EFFECT OF STRENGTH TRAINING PROGRAMS ON UPPER BODY MUSCULAR STRENGTH OF SECONDARY SCHOOL ATHLETES

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Abstract: The aim and purpose of the investigation is to establish the effect of strength training programs (individual effect of weight training and free weight training) on Muscular Strength of school athletes. Forty Five subjects (n=45) were randomly assigned to three equal groups. Each group contains 15 subjects and they were school athletes of secondary schools who are from Government High Schools situated at Vidyanagara and Bettahalasuru, Bangalore, Karnataka, India. The above subjects were assigned into Experimental Group-I (WTG) treated as Weight Training Group; Experimental Group-II (FWTG) treated as Free Weight Training Group and Group-III (CG) acted as control group. The Pre test scores were collected for all the subjects on Muscular strength collected by administering 1 RM Bench Press Test in kilograms. Experimental groups: Group-I practiced exercises with weight that is squat, bench press, half squad, biceps curl, quadrants extension, abdominal curl, lunges, half squad and Group-II practiced free weight exercises of floor push ups, sit ups, chin ups, vertical jump, broad jump, calf raises, flag exercises for a period of 12 weeks. The post test mean scores of upper body muscular strength was collected on said criterion variable after the said treatments. The difference between pre and post mean scores on muscular strength was considered as the effect of experimental treatments. Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) were used to determine the significant mean scores for upper body muscular strength. Post hoc analysis was made by using LSD test when obtained F value was significant. The SPSS Package was utilized to get the results with the help of MS Excel program. The level of significant level was fixed at 0.05 level. It was concluded that strength training programs (weight training and free weight training) had a positive impact on developing upper body muscular strength (1 RM Bench Press Test) of school athletes. The weight training shows better in developing muscular strength when compared with free weight training exercises.

Index Terms- Strength Training, Muscular strength, 1 RM Bench Press, Weight Training, Free Weight Training, Secondary School Athletes

I. INTRODUCTION

The point of sports training is to set up a sportsman for a most astounding conceivable performance in a challenge in a specific occasion. The performance in sports generally relies on the physical fitness of a sportsman; subsequently the improvement of different segments of physical fitness is the prime point of sports training. Each sport activity needs specific kinds of physical fitness however in this view the improvement of physical fitness ought not to be disregard since specific fitness is relies upon the general fitness.

Strength is the ability to apply a force against a resistance. The strength requirement is for a sprinter to blast out from the blocks. Weight training is one of the training to make strength among sports individual. Weight training is a sound physical development in context on its ramifications for body structure and function. It is training to make in the individual the substantial strength and flexibility basically and furthermore to make solid strength and endurance. Lifting weights and produce muscle will decrease solid strength. Strong strength and endurance are key segments to physical fitness. Minimal dimensions of solid fitness are expected to perform exercises of day by day living, to keep up functional independence as one ages, and to share in dynamic leisure-time interests without undue stress or fatigue. Solid strength is characterized as the maximal force that a muscle or muscle gathering can create amid a solitary bout of activity (Kenny, Wilmore, and Costil, 2015). Strong strength is the ability of a muscle or muscle gathering to apply maximal force against resistance. Strength and power are regularly confounded, yet the fundamental

contrast is speed. Strength is expressed by slower, controlled developments that are an overwhelming squat performed at a moderate speed.

Upper body strength is essential to have in light of the fact that the upper body controls the ability to perform ordinary exercises, for example, achieving, pulling, pushing and lifting. Having a solid upper body improves the flexibility, mobility and range of motion. Strength can be estimated dependent on the measure of weight lifted for a solitary rep. This is alluded to as a one-rep max, or 1RM. Upper-body and lower-body strength are estimated independently. Strength tests incorporate the bench press for upper body, the squat for lower body and the deadlift for lower back and leg assessments. Solid strength empowers the competitor to apply enough force in a contracting muscle to toss overwhelming weights and strength endurance is the blend of strength and the length of the development. For athletes, strength is required when the body is depleted. Because of the idea of separation races the muscle requires muscle strength that can stay functional over significant lots of time as opposed to executing substantial force. Weight training techniques is regularly used to condition the athletes in general and to assemble muscle strength and endurance specifically. Hence the present study is conducted to know the effect of strength training programs on upper body muscular strength of secondary school athletes.

II. PURPOSE OF THE STUDY

The aim and purpose of the investigation is to establish the effect of strength training programs (individual effect of weight training and free weight training) on Muscular Strength of school athletes.

III. STATEMENT OF HYPOTHESIS

It is hypothesized that there would be a significant difference in the Muscular Strength of experimental groups due to 12 weeks practice of weight training and free weight training.

IV. METHODOLOGY

The aim of research is to establish the effect of strength training on muscular strength of secondary school athletes. Forty Five subjects (n=45) were randomly assigned to three equal groups.

