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RESISTANCE TRAINING FOR YOUTH: MYTHS AND FACTS

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ABSTRACT

Using resistance training with the aim of developing muscle strength among youth is still a matter of debate and often receives severe criticism. Previous research, which has not noted an increase in muscle strength, led to the conclusion that resistance training is ineffective among youth. However, the results of numerous more recent studies which have closely followed the published statements and recommendations obtained by leading global professional and health organizations, indicate that if carried out properly, resistance training among youth can have very positive results. In addition to its positive influence on muscle strength and endurance, as well as the potential increase in the success rate of motor performance, regular resistance training can result in the improvement of body composition, increased bone mineral density, an improvement in cardiorespiratory fitness, as well as its influence on one's psychological well-being. The most commonly used types of load for resistance training include free weights and weight machines, which can have standard dimensions, but are also specially designed for younger people. It is also often the case that these training programs consist of body weight exercises, exercises with a medicine ball, expanders and elastic bands. Current findings from well-organized and monitored studies involving samples of youth indicated a very small possibility of injury during resistance training, provided that all the training recommendations for the given age group are adhered to.

Keywords: *resistance training, youth, muscle strength, muscle endurance.*

VADBA ZA MOČ PRI MLADIH: MITI IN DEJSTVA

IZVLEČEK

Vaje za moč, s katerimi razvijamo mišično moč pri mladih, so še vedno stvar razprave in pogosto predmet hude kritike. Predhodne raziskave, v katerih povečanja mišične moči avtorji niso zaznali, so pripeljale do zaključka, da je trening za moč med mladimi neučinkovit. Vendar pa rezultati številnih novejših raziskav, ki so pozorno spremljale objave in priporočila vodilnih svetovnih strokovnih in zdravstvenih organizacij, kažejo, da ima ob pravilni vadbi lahko trening za moč pri mladih zelo pozitivne rezultate. Poleg pozitivnega vpliva na mišično moč in vzdržljivost kot tudi potencialnega povečanja uspešnosti motoričnih vadb, lahko redni treningi moči pripeljejo do izboljšanja sestave telesa, večje gostote mineralov v kosteh, izboljšanja kardiorespiratornih sposobnosti kot tudi do vpliva le-teh na posameznikovo psihično dobro počutje. Najpogosteje uporabljene vrste obremenitev pri vadbi za moč vključujejo uporabo prostih uteži in uteži na fitnes napravah, ki so lahko standardnih dimenzij ali so izdelane posebej za mlade. Prav tako se pogosto zgodi, da so programi treniranja sestavljeni iz vaj z lastno težo, vaj z medicinsko žogo, vaj z ekspanderji ali elastičnimi trakovi. Trenutne ugotovitve dobro pripravljenih in nadzorovanih študij, ki so vključevale v svojih vzorcih tudi mlade, kažejo na zelo majhno možnost poškodb med treningom za moč, seveda pod pogojem, da se upošteva vsa priporočila za vadbo pri določeni starostni skupini.

***Ključne besede**: vadba za moč, mladi, mišična moč, mišična vzdržljivost*

INTRODUCTION

Resistance training (Faigenbaum, Kraemer, Jeffreys, Micheli, & Rowland, 2009) is a specialized method of physical conditioning that involves the progressive use of a wide range of resistive loads and a variety of training modalities − from medicine balls to high-intensity weightlifting that enhance or maintain muscular fitness (i.e. muscular strength and muscular power). Using resistance training with the aim of developing muscle strength among youth is still a matter of debate and often receives severe criticism. The terms youth and young athletes are broadly defined to include both children and adolescents (Faigenbaum, Lloyd, & Myer, 2013). Previous research, which has not noted an increase in muscle strength, led to the conclusion that resistance training is ineffective among youth. Moreover, the results of numerous recent studies which have closely followed the published statements and recommendations obtained by leading global professional and health organizations, indicate that if carried out properly, resistance training among children in late childhood (ages 9 through 12) and adolescents can

have very positive results. However, many parents, and also PE teachers, have lingering concerns about the safety of youth resistance training. The aim of of this article is to deal with these concerns and offer scientific evidence in response to misconceptions regarding the resistance training of youth.

