INFLUENCE OF STRENGTH TRAINING ON EXPLOSIVE POWER AND MUSCULAR STRENGTH AMONG SPRINTERS

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***Abstract*:** The purpose of the study was to find out the influence of strength training on explosive power and muscular strength among sprinters. To achieve the purpose of the study, 20 male sprinters were selected from the various schools in Tirunelveli, Tamil Nadu state, India. The age of subjects ranged from 16 to 18 years. The subjects had past experience of at least two years in sprint events and only those who represented their respective school athletic teams were taken as subjects. The selected subjects were randomly divided into two groups such as Group-I underwent strength training (n=10) and Group-II acted as control group (n-10). Group-I underwent strength training for three alternative days and one session per day and each session lasted for 60 minutes for six week period. Group-II was not exposed to any specific training but they were participated in regular activities. The data on explosive power and muscular strength were collected and administered by standing broad jump and sit up tests. The pre and posttests data were collected on selected criterion variables prior to and immediately after the training programme. The pre and post-test scores were statistically examined by the dependent't' test and Analysis of co-variance (ANCOVA) for each and every selected variables separately. It was concluded that the strength training group had shown significantly improved in explosive power and muscular strength. However the control group had not shown any significant improvement on any of the selected variables such as explosive power and muscular strength.

Keywords: Strength Training, Explosive Power, Muscular Strength, Sprinters.

I. INTRODUCTION

Strength and conditioning training is now an integral part of athletic preparation for all serious athletes and sports teams. Sport scientists and strength coaches working with strength/ power sports were among the first to adopt a planned distribution of training loads to help athletes reach peak performance at the most important competitions [1].

Recently, it has been reported that when proper strength training is used simultaneously with endurance training, improvements in strength and endurance performance is possible in world-class endurance athletes [2].

Strength on the other hand is the maximal force generating capacity of the muscles (or body) to move objects where time is not a factor. In other words, it does not matter how fast, just how much [3].

Explosive power and speed are the hallmarks of great athletes in any sport. Whatever sport one might compete in, power distinguishes the athletes from those just going through the motions. But the cool thing is, that everyone, yes everyone can improve their power, improve their performance, and have some fun doing it [4].

Sprinters are clearly differentiated from endurance athletes. Simply look at their physiques and one will note the remarkable muscle bulk of the sprinter in the key prime movers especially. What we are seeing a sport or selective hypertrophy in the major prime movers of the sprint athlete [5].

II. PURPOSE OF THE STUDY

The purpose of the study was to find out the influence of strength training on explosive power and muscular strength among sprinters.

III. METHODOLOGY

To achieve the purpose of the study 20 male sprinters were selected from the various schools in Tirunelveli District, Tamilnadu state, India. The age of subjects were ranged from 16 to 18 years. The researcher reviewed the available scientific journals, periodicals, magazines, e-resources and research papers taking into consideration feasibility criteria, availability of the

instrument and relevance of the variables of the present study the following dependent variables namely explosive power and muscular strength were selected. Similarly strength training was chosen as independent variable. The explosive power and muscular strength were assessed by standing broad jump and sit ups tests respectively. This study was conducted to determine the possibility cause and effect of strength training on explosive power and muscular strength among sprinters. The subjects were divided into two equal group consists of 10 each and named as experimental group (Group-I) and control group (Group-II). Group-I (n=10) underwent strength training and Group II (n=10) acted as control group. The control group was not given any special treatment and the experimental group was attended strength training for three alternative days per week, for a period of six weeks. The related group research design was used in this study. The collected data from the two groups prior to and after the experimental treatment on explosive power and muscular strength were statistically analyzed by using the statistical technique of dependent 't' test and analysis of covariance (ANCOVA). In all the cases 0.05 level of confidence was fixed as a level of significant.

IV. RESULT AND FINDINGS

The influence of strength training on explosive power and muscular strength were analyzed and presented below.

4.1 Explosive Power

Table 4.1.1: computation of 't' - ratio between pre and post test means of strength training and control groups on explosive power (In centimeters**)**

Criterion Variables	Test	Experimental Group Mean	Control Group Mean
Explosive Power (In Centimeters)	Pre test	122.55	121.47
	Post test	176.92	127.68
	't'test	8.15*	1.77

*****Significant at 0.05 level. (Table value required for significance at .05 level for 't'-test with df 9 is 2.26)

The table 4.1.1 shows that the pre-test mean value of strength training and control groups are 122.55 and 121.47 respectively and the post test means are 176.92 and 127.68 respectively. The obtained dependent t-ratio values between the pre and post test means of strength training and control groups are 8.15 and 1.77 respectively. The table value required for significant difference with df 9 at 0.05 level is 2.26. Since, the obtained't' ratio value of strength training group was greater than the table value, it was understood that strength training group had significantly improved on explosive power. However, the control group has not improved significantly. The 'obtained t' value is less than the table value, as they were not subjected to any specific training.