Each group contains 15 subjects and they were school athletes of secondary schools who are from Government High Schools situated at Vidyanagara and Bettahalasuru, Bangalore, Karnataka, India. The above subjects were assigned into Experimental Group-I (WTG) treated as Weight Training Group; Experimental Group-II (FWTG) treated as Free Weight Training Group and Group-III (CG) acted as control group. The Pre test scores were collected for all the subjects on Muscular strength collected by administering 1 RM Bench Press Test in kilograms. Experimental groups: Group-I practiced exercises with weight that is squat, bench press, half squad, biceps curl, quadrants extension, abdominal curl, lunges, half squad and Group-II practiced free weight exercises of floor push ups, sit ups, chin ups, vertical jump, broad jump, calf raises, flag exercises for a period of 12 weeks. The post test mean scores of upper body muscular strength was collected on said criterion variable after the said treatments. The difference between pre and post mean scores on muscular strength was considered as the effect of experimental treatments.

Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) were used to determine the significant mean scores for upper body muscular strength. Post hoc analysis was made by using LSD test when obtained F value was significant. The SPSS Package was utilized to get the results with the help of MS Excel program. The level of significant level was fixed at 0.05 level.

V. ANALYSIS OF THE DATA

The findings pertaining to analysis of covariance between experimental groups and control group on Muscular Strength of school athletes for pre, post and adjusted post tests scores respectively.

Table-1. ANOVA and ANCOVA for the pre-test, post-test and adjusted post test data on Muscular Strength (1 RM Bench Press Test in kilograms) of Control Group (CG), Weight Training Group (WTG) and Free Weight Training Group (FWTG).

Tests		CG	WTG	FWTG	SV	df	Sum of square	Means square	'F' ratio
Pre-test	Mean	19.733	24.600	23.200	B	2	188.311	94.156	1.57^{NS}
	S.D.	5.812	8.287	8.784	W	42	2514.933	59.879	
Post-test	Mean	20.400	28.600	25.933	B	2	524.844	262.422	4.72*
	S.D.	5.275	8.060	8.606	W	42	2336.133	55.622	
Adjusted Post-test	Mean	23.023	26.628	25.283	B	2	92.706	46.353	20.13*
					W	41	94.414	2.303	

Note: SV-Source of Variance; B-Between Groups; W-Within Groups; S.D.-Standard Deviation
Table value at 0.05(df-2, 42/41)=3.23
*Significant at 0.05 level; ^{NS}Not Significant

The table-1 illustrates the pre-test mean scores of Muscular Strength of CG, WTG and FWTG are 19.733, 24.600 and 23.200 and standard deviations are 5.812, 8.287 and 8.784 respectively the values shows in kilograms. The obtained 'F' ratio of 1.57 for pre-test mean scores of upper body muscular strength is less than the table value 3.23 for df 2 and 42 required for significance at 0.05 level. This indicates insignificant difference in the pre test scores of upper body muscular strength among the groups.

The table also explains post-test mean scores of Muscular Strength of CG, WTG and FWTG are 20.400, 28.600 and 25.933 and standard deviations are 5.275, 8.060 and 8.606 respectively. The obtained 'F' ratio of 4.72 on post-test mean scores on Muscular Strength is greater than the table value 3.23 for df 2 and 42 required for significance at 0.05 level. This indicates significant difference in the post test scores of muscular strength among the groups.

Further, the above table shows the mean scores of Muscular strength of CG, WTG and FWTG are 23.023, 26.628 and 25.283 respectively. The obtained 'F' ratio of 20.13 on adjusted post-test mean scores of upper body muscular strength is greater than the table value 3.23 for df 2 and 41 required for significance at 0.05 level. This indicated that there was a significant difference in adjusted mean scores of Muscular Strength of secondary school athletes. Since significant F ratio was obtained, the result related to Upper Body Muscular Strength is further subjected to post hoc analysis by using LSD test and results presented in Table-2.

Table-2. LSD Post Hoc Analysis Results on Upper Body Muscular Strength (1 RM Bench Press Test in kilograms) of secondary school athletes among control and experimental groups (CG, WTG and FWTG).

Adjusted post-test mean scores of Muscular strength			Mean Difference	Critical Difference
CG	WTG	FWTG		
23.023	26.628	×	3.605*	1.197
×	26.628	25.283	1.345*	
23.023	×	25.283	2.260*	

*Significant at 0.05 of confidence.

The table-2 shows that the adjusted post-test mean difference on upper body muscular strength between CG and WTG; CG and FWTG and WTG and FWTG groups are 3.605, 2.260 and 1.345 respectively which are higher than the critical difference of 1.197 at 0.05 level of confidence. The finding concludes that there was significant difference on upper body muscular strength of school athletes between CG and WTG; and CG and FWTG and shows that weight training and free weight training had developed muscular strength. The post hoc analysis also shows significant difference between WTG and FWTG groups and this concludes that weight training develops upper body muscular strength more when compared with free weight training of secondary school athletes. The comparison of pre, post and adjusted post-test mean scores of upper body muscular strength of school athletes among control and experimental groups are graphically depicted in Fig.1.

