

Influence of Resistance Training on Anabolic Hormones in Pre-Pubertal and Pubertal Males

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Abstract

This review focuses on the hormonal responses to resistance training in pre-pubertal and pubertal males with the aim to elucidate possible mechanisms that may be responsible for the increases in strength and power following systematic training in these age groups. Studies that have controlled for the confounding effects of growth and motor skill acquisition, have shown that resistance training results in significant increases in muscular strength even before puberty. Although the training induced muscle hypertrophy in pre-pubescent is possible, it is much less compared that of post-pubescent. On the other hand an equal or greater improvement in neuromuscular activation, motor skill and intrinsic muscular adaptations are reported in the pre-pubescent compared to the post-pubescent following resistance training programs. Resting serum testosterone concentration has been found to increase following 2-12 month resistance training programs and this is accompanied with an increase in muscle strength. Changes in strength and hormonal concentrations depend on the characteristics of the resistance training program, with the most important being exercise intensity and volume.

Key Words: Growth Hormone, Testosterone, Children

Introduction

Resistance training for children and adolescents has been a topic of great interest among scientists, physicians, coaches, young athletes and their parents. The research conducted in this area during the last two decades has provided valuable information on the responses of the young organism to this type of training and has advanced our understanding on mechanisms responsible for these adaptations (*Falk and Tenenbaum, 1996*). This review focuses on the hormonal responses to resistance training in pre-pubertal and pubertal males with the aim to elucidate possible mechanisms that may be responsible for the increases in strength and power following systematic training in these age groups.

Effectiveness of resistance training in pre-pubertal and pubertal males

The participation of boys in resistance training programs leads to a positive

influence on their fitness that results in an increase in sport performance and offers protection from sports injuries (*Kraemer-Fleck, 1993*). Resistance training in young boys also improves quality of life and contributes to positive attitude toward wellness and exercise (*Shephard, 1984*). One of the most important characteristics of resistance exercise programs for children must be safety. Emphasis should be placed on proper technique and sessions should be supervised by a qualified instructor. Exercise intensity and interval between exercises should be chosen according to the maturation level of the young athlete, but maximal loading should be avoided (*Bases, 2004*).

Heavy resistance exercise in adults' results in significant adaptive responses, including increases in strength and power and muscle hypertrophy that, are dependent on the type, intensity of loading and volume of training (*Fleck and Kraemer, 1987*). It is well known that in adults, the increases in