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Effect of Strength Training on Hemoglobin among Pre Pubescent, Pubescent and Post Pubescent Males

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ABSTRACT: *The purpose of the study was to find out the effect of strength training on hemoglobin 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 strength training. The selected criterion variable namely hemoglobin 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: strength training, hemoglobin, pre pubescent, pubescent, post pubescent.

INTRODUCTION

Strength 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 strength exercise. In fact, many biological processes of growth in the body require some breakdown, or catabolism, prior to re-growth. The testosterone, insulin, growth hormone, protein, and other nutrients rush to the muscle after a strength-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 (1). Strength is the key to success in sports and games. The value of strength in athletics is not a new idea. There is a vast need for every one for a better understanding of strength. The primary objective in strength training is not to learn to lift as much strength as possible but to increase strength 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. Strength 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. Strength and speed are integral components of fitness found in varying degrees in virtually in all athletic movements. Simply put the combination of strength 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 strength and power are not distinct entities, they have a hierarchical relationship with one another. Maximum strength 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 (2). The physiological response to dynamic resistance exercise is an increase in oxygen consumption and heart rate that parallels the intensity of the imposed activity and a curvilinear increase in stroke volume. There is a progressive increase in systolic blood pressure, with maintenance of or a slight decrease in the diastolic blood pressure and a concomitant widening of the pulse pressure. Blood is shunted from the viscera to active

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skeletal muscle, where increased oxygen extraction widens the systematic arteriovenous oxygen difference. Thus aerobic exercise imposes primarily a volume load on the myocardium (3). Blood is a tissue. The essential act of blood is to maintaining of hemostasis of internal tissues of body. A lot of actions are done in the body which changes the internal environment of chemical component, for example some changes will occur by contraction of muscles (4). A cell that contains hemoglobin and can carry oxygen to the body. Also called a red blood cell (RBC). The reddish color is due to the hemoglobin. Erythrocytes are biconcave in shape, which increases the cell's surface area and facilitates the diffusion of oxygen and carbon dioxide. This shape is maintained by a cytoskeleton composed of several proteins. Erythrocytes are very flexible and change shape when flowing through capillaries. Immature erythrocytes, called reticulocytes, normally account for 1-2 percent of red cells in the blood. Hemoglobin is a protein of 200 to 300 million nearly spherical molecules in each red blood cell, having a molecular weight of 64,458 based on the chemical structures of its alpha and beta chains (5).

METHODOLOGY

The purpose of the study was to find out the effect of strength training on selected variable hemoglobin 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 strength training. The selected criterion variable namely hemoglobin 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.

A. *Test Administration – Estimation of Hemoglobin*

Hemoglobin concentration was estimated using calorimetric procedure by Cyanmethaemoglobin method. An aliquot of well mixed whole blood was taken and reacted with a solution of potassium cyanide and potassium ferricyanide. The chemical reaction yields a product of stable color, Cyanmethaemoglobin. The intensity of the color is proportional to the hemoglobin concentration at 540 nm. The following reagents were used for the assay.

(a) Reagent 1: Drabkin’s reagent (50 mg potassium cyanide, 200 mg potassium ferricyanide and 1000 ml distilled water).

(b) Reagent 2: Cyanmethaemoglobin standard.

Three sets of test tubes were taken and marked as blank, Test and standard. In the blank 5.0ml of reagent 1, then 20 µl of an aliquot of well mixed EDTA- anticoagulated blood specimen was added, mixed well and stand for 10 minutes. Another tube marked as standard contained 5.0ml of Cyanmethaemoglobin standard. Blank solution was used for setting the spectrophotometer. Absorbance (Abs) of the test and standard was performed using pectrophotometer at 540nm (6).

B. Analysis of Data

The 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 (7).

RESULTS

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

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TABLE – I

MEAN, STANDARD DEVIATION AND 't' RATIO ON HEMOGLOBIN FOR PRE AND POST TEST STRENGTH TRAINING OF PRE PUBESCENT, PUBESCENT AND POST PUBESCENT MALES

Groups		Mean	S.D	DM	't'-ratio
Pre Pubescent Group	Pre-test	12.36	1.26	2.10	5.34
	Post-test	14.46	1.32		
Pubescent Group	Pre-test	12.42	1.28	1.82	4.86
	Post-test	14.24	1.14		
Post Pubescent Group	Pre-test	12.40	1.15	2.62	8.54
	Post-test	15.02	1.26		

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

Table I shows the mean value of hemoglobin of pre pubescent group before the commencement of strength training was 12.36 and after the completion of twelve weeks training the mean was 14.46. It resulted with a mean difference of 2.10. The obtained 't' ratio was 5.34 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 strength training improved the hemoglobin of pre pubescent boys.

The mean values of hemoglobin before and after the strength training for pubescent group were 12.42 and 14.24 respectively. The mean difference of 1.82 resulted with a 't' ratio of 4.86. 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 strength training has resulted in a significant improvement in hemoglobin for pubescent group.

The pre test mean value of hemoglobin of post pubescent group was 12.40 and the post test hemoglobin was 15.02. The mean difference was 2.62. The obtained 't' ratio was 8.54 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 strength training had caused significant improvement on hemoglobin for the post pubescent group.

TABLE II

COMPARISON OF MEAN GAIN ON HEMOGLOBIN BETWEEN PAIRED MEANS AMONG PRE PUBESCENT, PUBESCENT AND POST PUBESCENT MALES

Groups	Mean	S.D	t-ratio
Pre Pubescent	2.10	0.52	4.84
Pubescent	1.82	0.64	
Pre Pubescent	2.10	0.52	10.87
Post Pubescent	2.62	0.68	
Pubescent	1.82	0.64	12.54
Post Pubescent	2.62	0.68	

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 strength training were 2.10 and 1.82 respectively. It resulted with a 't' ratio of 4.84 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 hemoglobin was significantly higher for pubescent boys than pre pubescent boys.

The mean gain for pre pubescent and post pubescent group as a result of strength training were 2.10 and 2.62 respectively. It resulted with a 't' ratio of 10.87 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 hemoglobin was significantly higher for post pubescent boys than pre pubescent boys.

The mean gains for pubescent and post pubescent group as a result of strength training were 1.82 and 2.62 respectively. It resulted with a 't' ratio of 12.54 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 hemoglobin was significantly higher for post pubescent boys than pubescent boys.

Therefore the results of the study indicate that strength training improved hemoglobin 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.

DISCUSSION/CONCLUSION

Based on the results of the study, it was concluded that strength training improved hemoglobin 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. The improvement for pre pubescent was significantly greater than pubescent. The present study also revealed that the above finding of the study was supported by Pfeiffer and Francis (8), Ramsay and others (9) and Fukunaga, Funato and Ikegawa (10).

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