Table 4.1.2: analysis of covariance on explosive power of strength training and control groups

Adjusted Post Test Means		Source of variance	Sum of squares	df	Mean square	F – ratio
Strength Training Group	Control Group	Between	5408.87	1	5408.87	41.53*
177.05	127.68	Within	2214.08	17	130.24	

* Significant at 0.05 level. Table value for df 1, 17 was 4.45

Table 4.1.2 shows that the adjusted post test means values on explosive power. The obtained f- ratio of 41.53 for adjusted post test mean is greater than the table value 4.45 with df 1 and 17 required for significance at 0.05 level of confidence. The results of the study indicate that there is a significant mean difference exist between the adjusted post test means of strength training and control groups on explosive power.

The bar diagram figure 4.1.1 shows the mean values of pre, post and adjusted post tests on explosive power of strength training and control group.

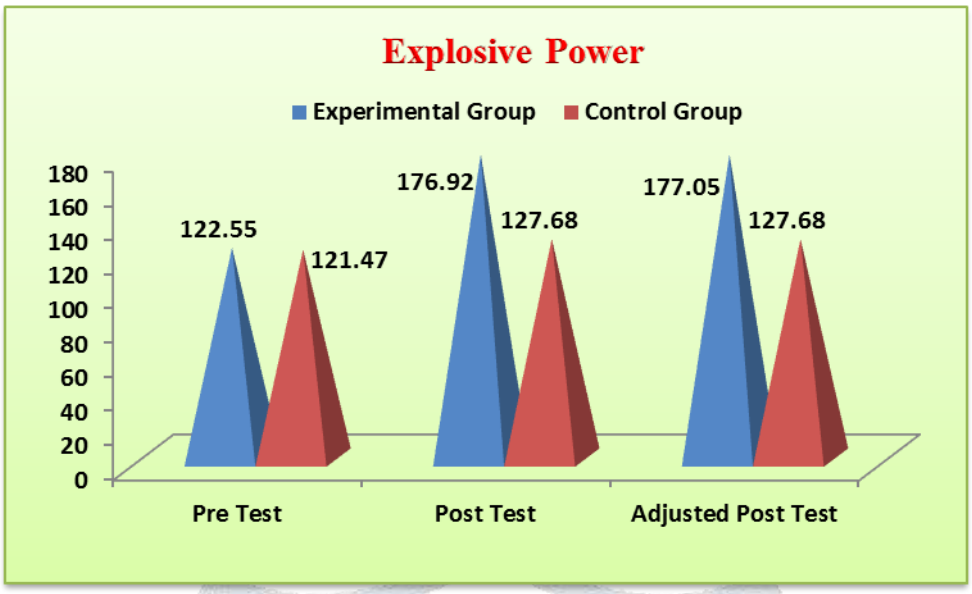

Fig 4.1.1: pre, post and adjusted post tests mean values of strength training and control groups on explosive power

4.2 Muscular Strength

Table 4.2.1: computation of 't' - ratio between pre and post test means of strength training and control groups on muscular strength (in counts)

Criterion Variables	Test	Experimental Group Mean	Control Group Mean
Muscular Strength (In counts)	Pre test	28.02	27.34
	Post test	36.99	29.68
	't'test	11.05*	0.93

*Significant at 0.05 level. (Table value required for significance at .05 level for 't'-test with df 9 is 2.26)

The table 4.2.1 shows that the pre-test mean value of strength training and control groups are 28.02 and 27.34 respectively and the post test means are 36.99 and 29.68 respectively. The obtained dependent t-ratio values between the pre and post test means of strength training and control groups are 11.05 and 0.93 respectively. The table value required for significant difference with df 9 at 0.05 level is 2.26. Since, the obtained't' ratio value of strength training group was greater than the table value, it was understood that strength training group had significantly improved the muscular strength. However, the control group had not improved significantly. The 'obtained t' value is less than the table value, as they were not subjected to any specific training.

