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RESEARCH ARTICLE

EFFECT OF RESISTANCE TRAINING PROGRAMME ON SELECTED PHYSICAL AND PHYSIOLOGICAL VARIABLES AMONG HIGHER SECONDARY SCHOOL HANDBALL PLAYERS

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ABSTRACT

Introduction: Resistance training is also known as strength training. Strength training programmes may include the use of free weights, weight machines, elastic tubing, or body weight. In preadolescents proper resistance training can enhance strength without concomitant muscles hypertrophy. This mechanism helps to explain the strength gained from resistance training in population with low androgen levels including males and females. Strength training can also augment the muscles enlargement that is normally acquired with pubertal growth in males in females. **Purpose:** To achieve the purpose of these study 30 male handball players were selected from Alagappa matric Higher Secondary School, karaikudi. Random group design was used. The subject's age ranged from 14 to 17 years. **Methodology:** To carry out the study the investigator used two groups, one experimental group and one control group, each group consists of 15 subjects. All the groups were tested after the training on Half squat, leg press, leg extension, leg curl, upright rowing, bench press, abdominal curl, shoulder press, seated calf rise with the intensity of 65% and duration of 30 seconds 9 repetition of 3 sets each with rest interval period of 10 seconds was given to the subjects, selected criterion variable and the readings were recorded in their respective unit, as pre-test scores. After pre-test the experimental group was treated with resistance training for a period of six weeks. After six weeks of training both the groups were tested again on the selected criterion variables and the scores were recorded in their respective units as post test scores. The pre and post test were taken for analysis. The followings statistical procedure was followed to estimate the effect of resistance training on speed, explosive power, and breath holding time of higher secondary school handball players. **Statistical technique:** The data collected from the subject on selected physical and physiological variables were statistically analyzed by using 't' ratio, 0.05 level of confidence was fixed to test the level of significance. **Conclusion:** The study concluded that Speed, Explosive power on Breath holding time, were significantly improved to the influence of resistance training group among higher secondary school handball players.

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INTRODUCTION

"The World Health Organization defined health in its constitution of 1948 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". (Oxendine, 1984) said" A sport is an activity that is governed by a set of rules or customs and often engaged competitively. Sports commonly refers to activities where, the physical capability of the competitor are the sole or primary determinant of the outcome (winning or losing), but the term is also used to include activities such as mind sports (a common name for some card games and board games with little to no element of chance) and motor sports where mental acuity or equipment quality are major factors. Sports are commonly defined as an organized, competitive and skillful physical

activity requiring commitment fair play. Some view sports as differing from games based on the fact that there are usually higher levels of organization and profit (not always monetary) involved in sports. Accurate records are kept and update for most sports at the highest levels, while failures and accomplishments are widely announced in sport news. The term sports are sometimes extended to encompass all competitive activities in which offense and defense are played, regardless of the level of physical activity. Both games of skill and motor sport exhibit many of the characteristics of physical sports, such as skill, sportsmanship, and at the highest levels, even professional sponsorship associated with physical sports. Being fit should include working your muscles against a force. After the age of 50 we lose about 6 percent of our muscle mass per decade, and we get a 5 to 7 percent decrease in our

metabolic rate. Thus, we burn fewer calories and apt to gain weight even though we are losing muscle. By adding resistance (weight training) to our exercise routine we can offset that loss, feel better and burn more calories. By strengthening our muscles we maintain or improve our bone density and improve balance. This helps prevent falls and bone fractures, as we grow older. For a long time now you have monitored your expanding waist size and have contemplated that you will need to do something to control the expanding girth. Yet not until the pair of pants that fit the most comfortable suddenly becomes too snug are you ready to move out of your comfort zone and into the gym to do something about it. Yet, what kind of exercise will help to get to a slimmer.

