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UDC 796.323.2:796.015.52

EFFECT OF PLYOMETRIC LOAD VOLUME ON JUMP READINESS OF BASKETBALL PLAYERS AGED 13-15 YEARS

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https://doi.org/10.5281/zenodo.23768681

Annotation. The paper examines the issue of optimizing the volume of plyometric load in the process of jump training of young basketball players. The age of 13-15 years is a sensitive period for the development of speed and strength abilities, but the question of the required number of jumping repulsions per training session remains debatable. The aim of the study was to compare the effects of plyometric training programs with low and high load volume on vertical jump performance in basketball players aged 13-15 years. The experiment involved 31 athletes divided into groups of low volume, high volume and control; the duration of the program was 6 weeks with a frequency of two sessions per week. The Squat Jump (SJ), Countermovement Jump (CMJ), and Horizontal Jump (HJ) tests were used for evaluation. It was found that both experimental groups showed a comparable increase in jumping performance, while низкообъёмнаяthe low-volume program turned out to be more effective per repulsion performed. The results obtained indicate the non-linear nature of the volume - result relationship and confirm the expediency of using economical plyometric protocols in working with young basketball players.

Keywords: jump training, plyometric training, load capacity, basketball, young athletes aged 13-15, vertical jump, Squat Jump, Countermovement Jump, sensitive period.

Jumping ability in basketball determines the effectiveness of jump shots, the efficiency of picking up the ball on the shield and the quality of blockedshots, which places high demands on the speed and strength training of players already at the stage of advanced specialization. The age range of 13-15years coincides with the active phase of pubertal development and is considered as a sensitive window for purposeful development of strength and power. Plyometric training, based on the use of a stretch-contraction cycle, is recognized as an effective means of improving jumping performance in adolescent basketball players. At the same time, practical recommendations on plyometric load dosing in this age group remain insufficiently specified. In particular, the question remains whether a twofold increase in the volume of jump repulsions gives a proportional increase in the result, or whether the volume-effect relationship is nonlinear. The answer to this question is of direct practical importance for planning the training process without the risk of overloading the musculoskeletal system of a growing organism.

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The experiment involved 31 male basketball players (average age 15.1 ± 1.8 years) representing four teams of an elite basketball club. The athletes were randomly assigned to three groups: a low volume group (LV, n = 10), a high volume group (HV, n = 11), and a control group (CG, n = 10). The experimental groups performed the plyometric program twice a week for 6 weeks. The load volume was regulated by the number of jumps per training session: in the LV group, it averaged 49.3 repulsions, in the HV group-98.7 repulsions, that is, twice as much. The program included two-sided vertical jumps with a free swing of hands, performed for 8 repetitions in a series. The control group continued to train according to the usual basketball program without additional plyometric load. Pre-and post-intervention testing included Squat Jump (SJ), Countermovement Jump (CMJ), and Horizontal Jump (HJ). Statistical data processing was performed using appropriate criteria for cross-group and intra-group comparisons; the significance level was assumed at $p < 0.05$.

At the end of the 6-week program, both experimental groups showed improvements in jump tests, while no significant changes were recorded in the control group. The key result of the study is that the LV and HV groups showed **a comparable increase** in vertical jump performance, despite a twofold difference in the amount of work performed. In particular, the low-volume group significantly improved results in SJ, CMJ, and HJ ($p < 0.001$–0.05), while the high — volume group only improved in SJ and CMJ ($p < 0.001$). None of the groups showed a significant increase in sprint performance or ability to change the direction of movement, which is consistent with the data on the specificity of plyometric effects mainly on the vertical vector of jumping activity.

From a practical point of view, it is fundamentally important that the low-volume program turned **out to be more effective per repulsion**: to achieve a similar increase in the LV group, it took half as many jumping loads as in the HV group. This result confirms the non-linear nature of the volume — result relationship and is consistent with modern concepts that further increase in the volume of plyometric work after reaching a certain threshold does not give a proportional increase, but increases the risk of accumulation of fatigue and potential injuries. The data obtained are important for the practice of training young basketball players: they support cost-effective plyometric protocols that provide sufficient training stimulus with fewer jump pushes. At the same time, there are indications in the literature that complex training, combining plyometric exercises with strength exercises, can provide an even more pronounced increase in Countermovement Jump compared to isolated плиометриейplyometry, which opens up prospects for further optimization of jump training in this age group.

Conclusions. Plyometric training programs with low and high load volumes provide a comparable increase in vertical jump performance for basketball players aged 13-15 years. At низкообъёмнаяthe same time, the low-volume program is more economical: it allows you to achieve a similar training effect with half the number of jump repulsions. The results obtained confirm the expediency of using moderate plyometric volumes in the jump training of young basketball players and indicate the nonlinear nature of the volume — result relationship. A promising area of further research is to study the differentiated effect of the plyometric load volume, taking into account the biological maturity of athletes (pre-PHV, mid-PHV, post-PHV), since

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adaptive responses to strength and speed-force exposures in adolescence differ significantly depending on the stage of pubertal development.

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