

THE POSSIBILITIES OF UTILIZATION OF PLYOMETRICS IN CONDITIONING TRAINING OF ADOLESCENTS

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Abstract

The report focuses on the domain of the plyometrics in the sports training of adolescents. It summarise relevant knowledge by literature retrieval. The sources were Czech and foreign publications. The aim of the report is to give a view of problems of plyometrics in the sports training of youth.

1 Theoretical part of plyometrics

In the area of sports training there is a demand on looking for new methods or the innovating of the current ones. Coaches are trying to use the most effective training methods to prepare their athletes for the successful performance. Plyometrics are a good example of it. If the coaches and athletes want to use the plyometric they have to know its principle. The principle of plyometric is based on the stretch-shortening cycle of the muscles. This cycle is a common element of many sport skills. If a muscle shortens immediately after a stretch: force and power output increase, and energy expenditure decrease (Zatsiorsky and Kraemer, 2006). Speed-strength and stretch-shortening cycle abilities are required every time the foot touches down to propel the body forward (Gamble 2010). In the context of that, even one of the basic kinds of locomotion, running, is a plyometric activity. Wilk and Voight (in Page and Ellenbecker, 2003) define the plyometrics as quick, powerful movements involving an eccentric contraction followed immediately by an explosive concentric contraction. These authors also mention that plyometric exercises stimulate the body's proprioceptive mechanism and elastic properties to generate maximal force output in the minimal amount of time. Debnam (2007) describes plyometrics as a exercises or drills that combine speed and strength to produce an explosive-reactive movement or increased power. This kind of exercises work on the principle that a concentric muscular contraction is much stronger if there immediately follows an eccentric contraction of the same muscle (Shepherd, 2006). Brown (2007) mentions that plyometric exercises focus on training the transition phase between the eccentric and concentric phases - it is called an amortization phase. Well designed plyometric training programs can bring many benefits to the athletes.

2 The benefits of plyometrics

Plyometric exercises are based on very quick and explosive movements. The authors generally agree that plyometrics are great type of exercises if you would like to enhance the muscle's ability to generate power (Bean, 2005, McNeely and Sander, 2007, Page and Ellenbecker, 2003, Radcliffe and Farentinos, 1999, Shepherd, 2006). Some authors mention that properly designed plyometric training can have more benefits. Brown (2007) mentions that elite athletes use some form of plyometric exercises to improve not only power necessary

for explosive movements but also the agility and speed. The recently researches have shown that plyometric training could have positive changes in running economy (Turner et. al., 2003) or energy cost of running (Berryman et. al., 2010). Plyometric exercises can also be utilize as a prevention of injuries. Hewett et. al. (1996) examined that plyometric training can have effects on knee stabilization and prevention of serious knee injury in female athletes. Boyle (2004) also mentions benefit of plyometric exercises as a prevention of injuries. He also suggests to use plyometric with the others exercises to increase its benefits. He mentions a combination of plyometrics, Olympic lifting, and medicine-ball throws to improve power. Shepherd (2006) mentions power combination training as combination weights and plyometric exercises. Using plyometrics with other training methods (resistance training, anaerobic, sprint, interval training or circuit training) is also mentioned by Chu (1998).

3 The basic principles of plyometric training for adolescent

Coaches should design plyometric training very cautiously. Training programs for children have to consider the dynamics of growth and development for each stages of growing up (Bompa, 2000). Radcliffe and Farentinos (1999) declare that there does not appear to be any significant response to explosive strength training in the adolescent until after the onset of puberty. Plyometric program should be based on competence and be teach by a progressive way (Boyle, 2004). First of all athlete should learn to jump off and properly land (softly) on the ground before we attempt minimize time spend on the ground. It's important to absorb force with the muscles not with the joints. Boyle (2004) also suggests don't exceed 150 foot contacts during plyometric exercises per week Athletes can change the intensity of the jumps, not the volume. Chu (1998) difers variables of plyometric exercises to intensity, volume, frequency and recovery and he mention that we should consider many factors during planning the plyometric training - sex, training level, eccentric strength and specificity of training, and of course age.

4 Equipment for plyometric exercises

Athletes and coaches could use many kinds of equipments during plyometric training. Radcliffe and Farentinos (1999) mention angle box, angle board, bars, boxes, cones, dumbbells, heavy bags, hurdles, landing pits, medicine balls, star stairs and tubing or bands. McNeely and Sandler (2007) suggest use for throwing and increasing resistance while jumping shot puts, kettlebells, dumbbells, or bars. Also weighted vests of various weight are a good way to increase resistance according to him. Chu (1998) mentions using also various barriers, stairways, bleachers and stadium steps. Page and Ellenbecker (2003) mention utilization the plyometric exercises with elastic resistance. Elastic resistance is provided by an elastic band which can have various lengths. Submit equipments have many advantages. They are used commonly for training because of their versatility, simplicity, portability and low cost.

