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EFFECT OF WEIGHT TRAINING ON HORMONAL VARIABLE ADIPONECTIN

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Abstract

The purpose of the study was to find out the effect of weight training on variable adiponectin among pre pubescent, pubescent and post pubescent males. To achieve this purpose fifteen (n = 15) male pre pubescent (age 9-12 years), fifteen (n = 15) male pubescent (age 13-18 years) were randomly selected from Sri Ramakrishna Higher Secondary School, Chidambaram, Tamil Nadu, India and fifteen (n = 15) male post pubescent (age 19-25 years) from Faculty of Arts, Annamalai University, Annamalai Nagar were randomly selected as subjects for this study (N = 45). The selected subjects were assigned as Group I pre pubescent (PP), Group II pubescent (PU) and Group III post pubescent (POP) respectively. All the three groups underwent weight training. The selected criterion variable namely adiponectin was assessed before and after the training period. The data collected from experimental group I, group II and group III prior to and after the completion of the training period were statistically analysed for significant difference if any, by applying dependent 't' test. The paired mean gains of experimental groups were tested for significance by applying independent 't' ratio. The level of confidence was fixed at 0.05 level

Keywords: Weight training, Weight variable and Weight endurance.

INTRODUCTION

A hormone can be defined as a discrete chemical substance secreted into the body fluids by an endocrine gland and which has a specific effect on the activities of other cells, tissues and organs. The cell, tissue, or organ upon which a hormone has an effect is called a target cell, or target tissue, or target organ, respectively. Hormone causes a specific effect on the activities of target organs. This effect, which may require minutes or hours to occur, is brought about mainly increasing or decreasing an ongoing cellular process rather than by initiating a new one. For example, hormones may activate enzyme systems, alter cell membrane permeability, cause muscular contraction or relaxation, cause protein synthesis, and cause cellular secretion. Three general characteristics of hormone action that need to be discussed are specificity of hormone action, physiological mechanisms of hormone action and control of hormone secretion (Fox and Mathews, 1981).

Four major organs play a dominant role in fuel metabolism are liver, adipose, tissue, muscles and brain. These tissues contain unique sets of enzymes, as such each organ is specialized for the storage, use and generation of specific fuels. These tissue do not function may provide substrates to another, or process compounds produced by other organs (Champe, Harvey and Ferrier, 2005).

Until now a number of hormones produced by adipose tissue have been discovered and their role in the human body is being unraveled. Further studies including and suggested that leptin is an important regulator of food intake and energy expenditure that links peripheral adipose energy stores to the hypothalamic satiety center and serves as a very sensitive marker of the body fat content and metabolic activity (Havel, 2002). Adipose tissue is second only to the liver in its ability to distribute fuel molecules. In a 70 kg man, adipose tissue weighs approximately 14 kg, or about half as much as the total muscle mass. In obese individuals adipose tissue can constitute up to seventy per cent of body weight. Nearly the entire volume of each adipocyte can be occupied by a droplet of triacylglycerol (Champe, Harvey and Ferrier, 2005).

Adiponectin is expressed exclusively in white and according to some reports also in brown adipose tissue (T37i brown adipocyte cell line). Adiponectin gene regulation includes a number of hormonal and environmental factors. Adiponectin gene expression in white adipose tissue is decreased by obesity, glucocorticoids, adrenergic agonists and TNF and increased by leanness, cold exposure, adrenalectomy and IGF-1.There are somewhat conflicting reports concerning the influence of insulin on the adiponectin gene expression. Some authors have reported an increase of adiponectin gene expression in 3T3-L1 adipocytes in vitro after short-term insulin stimulation, while others found a decrease in adiponectin gene expression that may have different effects depending on the dose and the duration of action. It should be stressed that most of the hormonal actions described above were studied under in vitro conditions which may not necessarily reflect the true in vivo situation (Fasshauer *et al.*, 2002).

