

Summary

The effect of physical effort on the force-velocity profile volleyball players.

Success in sports competition is conditioned by a number of factors that always appear as a complex. These factors are constantly in mutual relation, and so, for example, every activity in a sports fight consists of fitness conditioning, coordination abilities and volitional factors. The aim of the study was to investigate the influence of physical effort and physical effort of submaximal jump on force-velocity profiles in vertical jump in young volleyball players. Thanks to the use of the linear regression method, it was possible to create individual and group profiles of the relationship between force and velocity, and to determine the maximum parameters of muscle work, ie. F_0 and V_0 . Moreover, the change of these profiles under the influence of physical effort was examined, which in the presented work was considered on two levels: as an effort leading to fatigue changes and effort as a submaximal task assuming performing a vertical jump at 50% of the maximum capacity.

The study involved 12 players of the MKS Będzin volleyball club (age 17.5 ± 0.52 , body height 188.1 ± 5.8 , body weight 79.6 ± 10.2) and 12 physical education students (age 22.15 ± 1.86 , body height 179 ± 5.59 , body weight 74.08 ± 7.79). The participants' task was to perform vertical jumps (CMJ) without arm swing before and immediately after the exercise protocol to the maximum height and submaximal height (50% of the maximum capacity). For the correct determination and evaluation of the force-velocity profile for each of the conditions (before and after physical effort), it was necessary to perform 9 jumps, including 6 with additional load (9 kg and 27 kg) in each condition.

In order to obtain the necessary force-velocity parameters for the analysis, a force platform and a specially constructed stabilization system were used for the subject in the semi-squat position. During the study, the participants were instructed to stand on the force platform in a semi-squat position and, after appropriate adjustment of the installation, to extend the lower limbs and the entire body. Due to the applied limitation of movement, this task in effect forced contraction of the involved muscles under isometric conditions. The generated force was analyzed during the exercise, and its decrease by 50% for 7 consecutive seconds from the maximum values determined the critical point and determined the end of the fatigue protocol, which was followed by the transition to the research protocol.

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The results obtained in the study indicate no differences in the force-velocity profiles in the studied groups, both during maximum and submaximal jumps. At the same time, empirical data showed higher values of F_0 and V_0 in the group of volleyball players obtained during maximum jumps. Moreover, the assessed influence of isometric exercise on the change of the differentiation coefficient did not show any statistically significant changes in both studied groups. The possibility of using the force-velocity profile to assess the maximum power in maximum CMJ was also investigated. The obtained power profile results were significantly smaller than the real power recorded on the force platform.

Higher parameters of muscle work are caused by the training regime to which volleyball players are subjected. On the other hand, the lack of differences in the differentiation coefficient after the exercise protocol may be caused by the intensity of the effort, which did not cause large enough changes in the system to disturb the quality of control in the context of kinesthetic differentiation.