5 Researches of plyometrics in adolescent

It is important to mention the age of adolescents stage of growing up. According to Langmeier and Krejčířová (2006) and also Řičan (2008) is adolescent the stage of growing up between 15-20, respectively 22 years. Some recent examinations were focused on the plyometric training and its effects on the subjects of this age. For example Matavulj et. al. (2001) looked at effects of plyometric training on jumping performance in junior basketball players (15-16y). They applied a 6-week- plyometric training program of young basketball players and

conclude that a limited amount of plyometric training could improve jumping performance in elite athletes. Herrero et. al. (2006) compared effects of two kinds of training methods (electromyostimulation and plyometric training) on jumping and sprint time. The subjects were male physical education students of the elderly adolescent age (19-22,3y). They conclude that combination of these methods could increase the jumping height, sprint time, maximal strength and to influence some hypertrophy of trained muscles in physical active men. Another research compared two plyometric training techniques, drop jump and countermovement jump, and their effect on muscular power and agility in youth soccer players (16,9-17,7y). The investigators Thomas et. al. (2009) concluded that both plyometric techniques are activities for improving power and agility in youth athletes. Also Chelly et. al. (2010) were focused on soccer players of the adolescent age (18,3-19,7y). They examined the effects of in-season short term plyometric training program on leg power, jump and sprint performance. They found significant improvements in important components of athletic performance. According to their conclusions, they recommend plyometric exercises to be involved to the annual soccer training program.

Conclusion

Use the addition of plyometric training to the physical preparation of the athletes seems to make sense. This kind of training could bring many benefits. The plyometric exercises primarily enhance the muscle's ability to generate power. Secondly they can stimulate also speed, ability or improve running economy. Those are the reasons why the plyometric exercises are utilized in the sports training. Well designed plyometric training program could also work as prevention of injuries. It depends on the goals which coaches and athletes would like to achieve. Coaches and athletes can use many kinds of equipments. These equipments are often simple, portable and not to much expensive. Some of them can be also handmade. It is very important not to forget that the training of adolescent has its own specifics. We cannot just transform the fundamentals of sports training of adult to adolescent without thinking. We should consider the special needs of the age. Recently there have been made some researches focused on effect of plyometrics training programs in youth athletes. Many of them found significant improvements in the athletes' performances or abilities. The researchers recommend the utilization of plyometrics to the annual training programs. They also mention that there should be made more researches focud on the plyometric exercises and various plyometric training programs.

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MOŽNOSTI VYUŽITÍ PLYOMETRICKÉ METODY POSILOVÁNÍ V KONDIČNÍ PŘÍPRAVĚ ADOLESCENTŮ

Příspěvek se zabývá problematikou plyometrie a jejím využitím ve sportovním tréninku adolescentů. Jedná se o literární rešerši, která využívá informace z českých, ale především zahraničních zdrojů. Cílem příspěvku je upozornění na teoretická východiska týkající se plyometrie a v neposlední řadě také nastínění možnosti využití plyometrie ve sportovním tréninku adolescentů.

DIE ANWENDUNGSMÖGLICHKEITEN DER PLYOMETRIE IN DER KONDITIONELLEN VORBEREITUNG VON JUGENDLICHEN

Der Beitrag beschäftigt sich mit der Problematik der Plyometrie und der damit verbundenen Anwendung im Sporttraining von Jugendlichen. Es handelt sich hierbei um eine Literaturrecherche, welche auf Informationen aus tschechischen aber vor allem ausländischen Quellen beruht. Der Beitrag soll auf die theoretischen Ausgangspunkte aufmerksam machen, welche die Plyometrie betreffen und nicht zuletzt die Möglichkeiten der Nutzung der Plyometrie im Sporttraining von Jugendlichen aufzeigen.

MOŻLIWOŚCI WYKORZYSTANIA PLYOMETRYCZNEJ METODY WZMACNIANIA MIĘŚNI W PRZYGOTOWANIU KONDYCYJNYM ADOLESCENTÓW

Artykuł dotyczy zagadnienia plyometrii i jej wykorzystania w treningu sportowym adolescentów. Obejmuje przegląd literatury, oparty na informacjach pochodzących z czeskich, a zwłaszcza zagranicznych źródeł. Artykuł ma na celu wskazanie teoretycznych założeń dotyczących plyometrii oraz zdefiniowanie możliwości wykorzystania plyometrii w sportowym treningu adolescentów.