used the section method of the bone divided into 23 sections parts with the tomographic computer. We determined precisely the spatial coordinates of a 12 points set from every section's boundary. Then we built the spatial model of the metacarpal bone using the finite element E13 "NISA" soft. At first, the coordinates have been linked by interpolation, giving the entry nodes and points of the surfaces method. Then, with the help of the surfaces method there have been united close sections two by two and with the hyper surfaces method the programme creates the spatial modelisation of the whole bone. The modelisation was realized with tetrahedral finite elements. During this step we made a statistical analysis of the fractures cases, analyses on age and sex.