The emergence of the elite young athlete has triggered interest in understanding the anatomic and physiologic responses to exercise in children. Do children have the same physiological adaptation as adults? If not, do these differences influence how child athletes should train and compete? Are there particular risks to young athletes based on their physiologic responses to exercise? Attempts to answer these important questions have stimulated the researcher to review the books and journals to know scientific findings specifically with regard to exercise and its influence on children and adult.

Not surprisingly, children do, manifest unique features in their responses to exercise that separate them from adults. Children, in contrast to mature individuals, are growing. This growth is both physical (i.e., progressive increase in size of heart, lungs, and muscle) and functional (changes in sweating rate, increases in cellular glycolysis). Many of these changes influence exercise and bear consideration in the care and nurture of young athletes. This is true not only of elite athletes but also of children who participate at all levels of competition.

No previous studies have attempted to compare the responses of adiponectin and insulin sensitivity to weight training among pre-pubescent, pubescent and post-pubescent males. Therefore, the present study was designed to determine the effects of weight training on strength parameters and also on insulin sensitivity and adiponectin concentration among pre-pubescent, pubescent and post-pubescent males.

Weight training works by causing microscopic damage or tears to the muscle cells, which in turn are quickly repaired by the body to help the muscles to regenerate and grow stronger. The breakdown of the muscle fiber is called “catabolism”, and the repair and re-growth of the muscle tissue is called “anabolism”. Anabolic means to grow, and that’s exactly what happens after break down of muscle fibers with weight exercise. In fact, many biological processes of growth in the body require some breakdown, or catabolism, prior to re-growth. The testosterone, adiponectin, growth hormone, protein, and other nutrients rush to the muscle after a weight-exercise session to repair the muscles and make them stronger. Importantly, the muscles heal and grow when they aren’t working out, and so that’s why it’s necessary to leave time between workouts for recovery.

According to Hooks (1988) weight is the key to success in sports and games. The value of weight in athletics is not a new idea. There is a vast need for every one for a better understanding of weight. The primary objective in weight training is not to learn to lift as much weight as possible but to increase weight for application to the relevant sport. This is possible only when the coaches and physical education teachers use the correct and the most beneficial and economical means to train their sportsmen. Weight in the form of explosive power is used more in sports and games competition. Whenever an athlete has to accelerate himself, an external object, or both, his ability to generate force with speed will be a primary determinant of his success. Weight and speed are integral components of fitness found in varying degrees in virtually in all athletic movements. Simply put the combination of weight and speed is power. Power represents the one component of athletic fitness that may be most indicative of success in sports, requiring extreme and rapid force production. Maximal weight and power are not distinct entities, they have a hierarchical relationship with one another. Maximum weight is the basic quality that influences power performance. Power performance is affected by the interaction between agonist, antagonist and synergic muscles involved in joint movements

METHODOLOGY

The purpose of the study was to find out the effect of weight training on selected hormonal variable adiponectin among pre pubescent, pubescent and post pubescent males. To achieve this purpose fifteen (n = 15) male pre pubescent (age 9-12 years), fifteen (n = 15) male pubescent (age 13-18 years) were randomly selected from Sri Ramakrishna Higher Secondary School, Chidambaram, Tamil Nadu, India and fifteen (n = 15) male post pubescent (age 19-25 years) from Faculty of Arts, Annamalai University, Annamalai Nagar were randomly selected as subjects for this study (N = 45). The selected subjects were assigned as Group I pre pubescent (PP), Group II pubescent (PU) and Group III post pubescent (POP) respectively. All the three groups underwent weight training. The selected criterion variable namely adiponectin was assessed before and after the training period by Enzyme Immuno assay test. The data collected from experimental group I, group II and group III prior to and after the completion of the training period were statistically analysed for significant difference if any, by applying dependent ‘t’ test. The paired mean gains of experimental groups were tested for significance by applying independent ‘t’ ratio. The level of confidence was fixed at 0.05 level.

ADIPONECTIN

The mean, standard deviation and dependent ‘t’ ratio on the data obtained for adiponectin of pre and post-test of pre pubescent (PP), pubescent (PU) and post pubescent (POP) groups have been presented in Table I.