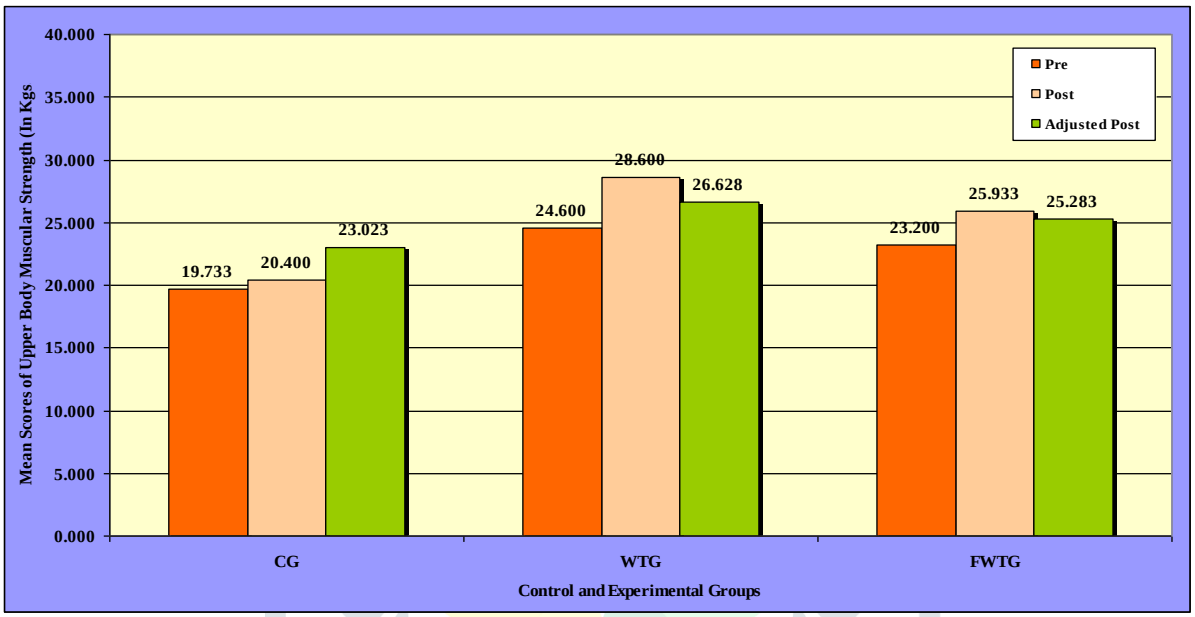

Fig.1: Bar diagram of Pre, Post and Adjusted Post-test Mean scores on Upper Body Muscular Strength among control and experimental groups.

VI. DISCUSSIONS ON FINDINGS

The ANOVA and ANCOVA results shows significant difference exists in the Upper Body Muscular Strength of experimental groups by practicing exercises related to weight training and free weight training. The output pertaining to muscular strength between pre and post (12 weeks duration) tests mean scores have been found significantly higher in experimental groups when compared to control group. This may be due to regular practice of strength trainings of weight training and free weight training individually for duration of 12 weeks to build muscles and increase muscular strength of the athletes. The exercises of half squad, bench press, biceps curl, abdominal curl, quadrants extension, lunges, half squad with weight and free weight exercises of vertical jump, sit ups, calf raises for 12 weeks.

VII. CONCLUSION

It was concluded that strength training programs (weight training and free weight training) had a positive impact on developing upper body muscular strength (1 RM Bench Press Test) of school athletes. Both weight training and free weight training programs showed better development of Muscular strength of school athletes when compared with control group. The weight training shows better in developing muscular strength when compared with free weight training exercises.

REFERENCES

[1] Gopinath R. (2000). Effect of Resistance Training, Plyometric Training and Combined Resistance and Plyometric Training on Strength, Power and Speed Parameters. *Unpublished Doctoral Thesis*, Annamalai University,.

[2] Kenny, L., Wilmore, J., & Costil, D. (2015). *Physiology of sport and exercise* (Vol. 6). Champaign, IL: Human Kinetics.

[3] Lakshmikrishnan R. and Sivakumar K. (2014). Effect of Weight Training and Plyometric Training on Speed Performance and Speed. *International Journal of Recent Research and Applied Studies*, *1*, *2*(4), 16-18.

[4] Singh Ajmer et al (2016), Essentials of Physical Education, New Delhi: Kalyani Publications.

[5] Uppal, A.K. (2001). *Principles of Sports Training*. Delhi: Friends Publications (India).