Effect of joint stiffness of the ankle joint stability in quiet standing posture

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Joint Stability is the ability of the joint to resist a given perturbation. Several studies have suggested that the number of falls, and injuries, are related to changes in the postural control system, mainly in the sensor and motor systems. The sway variability during quiet standing reflect the strategies assumed by the control system of the joint stability. The balance stabilization during quiet standing it's not only achieved by ankle muscle stiffness, but with a reflex component from changes of muscle activation. The purpose of this work is to contribute to the study and understanding of the mechanisms of joint stability at the ankle joint during a quasi-static posture. Using a stiffness model (Winter et al, 1998) for quiet standing. Methods: The patient studied was an Olympic athlete (26 years old; 1.74 m; 71.1kg) who, for the past six months presented several sprains ankle on the left ankle. Although the sample is not representative of the ankle injury population, it is representative of the problem under study, being possible to analyze using procedures and means of collection of great accuracy. The present study case thus represents an approximation to the inductive behavior of a healthy ankle versus an injured ankle. The task trial consisted in the maintenance of the biped position and one leg stand position on the two platforms of forces plates for thirty seconds. Was asked to the subject to put the feet on the platform in the most comfortable position without any enforcement in relation to the support base. Results: The joint stiffness (k), presented different values in the left ankle (l) compared to the right ankle (r) in medio-lateral (ML) component and the Antero-posterior (AP) component; kAPl = 1.275 Nm/kg/°, kAPr = 0.355 Nm/kg/°, kMLl = -0.370 Nm/kg/°, kMLr = -0.474 Nm/kg/°. The obtained values of the ML component are presented in general lower values of ankle joint stiffness the exception is made when the position in one leg stand and with the introduction of noise (special perturbation). The results allow us to conclude that a) it is possible to describe the condition of Joint Stability through non-invasive processes; b) analyze the behavior of Joint Stability, as a consequence of quasi-static posture, either double or single stance, using joint stiffness as the primary tool.

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Time-to-contact perception in relay swimming: a preliminary study with high-performance Portuguese swimmers.

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In competitive swimming, recent studies have highlighted the importance of optimal relay start strategies to improve the change-over time (Fisher, Braun, & Kibele, 2017; Luedke & Duoos, 2015), suggesting also that the technique used for diving off the block may be influenced by the perception of the time for the oncoming swimmer to touch the wall. Therefore, the aim of this study was to analyze the swimmers' perceptual judgements of a simulated time-to-contact corresponding to the 4x100m and 4x200m freestyle relays. The sample was composed of 31 national-level Portuguese swimmers (n=18 males, 17.22±1.95 yr; n=13 females, 14.61±0.76 yr). Prior to data collection, participants with the experimental task that consisted of the visualization of two videos of the performance of a swimmer approaching the wall in a simulated relay race of 4x100m and 4x200m. These videos were presented with temporal occlusion correspondent to predetermined approaching distances (7.5m, 5.0m, and 2.5m). For each distance, were required to predict the time-to-contact of the approaching swimmer by pressing a switch. A pairwise t-test comparison was performed with a significance level of 5%. The results showed that the time-to-contact predicted by the swimmers was smaller (between 3.8% and 39.8%) than the real time in all the approaching distances. For the male participants, there were significant differences ($p<0.05$) between the predicted and the real time, in both videos, in all the approaching distances, with the exception of the 4x200m video in the distance of 7.5m occlusion ($p=0.620$). For the female participants, significant differences were found between the

predicted and the real time in the shortest (2.5m; p=0.004 and p=0.040, for the 100m and 200m events, respectively) and in the longest approaching distances (7.5m; p=0.000 and p=0.034, for the 100m and 200m events, respectively). This study suggested that high-level swimmers seem to underestimate the time-to-contact when approaching the wall, in the context of a simulated relay race (video). Taken together, these results highlight the importance of the development of perceptual abilities in swimming to optimize the relay start technique and perception when diving off the block.

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Neuromuscular activation in different technical elements of power jump between two groups

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Introduction: Power Jump (PJ), created in Brazil, is a perfect example of indoor physical activity. The aim of this study was the comparison of neuromuscular activation, by evaluating electromyography (EMG) from different technical elements of Power Jump between two groups with difference levels of practice. Methods: Fourteen participants (random selection) were divided into two groups (intermediate level of practice - G1 and advanced level of practice - G2), conducted two technical elements (double scissors –DSs; double side – DSd) of PJ at different levels of intensity (low- 1; medium- 2; high-3). Muscle activation of tibial anterior (TA) and rectum abdominal (RA) muscles were evaluated. The criteria for selecting the participants in different groups was based in video analysis, applying an observation grid from the critical technical components, set up for this purpose. Results: The results from both muscle, for the double scissors element were: (Parameter-Mean (%MVC) ±sd) TA_G1_DSs1- 19.74±8.85; TA_G2_DSs1- 20.53±9.63; TA_G1_DSs2- 21.92±9.09; TA_G2_DSs2- 24.58±11.32; TA_G1_DSs3- 21.42±12.92; TA_G2_DSs3- 27.22±10.16; RA_G1_DSs1- 16.91±8.19; RA_G2_DSs1- 21.60±18.27; RA_G1_DSs2- 20.03±10.95; RA_G2_DSs2- 27.61±9.39; RA_G1_DSs3- 19.07±9.61; RA_G2_DSs3- 34.82±10.24. From the statistical analyses, it was possible to find significances differences between muscle and groups specially in the high intensity exercise. The activation of the TA has statistically differences mainly in the early stages of the movement, and in the higher intensity levels. Muscle activation of RA was different in different levels of intensities and between technical elements. When comparing the Double Side between the groups in the same areas and levels of intensity you can see significant differences only in higher intensity levels. The results allow us to say that there is a progressive adaptation to contact surface as a function of increased intensity and execution of the different technical elements, recruiting more RA, a muscle important for stability in the execution. Conclusions: These changes are easier evident in higher intensity levels, where you need more control or less muscular adaptation in response to the supporting surface. When we compare the elements with each other we can find that, both the double side as the scissors are technical elements easy to learn but that require a large control of stabilizers, which most people can do because in the presence of the risk of a fall the centre of the body that is activated.

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Environment perception and physical activity in Portuguese high school students

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Promoting regular physical activity (PA) in youth has become a main public health goal. Thus, knowledge about the factors that may influence PA, namely environmental features, has gained increased interest. This study aimed at analysing the association between perceived environmental features and PA among adolescents of both genders. Participants were 866 (412 girls; 454 boys) 12-18-years-olds, from four