



A STUDY ON THE DEVELOPMENT OF STRENGTH ENDURANCE OF PREADOLESCENT GIRLS THROUGH RESISTANCE TRAINING PROGRAMME

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ABSTRACT

Resistance training for children has been a debated topic for many years. Researchers, coach. Many research reports now have established that strength/ resistance training is beneficial for adults. Coaches, parents and the general public alike have been very cautions regarding this topic. The majority of current evidence indicate that prepubescent and adolescent resistance training is not only safe, but effective in developing muscular strength and endurance. The purpose of the present study was to observe the effects of weight training program on strength endurance development of preadolescent girls. 30 school girls of 11+ years but less than 12 years were selected for the study. Total girls were divided into two groups. Experimental group (EG); n=15 and control group (CG); n=15. The strength endurance of different muscles groups (Deltoid, Abdomen, and Quadriceps) were measured by the Flex arm hang, Sit ups, and Half squat test respectively for both the groups. The experimental group underwent a weight training regimen twice per week for 12 weeks. Researcher believes that weight training program improve the strength endurance level in the preadolescents girls.

Key words: Strength Endurance, Weight Training and Preadolescents

Introduction

Strength endurance is the ability of a muscle or group of muscles to sustain repeated contractions against a resistance for an extended period of time. Endurance contributes to improved performance in instances in which fatigue is a limiting factor. Muscular endurance is dependent upon, quality of the muscles, the extensiveness of their capillaries bends and the nerve mechanism supplying them. Resistance training is a form of strength training in which each effort is performed against a specific opposing force generated by resistance.

Resistance training for children has been a debated topic for many years. Researchers, coaches, parents and the general public alike have been very cautions regarding this topic. Previous arguments stated that if any one under the age of 16 years engages in strength training, he or she will develop serious growth problem and overall development set backs. Despite evidence of poor strength level in children, the idea of children participating in strength and resistance training program has gained support from the physician and physical educators. Many research reports now have established that strength/ resistance training is beneficial for adults Hakkinin et.al (1985), In many research report in the past indicated that strength training for prepubescent boys and girls is not effective due to lack of sufficient level of testosterone. Further it was indicated that



strength training may affect bone growth plate and a potential hazard for musculoskeletal development. However Faigenbaum and associates (1999) have clearly shown overall muscle strength development following resistance training among 10 years boys and girls. American Academy of Pediatric have also revised their positional statement on resistance training in children and made recommendations of its use in children's fitness. Resistance training can enhanced strength and muscle hypertrophy in adolescent (Webb 1990), bone mineral density (Morris and associates 1997) and have long lasting effect on children (Faigenbaum et.al 1996). The majority of current evidence indicates that prepubescent and adolescent resistance training is not only safe, but effective in developing muscular strength and endurance.

Methods

The study was designed to assess the effects of weight training program on the strength endurance development in prepubescent girls. 30 school girls of 11+ years but less than 12 years were selected for the study. The subjects belong to the colliery belt of Burdwan District, West Bengal. Both the participants and their parents were informed about the nature of the study. Total girls were divided into two groups. Experimental group (EG); n=15 and control group (CG); n=15. The strength endurance of different muscles groups (Deltoid, Abdomen, and Quadriceps) were measured by the Flex arm hang, Sit ups, and Half squat test respectively for both the groups. The experimental group underwent a weight training regimen twice per week for 12 weeks. Each training session lasted 100 min. the weight training consisted 5 exercises. These were Front press, barbell curl, Bench press, leg press and Hamstring curl. Before the training provides

the strength of the different muscles groups were determined by 1RM test. The exercises were started with 50% of 1RM. The loads were increased by 5% after 3 weeks of training. The detail training program is given in table 1.

TABLE 1.
THE WEEKLY SCHEDULE FOR EXPERIMENTAL GROUP.

Day	Duration	Schedule
Tuesday	100 min.	1. Warming up- 10 min. 2. Main exercise with 50% of 1RM. Set 1- 10 rept. Set 2- 12 rept. Set 3 12 rept. Density: 3 min. in each set For each exercise 15 min. For 5 exercises 15*5=75 min. 3. cooling down 15 min.
Friday	100 min.	Repetition of the same schedule

*The progressive resistance training method followed during the total training period

* 5% load increased after each 3 weeks of training.

Results

The result between the pre and post test for strength endurance scores in both groups presented in the table 2.

TABLE 2.
POST HOC TEST FOR SIGNIFICANCE DIFFERENCE
BETWEEN MEAN IN DIFFERENT TEST.

Tests	Group	Pre mean	Post mean	Mean difference	Level of significant
Flex Arm Hang	E.G.	19	36.08	17.08	.000
	C.G.	17.05	18.60	1.55	.680
Sit Ups	E.G.	4.93	10.07	5.13	.021
	C.G.	4.33	5.50	1.46	.126
Half Squat	E.G.	24.67	43.33	18.67	.000
	C.G.	23.67	26.13	2.46	.019

From the table 2 it is observed that the mean value of pre and post test in Flex arm hang test of experimental group is 19 and 36.08, in sit ups test it is 4.93 and 10.07 and in the Half squat test it is 24.93 and 43.33 respectively. But for



the control group the mean value of pre and post test in above mentioned test is 17.05 and 18.60, 4.93, 1007 and 23.67 and 26.13. respectively. The difference of the mean value of experimental group found in all the three test i.e. Flex arm hang, sit ups, and half squat test are 17.08, 5.13 and 18.67 respectively which are found statistically significant.