The goal of resistance training, according to the American sports medicine institute (ASMI), is to gradually and progressively overload the musculoskeletal system. So it gets stronger research shows that regular resistance training will strong than and tone muscles and increase bone mass. Resistance training should not be confused with weightlifting, power lifting or body building, which is competitive. Sports involving different types of strength training with non-elastic force such as gravity (weight training or plyometric) rather an immovable resistance (isometrics, usually the body's own muscles or a structural feature such as a door frame). Full range of motion is important in resistance training because muscle overload occurs only at the specific joint angles where the muscle is worked. Resistance training can be performed using various types of exercise equipment are resistance bands and exercise machines. Vieira F, *et al.* (2013)., The aim of this study was to compare the morphology and physical fitness of 104 under-16 male handball athletes with different competitive levels in function of their bone maturation. Methods: Athletes were divided into two groups, 59 competed in the NL-national league, with higher competitive level (14.06 ± 0.66 years) and 45 competed in the RL-regional league (14.24 ± 0.60 years). The morphology was evaluated by measuring body mass, height, sitting height, arm span, four lengths, four breadths, five girths and eleven skinfolds. The physical fitness assessment used eight tests (20-m shuttle run; 30-m sprint; sit-and-reach; horizontal and vertical jump with counter movement; overhead medicine ball throw-3 kg; handgrip; handball specific agility test). Bone age was determined using the TW3 method. Results: In morphological terms, NL athletes showed greater dimensions for all anthropometric variables except for hand length (transversal and longitudinal), biepicondylar femur breadth, mid-thigh girth and skinfolds. In physical fitness terms, these athletes have better results for VO₂max, velocity, agility, arm strength and handgrip than athletes competing in the RL. Maturation differences explain the morphological profile superiority of NL athletes in terms of arm span, lower limb length, biacromial breadth and physical fitness profile for VO₂max and arm strength. Conclusion: Maturation should be considered as a covariate when one intends to distinguish the morphological characteristics and physical fitness of under-16 athletes with different levels of practice. Deschenes MR, *et al.* (2006)., Weight lifting, or resistance training, is a potent stimulus to the neuromuscular system. Depending on the specific program design, resistance training can enhance strength, power, or local muscular endurance. These improvements in performance are directly related to the physiologic adaptations elicited through prolonged resistance training. Optimal resistance training programs are individualized to meet specific training goals. When trained properly (i.e., similar intensity and volume), these functional

and physiologic adaptations are similarly impressive among women and the aged as they are among young men. Yet, in contrast to relative measurements, sex and age differences exist in the absolute magnitude of adaptation. Of equal importance, perhaps most notably among the elderly, are the important health benefits that may also be derived from resistance training. For example, bone density, insulin sensitivity, and comorbidities associated with obesity can be effectively managed with resistance exercise when it is conducted on a regular basis. The extent of the functional and health benefits to be accrued from resistance training depend on factors such as initial performance and health status, along with the specification of program design variables such as frequency, duration, intensity, volume, and rest intervals.

Statement of the Problem: The purpose of this study was to find out the effect of resistance training programme on selected physical and physiological variables among higher secondary school handball players.

Hypothesis: It is hypothesized that the resistance training programme may improve the selected physical and physiological variables among higher secondary school handball players.