THE MISCONCEPTIONS REGARDING THE RESISTANCE TRAINING FOR YOUTH

Myth: "Resistance training is unhealthy for youth."

Facts: It may not be as rewarding to cardiovascular and respiratory changes in the body as aerobic exercises, but a child who exercises is far more healthy than an inactive youth. While youth have traditionally been encouraged to participate in aerobic activities such as swimming, cycling and ball games, a compelling body of evidence indicates that resistance training can also be a safe and effective method of exercise (Faigenbaum, 2009). In addition to its positive influence on muscle strength and endurance, as well as the potential increase in the success rate of motor performance, regular resistance training can result in the improvement of body composition, increased bone mineral density, an improvement in cardiorespiratory fitness, as well as its influence on one's psychological well-being. However, any improvement in muscle strength will not always and necessarily lead to an improvement in the desired motor performance. If the main goal of exercise is this type of improvement, then resistance training should respect the principle of specificity, that is, should include precisely those movements and types of muscle contractions which most closely resemble the ones that occur during motor performance (Radovanović & Ignjatović, 2009). However, youth should not use weight training equipment at home without the supervision of a qualified professional.

Myth: "There is a high risk of injuries from resistance training."

Facts: Current research indicates that resistance training can be a safe, effective and worthwhile activity for youth (Faigenbaum, Myer, Fernando, & Casas, 2011). There may be a cause for concern if the activity is performed by youth, unsupervised, with poor technique and incorrect training methods (Faigenbaum et al., 2009; Faigenbaum & Myer, 2010). Resistance training, like most other physical activities, carries with it a certain risk of injury. Nevertheless, this type of risk is no greater than the risk found in other sports or recreational activities in which youth regularly take part. Current findings from well-organized and monitored studies involving samples of youth indicated a very small possibility of injury during resistance training, if all the training recommendations for the given age group are adhered to.

Myth: "Resistance training is unsafe for youth."

Facts: The risks associated with resistance training are not greater than with other sports and activities in which youth regularly participate. They should not use weight training equipment at home without a supervision of a qualified professional (Faigenbaum & Myer, 2010). The most commonly used types of load for resistance training include free weights and weight machines, which can have standard dimensions, but are also specially designed for younger people. It is also often the case that these training programs consist of body weight exercises, exercises with a medicine ball, expanders and elastic bands. Lately, the most widely used training programs include exercises for the improvement of balance and coordination. The potential benefit of such training is reflected in the decreased risk of injury. Besides using free and fixed weights (child- and adult-sized weight machines), other alternative methods to provide resistance, such as the individual's own body weight (Falk & Mor, 1996), medicine balls (Faigenbaum & Mediate, 2006; Ignjatovic, Markovic, & Radovanovic, 2012) and elastic bands (Annesi, Westcott, Faigenbaum, & Unruh, 2005) have also been shown safe and effective in youth.

Myth: " Youth cannot increase strength because they do not have enough testosterone."

Facts: Testosterone is not essential for achieving strength gains. In short-term (8 to 20 weeks) resistance training programs, the expected progress in strength in youth is around 30 % (Faigenbaum et al., 2009). The Falk and Tenenbaum meta-analysis (1996) found that gains in muscle strength were approximately 13 – 30 % greater than that which would be expected to result from growth and maturation. The ability to gain muscular strength seems to increase with age and maturational status, but there is no noticeable boost during puberty (Behringer, vom Heede, Yue, & Mester, 2010). Due to the lack of strong and clear evidence which would indicate muscle hypertrophy among children, the increase in muscle strength is usually ascribed to neurological adaptations.