Table 4.2.2: analysis of covariance on muscular strength of strength training and control groups

Adjusted Post Test Means		Source of Variance	Sum of Squares	df	Mean Square	F – ratio
Strength Training Group	Control Group	Between	217.65	1	217.65	34.71*
36.91	29.71	Within	106.59	17	6.27	

* Significant at 0.05 level. Table value for df 1, 17 was 4.45

Table 4.2.2 indicates that the adjusted post test means values on muscular strength. The obtained f- ratio of 34.71 for adjusted post test mean is greater than the table value 4.45 with df 1 and 17 required for significance at 0.05 level of confidence. The results of the study indicate that there is a significant mean difference exist between the adjusted post test means of strength training and control groups on muscular strength. The bar diagram figure 4.2.1 shows the mean values of pre test, post test and adjusted post test on muscular strength of strength training and control groups.

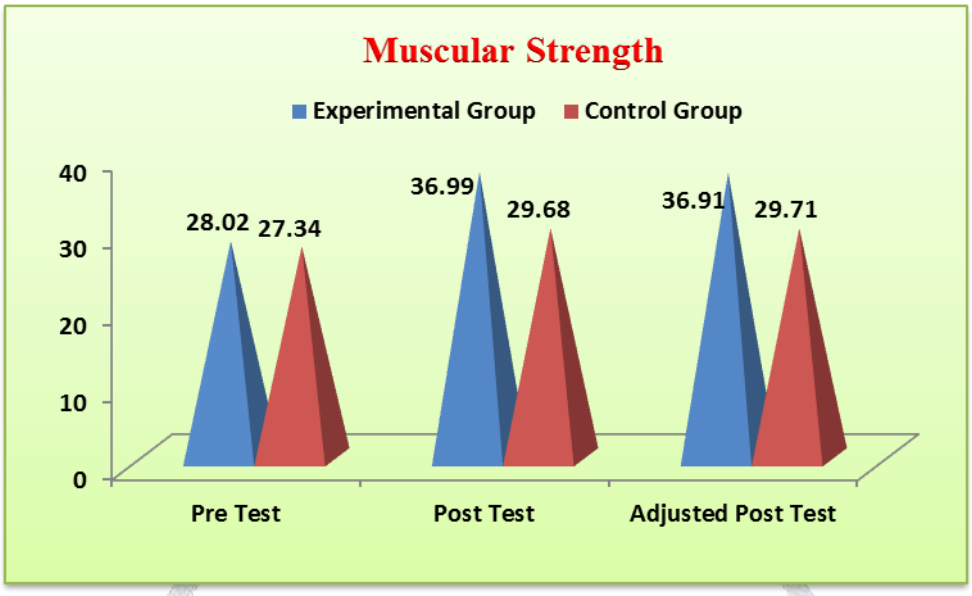

Fig 4.2.1: pre, post and adjusted post tests mean values of strength training and control groups on muscular strength

V. DISCUSSION ON FINDINGS

The present studies found statistically significant improvement on explosive power and muscular strength, which showed that positive, practices of strength training among sprinters. The findings of the study were also agreed with the following findings, **Arumugam, (2016)** conducted a study on effect of complex training on muscular strength among men kabaddi players. He told his study on strength exercise activates the fast twitch muscle fibers and he concluded his study on that complex training should improve the muscular strength. His results showed that there had a significance improvement on muscular strength due to complex training among men kabaddi players [6]. **William & et al (2016)** conducted the study on strength and muscular power of elite young male runners in order to determine the relationship of these characteristics to age and specialization in either sprint or middle distance events. They are concluded the study muscular power values were also greater for the older runners, but event-related differences only appeared for peak power and mean power measures [7]. **Suchomel, Nimphius, & Stone, (2016)** conducted the study on influence of muscular strength on various factors associated with athletic performance and the benefits of achieving greater muscular strength. Therefore, sport scientists and practitioners should implement long-term training strategies that promote the greatest muscular strength within the required context of each sport/event. Future research should examine how force-time characteristics, general and specific sport skills, potentiation ability, and injury rates change as individual's transition from certain standards or the suggested phases of strength to another [8].

VI. CONCLUSIONS

1. There was significant improvement on explosive power due to the effect of strength training among sprinters.
2. There was significant improvement on muscular strength due to the effect of strength training among sprinters.
3. There was significant difference on experimental and control group on explosive power and muscular strength due to the effect of strength training among sprinters.
4. However the control group had not shown any significant improvement on any of the selected variables.

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