MATERIALS AND METHODS

Selection of the Subjects

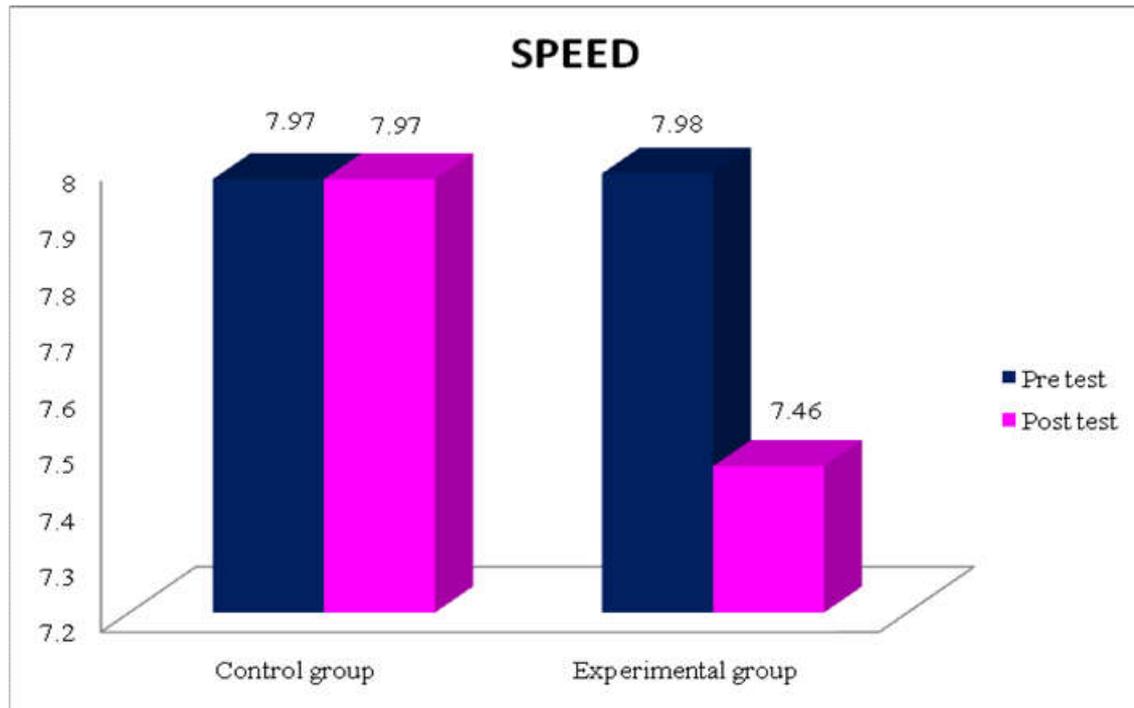
- 1) To achieve the purpose of this study thirty handball players were selected at random, from the Alagappa matric higher secondary school, karaikudi, sivagangai district.
- 2) The age of the subjects ranged from 14 to 17 years. The selected subjects were divided in to one experimental group and one control group at random.

Selection of Experimental Variables: The research scholar reviewed the various significant changes on selected performance variables that selected to Resistance training a period of six weeks, the research scholar reviewed the variable literature from Book, Journals, periodicals, magazines and research papers taking in to consideration the Speed and Explosive power and Breath holding time Dependent Variables and Resistance trainingsuch as Half squat, leg press, leg extension, leg curl, upright rowing, bench press, abdominal curl, shoulder press, seated calf rise with the intensity of 65% and duration of 30 seconds 9 repetition of 3 sets each with rest interval period of 10 seconds was given to the subjects. They were equally divided into two groups. Each group consists of fifteen subjects. Resistance training according to the training programme three days in a week. The control group was not permitted to participate in the experimental training programme. The experimental group 15 students were allowed to take part in the regular Resistance training programme for Forty five minutes with interval period for six weeks. There was no specific training for above said training period. The first of preparing the body for strenuous training activity is to Warm-up. Stretching exercise increases readiness to perform and help prevent injuries. Care was to be taken to prevent injury by moving slowly, focusing on the muscle when changing the stretching position from one position to another. The trained are one go to the point where is moderate amount of tension holding the position from 10 to 15 seconds mentally and then relax.

Table 1. Table showing the mean, mean difference, standard deviation and 't' value of experimental and control group on speed

Variable	Groups	Mean		SD		Sd Error	df	't' ratio
		Pre	Post	Pre	Post			
Speed	Control	7.97	7.97	0.55	0.55	0.14	14	0.81
	Experimental	7.98	7.46	0.18	0.16	0.14		12.97*

*Significance at 0.05 level of confidence

**Figure 1. Bar diagram showing the pre and post mean test value of experimental and control group on speed****Table 2. Bar diagram showing the pre and post mean test value of experimental and control group on explosive power**

Variable	Group	Mean		SD		Sd Error	df	't' ratio
		Pre	Post	Pre	Post			
Explosive power	Control	2.12	2.06	0.12	0.28	0.03	14	1.08
	Experimental	2.15	2.21	0.04	0.04	0.07		18.36*