TABLE – I
MEAN, STANDARD DEVIATION AND 't' RATIO ON ADIPONECTIN FOR PRE AND POST TEST WEIGHT TRAINING OF PRE PUBESCENT, PUBESCENT AND POST PUBESCENT MALES

Groups		Mean	S.D	DM	't'-ratio
Pre Pubescent Group	Pre-test	9.12	1.50	0.54	4.84
	Post-test	9.66	1.30		
Pubescent Group	Pre-test	9.32	1.04	0.55	4.61
	Post-test	9.80	0.94		
Post Pubescent Group	Pre-test	10.12	1.21	3.30	13.49
	Post-test	13.42	1.46		

The table value required for significant for df 14 is 2.14.

Table I shows the mean value of adiponectin of pre pubescent group was 9.12 and the post test adiponectin was 9.66. The mean difference was 0.54. The obtained 't' ratio was 4.84 and it is higher than the table values 2.14 required for significance at 0.05 level for df 14. It was inferred that the weight training had caused significant improvement on adiponectin for the pre pubescent group.The mean value of adiponectin of pubescent group before the commencement of weight training was 9.32 and after the completion of twelve weeks training the mean was 9.80. It resulted with a mean difference of 0.55. The obtained 't' ratio was 4.61 and it was higher than the table value of 2.14 required for significance at 0.05 level for df 14. It was concluded that the weight training improved the adiponectin of pubescent boys.

The mean values of adiponectin before and after the weight training for post pubescent group were 10.12 and 13.42 respectively. The mean difference of 3.30 resulted with a 't' ratio of 13.49. The table value required for significance at 0.05 level for df 14 is 2.14. As the obtained 't' ratio was higher than the table value it was concluded that the weight training has resulted in a significant improvement in adiponectin for post pubescent group.

TABLE II
COMPARISON OF MEAN GAIN ON ADIPONECTIN BETWEEN PAIRED MEANS AMONG PRE PUBESCENT, PUBESCENT AND POST PUBESCENT MALES

Groups	Mean	S.D	SE	t-ratio
Pre Pubescent	0.54	0.43	0.112	0.1
Pubescent	0.55	0.30	0.007	
Pre Pubescent	0.54	0.43	0.112	10.64
Post Pubescent	3.30	0.94	0.245	
Pubescent	0.55	0.30	0.007	25.22
Post Pubescent	3.30	0.94	0.245	

The table value required for significance for df 28 is 2.05

Table II shows the mean gain for pre pubescent and pubescent group as a result of weight training were 0.54 and 0.55 respectively. It resulted with a 't' ratio of 0.1 and it was lesser than the table value of 2.05 required for significant at 0.05 level to the df 28. It is concluded that improvement in adiponectin was significantly lesser for pubescent boys than pre pubescent boys.

The mean gain for pre pubescent and post pubescent group as a result of weight training were 0.54 and 3.30 respectively. It resulted with a 't' ratio of 10.64 and it was higher than the table value of 2.05 required for significant at 0.05 level to the df 28. It is concluded that improvement in adiponectin was significantly higher for post pubescent boys than pre pubescent boys.

The mean gains for pubescent and post pubescent group as a result of weight training were 0.55 and 3.30 respectively. It resulted with a 't' ratio of 25.22 and it was higher than the table value of 2.05 required for significant at 0.05 level to the df 28. It is concluded that improvement in adiponectin was significantly higher for post pubescent boys than pubescent boys. Therefore the results of the study indicate that weight training improved adiponectin for all the three groups namely pre pubescent, pubescent and post pubescent males. It also indicated that the improvement for post pubescent was greater than pubescent and pre pubescent. There was no significant improvement between pre pubescent and pubescent boys.

CONCLUSIONS

Based on the results of the study, it was concluded that weight training improved adiponectin for all the three groups namely pre pubescent, pubescent and post pubescent males. It also indicated that the improvement for post pubescent was greater than pubescent and pre pubescent. There was no significant improvement between pre pubescent and pubescent boys.

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