Myth: "Resistance exercise stunts children's growth."

Facts: Neither physiological arguments nor research or investigation show that this has occurred. Participation in weight-bearing physical activities (including resistance training) will have a favourable influence on growth at any stage of development but will not affect a child's genetic height potential (Faigenbaum, 2009).

Myth: "Resistance training is only for young athletes."

Facts: While regular participation in a resistance training program can enhance the performance of young athletes and reduce the risk of sports-related injuries, boys and girls of all abilities can benefit from resistance training (Lloyd et al., 2014). For example, resistance training can enhance the bone mineral density of girls, and can spark an interest in physical activity in overweight children who tend to dislike prolonged periods of aerobic exercise (Faigenbaum, 2009; Dahab & McCambridge, 2009). More scientific research should be carried out to precisely identify the magnitude of strength increase and the parameters of training in young athletes.

Myth: "Squats are bad for knees."

Facts: Youth put more stress on knees during running than they do when performing squats. Squats are a safe exercise for even those who have had reconstruction of the ACL (Shelburne & Pandy, 1998), and deep squats do not contribute to an increased risk of injury to passive tissues (Hartmann, Wirth, & Klusemann, 2013).

Myth: "Resistance training can give poor flexibility."

Facts: Studies indicate that resistance training generally enhances flexibility. Regular resistance exercises, with a full range of movements, will improve both the elasticity of the muscles and flexibility (Smith et al., 2014), or it will not interfere with the increase in joint range of motion during flexibility training (Noóbrega, Paula, & Carvalho, 2005).

DISCUSSION

The majority of recent research provides convincing evidence that youth enrolled in a properly designed resistance training program can significantly increase their muscle strength and power, above and beyond that expected as the result of growth and maturation. Moreover, some leading world fitness and health organizations (British Association of Sport and Exercise Science, 2004; American Academy of Pediatrics, 2008; Behm, Faigenbaum, Falk, & Klentrou, 2008) guidelines, and review articles (Hass, Feigenbaum, & Franklin, 2001; Ignjatović, Stanković, Radovanović, Marković, & Cvećka, 2009; Faigenbaum et al., 2013) all state that strength training, if done properly, can be very beneficial for youth.

Although it is generally accepted that properly designed resistance training programs will over time increase the force-generating capability of a muscle (Fleck & Kraemer, 2003), there is still considerable debate among the field specialists about the

loads that should be used to maximize power gains (Cronin, Mcnair, & Marshall, 2001) and the level of load at which maximum power will be produced. Studies using the individuals who were experienced in explosive exercises reported that loads between 40 and 70 % of 1 RM were most effective in power production improvements (Baker, Nance, & Moore, 2001; Seigel, Gilders, Staron, & Hagerman, 2002). The results from our previous study on young athletes (Ignjatovic, Radovanovic, Stankovic, Markovic, & Kocic, 2011) also suggest that with trained subjects, maximum power gains should be expected around 50 % of 1 RM. Recent reviews suggest that the youth should begin with exercises that involve all major muscle groups with relatively light weight, one to three sets of six to fifteen repetitions, two to three non-consecutive days per week (Miller, Cheatham, & Patel, 2010), and as muscle strength and motor skill proficiency improve, the load and complexity of the prescribed training program should reflect the training experience, age, and technical abilities of the youth (Harries, Lubans, & Callister, 2012; Faigenbaum et al., 2013).

CONCLUSIONS

The results of numerous recent studies which have closely followed the published statements and recommendations obtained by leading global professional and health organizations, indicate that if carried out properly, resistance training among youth can have very positive results. Resistance training, like most other physical activities, carries with it a certain risk of injury. Nevertheless, this type of risk is no greater than the risk found in other sports or recreational activities in which youth regularly take part. Current findings from well-organized and monitored studies involving samples of children or adolescents indicated a very small possibility of injury during resistance training, if all the training recommendations for the given age group are adhered to.

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