*Significance at 0.05 level of confidence

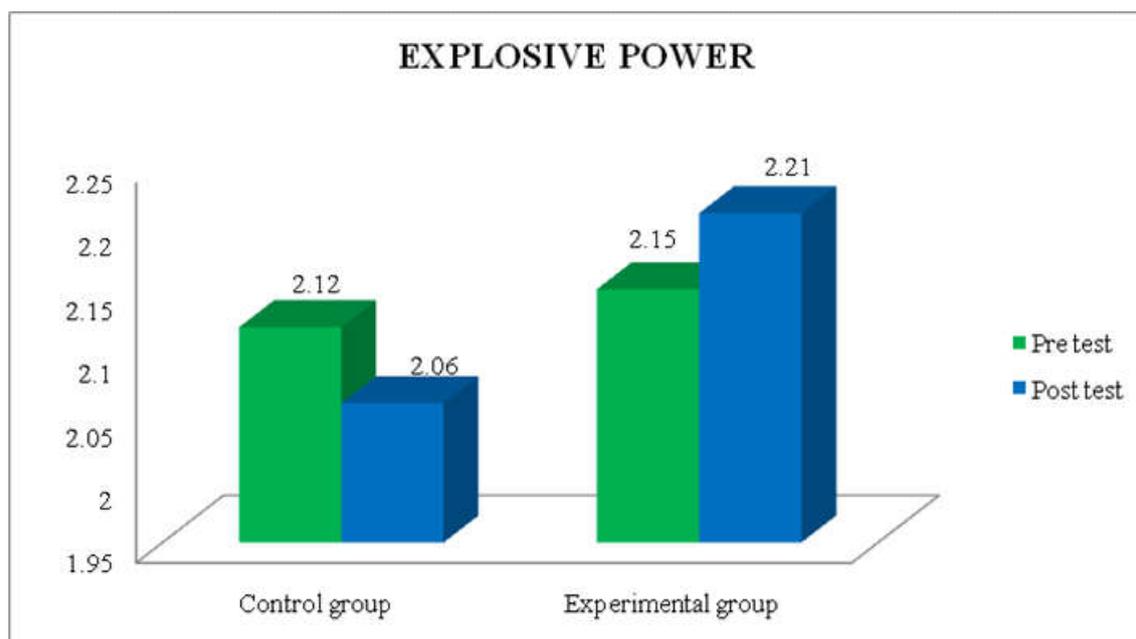
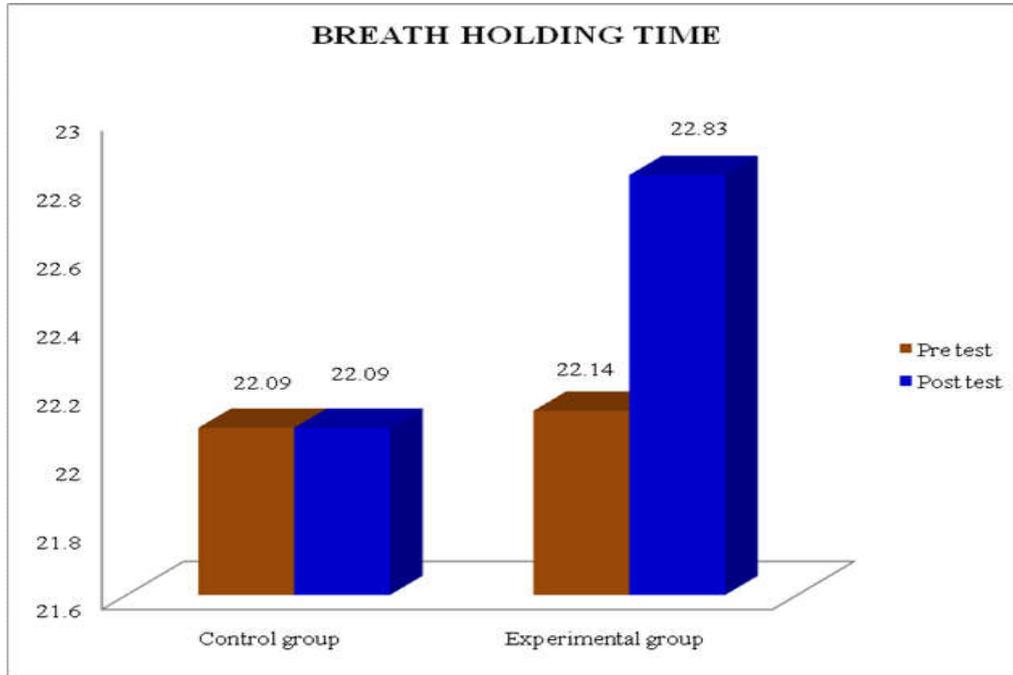
**Figure 2. Bar diagram showing the pre and post mean test value of experimental and control group on explosive power**

Table 3. Table showing the mean, mean difference, standard deviation and 't' value of experimental and control group on resting heart rate

Variable	Group	Mean		SD		Sd Error	df	't' ratio
		Pre	Post	Pre	Post			
Breath holding time	Control	22.09	22.09	1.34	1.34	0.35	14	0.94
	Experimental	22.14	22.83	0.42	0.38	0.35		

*Significance at .05 level of confidence.

