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MUSCLE POWER OF LOWER EXTREMITIES IN RELATION TO BODY COMPOSITION OF TOP FEMALE RHYTHMIC GYMNASTS

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It’s known that novice rhythmic gymnasts have a specific anthropometric profile that could be correlated with performance (1). Also other aspects like lean body mass and composite measures of flexibility, leg power and visuo-motor proficiency were also significant correlates of attainment (r = 0.69; 11). Due to the importance of anthropometric profile we evaluated Spanish senior national rhythmic gymnasts team during the preparation period before 2007 World Championship. The purpose of this study was to compare the anthropometric measurements and jump results during the season.

11 gymnasts from the Senior Spanish National Team participated for the study. The measurements were carried out at three different moments during the season. Muscle power of lower extremities was measured with a force plate (Kistler Quattro Jump) at 500 Hz. Gymnasts execute Squat Jump (SJ) and Counter Movement Jump (CMJ) tests. We selected the height (m), Peak Force (N), Peak velocity (m/s-1) and Peak Power (W/Kg) of the highest jump execute at each test.

Anthropometric and jump capacity evaluation were made at the same week. Seventeen anthropometric dimensions were taken to calculate the anthropometric somatotype: stretch stature, body mass, nine skin folds, three bone breadths, and five limb girths. Statistical analysis was made with SPSS 15.0 software.

Significant correlation was showed between the thigh skin fold and SJ Peak Power (r: -0.41, p<0.05) and CMU Peak Power (r: -0.41, p<0.05). It was showed a significant correlation between thigh skin fold and SJ (r: -0.47, p<0.01) and CMU (r: -0.48, p<0.01) height. Low thigh skin fold data was revealed as an indicator of better jump capacity.

We also found significant correlation between Endomorphic component with SJ (r: -0.44, p<0.05) and CMU height (r: -0.45, p<0.01). Endomorphic component also showed significant correlation with SJ Peak Power (r: -0.39, p<0.05) and CMU Peak Power (r: -0.43, p<0.05). Significant correlation was found between Percent body fat (Yuhasz) and SJ height (r: -0.41, p<0.05) and CMU height (r: -0.38, p<0.05). No significant correlation was showed between jump capacity variables and muscle mass (Malieka).

An adequate decrease of endomorphic component, decrease of percent body fat, with a correlated increase of jump performance was showed during the preparation period of the world championship. These results revealed the importance of control the evolution of these variables during the training season of elite rhythmic gymnasts. It’s necessary to check that the decrease of the endomorphic component is synchronized with the increase of the jump capacity.

References.

SUB-MAXIMAL VELOCITY, TRAINING AND THE BEHAVIOUR OF BIOMECHANICAL PARAMETERS ASSOCIATED WITH RUNNING ECONOMY

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The running economy has been associated to a variety of biomechanical variables (Saunders & col., 2004). The main goal of our study was to determine the differences between trained and untrained individuals, in relation to some of those biomechanical variables, during the support phase, in 3 different sub-maximal race speeds.

For the accomplishment of this study, 2 different groups were constituted with 8 adult males each, one of trained and another of untrained runners, to determine the behaviour differences of the variables (length and rate step, angles of ankle, knee and shank at the instants of initial contact, intermediate support and toe-off, ground reaction forces in the antero-posterior and vertical components) with an increase of race speed (3, 4 and 5 m/s). For the cinematic data, 1 camera of high temporary resolution with a capture speed of 250 Hz was used along with the Sequen computer program (Gabriel & col., 1998) for the analysis of images. For the dynamic data, a Kistler 9281 B platform of forces was used and the results were analysed by the computer program Acqknowledge 3.2.6 of BIOPAC Systems. To determine the behaviour differences, a t-test was used for matched samples (in non parametric sample distribution it was used the test of Wilcoxon). Then, the differences between the groups were tested using a t-test of 2 independent samples (Mann-Whitney test, in non parametric sample distribution), to determine the differences of behaviour accordingly the training level (p<0.05).

In the analysis between groups, a significant difference was verified in plantar flexion of ankle at toe-off 1.3±10.6° to untrained versus -20.3±15.2° to trained runners at 5 m/s speed race, p=0.04. In the kinetics data, just at 3 m/s, we verified a significant difference in propulsive impulse (0.021±0.005 BW.s to untrained versus 0.016±0.007 BW.s to trained runners, p=0.02). With the increase of running velocity, the untrained increased the plantar flexion to obtain the same step length, while the trained runners probably increased the stiffness of the joints for a better use of the elastic properties of muscles, which seems better for running economy. In the reception, the trained runners have smaller impact impulse 0.036±0.008 BW.s to untrained versus 0.030±0.006 BW.s to trained runners, p=0.03 at 3 m/s and 0.038±0.006 BW.s to untrained versus 0.032±0.006 BW.s to trained runners, p=0.05 at 5 m/s, showing a better technical capacity to attenuate the impact impulse, with a smaller percentage of the impact duration in the total support time 13.3±1.2% to untrained versus 11.9±2.7% to trained runners, p=0.02 at 4 m/s). These characteristics seem an adaptation by training.

References.