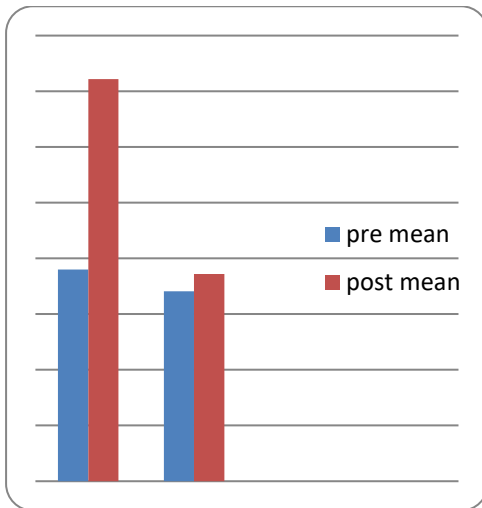


Fig 1. Graphical presentation of pre and post mean value of Flex Arm Hang test.

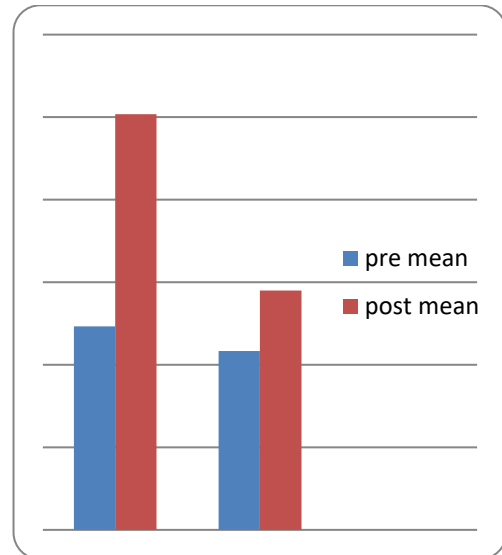


Fig 2. Graphical presentation of pre and post mean value of Sit Ups Test.

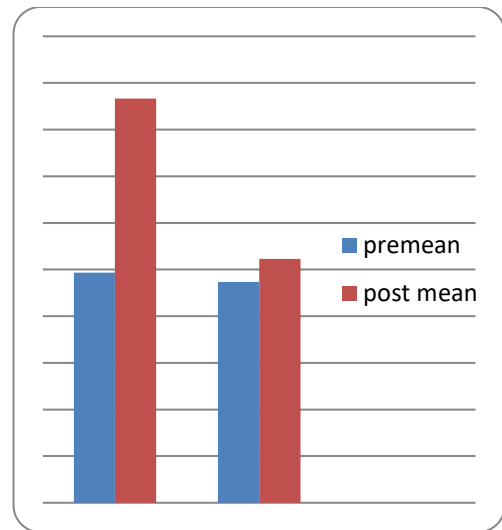


Fig 3. Graphical presentation of pre and post mean value of Half Squat Test.



DISCUSSION

From the table it appears that the experimental group improves significantly due to training in all the variables. The control group on the other hand showed a significant increase in the Half Squat Test only. In this study the training program was designed to improve muscular strength endurance level focusing on Flex Arm Hang, Sit Ups and Half Squat Test. Researcher used weight training method for the development of strength endurance in preadolescent girls which enable the coaches to supervise resistance training program for female athletes. The improvements in muscular strength endurance in the present study support the observations of Ramsay and colleagues 1990, who reported increases in muscular strength endurance in children who participated in a 20 week progressive resistance training program. The physiological aspects of strength and strength endurance developments attributed to length and diameter of the muscle fibers, increased total amount of proteins, more vascularisation, thickness of the sarcolemma and other membranes, increase in motor unit activation etc. In the present study strength endurance improvement may also be attributed to such development. Mersch and Stoboy, (1989) showed an increase in strength and muscle size in preadolescent, following a strength training program. Fukunaga et al. (1992) Showed muscle hypertrophy in preadolescents. There are some studies which have examined neuromuscular changes in strength training intervention studies in children. Blimkie (1989) showed 9% increase in motor unit activation following 10 weeks of strength training program. Ozmun et al. (1994) showed a 17% increase in muscle activation in prepubertal boys and girls following a training program of 8 weeks. Thereby the findings of

this study are in close proximity with the finding of leading researchers.

Resistance training method stimulates the neuromuscular system. It activates the muscular fibers and nervous system. Further more resistance training increases motor neuron excitability and reflex action, which may lead to better training conditions for subsequent exercises (Ebben et al. 1998). This fact may contribute to the improvement observed in this study. On the other hand, with the beginning of puberty and through out the maturation process, there is an increase in boys muscular proportion from 27% to 40% of body mass with increases in muscular strength (Israil.S,1992). (Kraemer et al.1993) reported that hormonal factors like increase in circulating androgens and level of testosterone may help in this process.

In conclusion, researcher believes that weight training program improve the strength endurance level in the preadolescents girls and conducive to health and fitness.

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