**Figure 3. Bar diagram showing the pre and post mean test value of experimental and control group on resting heart rate**

Analysis of data were presented the table I table II and Table III and t-test was used to find out comparison between means. The subjects for this study were selected at random but the groups were equal in relation to the factors that have been examined. Hence the difference among the means of the two groups in the pre test had take into account during the analysis of the post test difference among the means. This was achieved by the application of t-ratio where the final means were for significance, when the post test means were significant; the t-ratio test was administered to find our the paired means significant difference. The Table 4 shows that the mean values of pre-test and post-test of control group on speed were 7.97 and 7.97 respectively. The obtained 't' ratio was 0.81, since the obtained 't' ratio was less than the required table value of 2.15 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of experimental groups on speed were 7.98 and 7.46 respectively. The obtained 't' ratio was 12.97 since the obtained 't' ratio was greater than the required table value of 2.15 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant. The result of the study showed that there was a significant difference between control group and experimental group in speed. It may be concluded from the result of the study that experimental group improved in speed due to six weeks of resistance training. The Table 2 shows that the mean values of pre-test and post-test of control group on explosive power were 2.12 and 2.06 respectively. The obtained 't' ratio was 1.08 since the obtained 't' ratio was less than the required table value of 2.15 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of experimental groups on explosive

power were 2.15 and 2.21 respectively. The obtained 't' ratio was 18.36 since the obtained 't' ratio was greater than the required table value of 2.15 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant. The result of the study showed that there was a significant difference between control group and experimental group in explosive power. It may be concluded from the result of the study that experimental group improved in explosive power due to six weeks of resistance training. The Table 5 shows that the mean values of pre-test and post-test of control group on breath holding time were 22.09 and 22.09 respectively. The obtained 't' ratio was 0.94 since the obtained 't' ratio was less than the required table value of 2.15 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of experimental groups on breath holding time were 22.14 and 22.83 respectively. The obtained 't' ratio was 11.56 since the obtained 't' ratio was greater than the required table value of 2.15 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant. The result of the study showed that there was a significant difference between control group and experimental group in breath holding time. It may be concluded from the result of the study that experimental group improved in breath holding time due to six weeks of resistance training.

DISCUSSION ON FINDINGS

The results of the study indicate that the experimental group namely resistance training had significantly improved in the selected dependent variables namely speed, explosive power,

and breath holding time. Gabbett *et al.*, (2008) supported a study on Speed, change of direction speed, and reactive agility of rugby league players. While studies have investigated speed and change of direction speed in rugby league players, no study has investigated the reactive agility of these athletes. In addition, the relationship among speed, change of direction speed, and reactive agility within the specific context of rugby league has not been determined. These findings question the validity of preplanned change of direction speed tests for discriminating higher and lesser skilled rugby league players, while also highlighting the contribution of perceptual skill to agility in these athletes.

Discussions on Hypothesis: It was hypothesized that there would be a significant improvement on the selected physical and physiological variables due to resistance training. The present study result show significant improvement on selected variables. Hence, the due to resistance training research hypotheses of the investigator was accepted.

Conclusions

Based on the results of the present study the following conclusions have been school boys.

1. It was concluded that there was significant improvement in selected physical and physiological variables of speed, explosive power, and breath holding time due to resistance training among school handball players.
2. The result of the study reveals that resistance training would improve among school boys on physical and physiological variables significantly.

Recommendations

In the light of the experience gained from the present study, a few suggestions are made for future study. In the course of the study the investigator faced several problems for which no sufficient answers were found in the literature. These problems are therefore stated below for future study.

- The same study may be conducted on some other groups of players.
- The same study may be analyzed with some other variables for another group.
- The study may be recommended for various level players.

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