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Praveen Kumar
Research Scholar, Faculty of Physical Education and Sports Science, Gujarat Vidyapith, Ahmedabad, Gujarat, India

Dr. Nimeshkumar D Chaudhari
Associate Professor, Faculty of Physical Education and Sports Science, Gujarat Vidyapith, Ahmedabad, Gujarat, India

Corresponding Author:
Praveen Kumar
Research Scholar, Faculty of Physical Education and Sports Science, Gujarat Vidyapith, Ahmedabad, Gujarat, India

The effect of strength and psychological training on upper body strength endurance among young archery players

Praveen Kumar and Nimeshkumar D Chaudhari

Abstract
The objective of the research was to determine the effect of strength training on Upper Body Strength Endurance of male Archers. Sixty male Archers of District Level Sports School of Gujarat were chosen as subject for research. The age range of the archers were from 14-18 years. The study was further confined to eight weeks of strength training and psychological training program only. There were 60 archers in three groups, which were comprising a single control group (CG, n=20) as well as two experimental groups (psychological cum strength group (PCSG), n=20 and Strength group (PG), n=20), Upper Body Strength Endurance was tested by Push-ups test, respectively twice that is before and after the specific eight-week training. The hypothesis was tested using analysis of covariance (ANCOVA) at the 0.05 level of significance. The result reveals that there was significant ($p<.05$) effect of strength training on Upper body strength Endurance of Archery players.

Keywords: Strength training, upper body strength endurance, push-ups

1. Introduction
Archery is a robust and powerful recreational sport. The art of sport is the practice or ability to shoot arrows with a bow. When archery is being shot, arrows and a bow are used to propel the target. Drawing the bow, aiming, and releasing the arrow are the steps involved in archery shooting.

The ability of a person to execute a specific number of repetitions of an exercise or technical gesture over a predetermined amount of time, or until failure, by maintaining a specific movement in the same prescribed rhythm and with the same efficiency, is what is known as strength-endurance.

The types of strength required depend on the particulars of each sport. One of the physical characteristics that affects performance in a number of sports, such as football and archery, is strength and endurance.

Strength endurance is the amount of force you can generate for an extended period of time. This is the ability to be as strong as possible, as long as possible. (Singh, 2008) [7].

Strength-endurance performance is primarily determined by two factors: the maximal force, which is associated with the domain of a particular load, and the duration of the domain of this load, which is based on the efficiency of energy transfer in the musculature's metabolism.

Therefore, due to the high metabolic mobilization, strength-endurance improves with the length of time that tension is maintained with a specific load that promotes an increase in muscle exhaustion.

2. Objective of Research
The objective of the research was to determine the effect of strength training on Upper Body Strength Endurance of male Archers.

Criterion Measures
Hypothesis for selected measuring standards given below:

o.	Test	Measuring Standards
1	Upper Body Strength Endurance	Push-Ups

3. Methods and Material

Sixty male Archers of District Level Sports School of Gujarat were chosen as subject for this study. The age of the archers were from 14-18 years. The archers were divided into three groups i.e. two experimental group (Strength training group and Strength cum psychological group) and one control group. Upper Body Strength Endurance was tested by Push-ups test, respectively twice i.e. before and after the particular eight weeks training.

3.1 Statistical Analysis

Analysis of Co-variance was applied at 0.05 level of significance.

4. Result of the Study

The following tables display the study's findings:

Table 1: Analysis of Covariance of Pre-Test, Post-Test and Adjusted Post-Test Mean on Upper Body Strength Endurance of Experimental Groups and Control Group Upper Body Strength Endurance

Test	Group			Anova, Ancova Table			
	Strength Training	Strength cum Psychological Training	Control Group	SS	*df*	MSS	*F*
Pre-Test Mean	35.800	32.700	33.000	116.933	2	58.467	1.663
				2003.400	57	35.147	
Post-Test Mean	42.050	40.150	32.550	1010.800	2	505.400	12.962*
				2222.450	57	38.990	
Adjusted Mean	40.222	41.203	33.325	733.376	2	366.688	41.764*
				491.684	56	8.780	

Significant Level at 0.05 F (2, 57) = 3.159 & (2, 56) = 3.161

Results of Upper Body Strength Endurance

Table 1 shows the analysis data on Upper Body Strength Endurance. The pre-test means of Upper Body Strength Endurance were 35.800 for Strength Training Group, 32.700 for Strength cum Psychological Training Group and 33.000 for Control group. The obtain "F" ratio of 1.663 was lesser than the table F-ratio 3.159. Hence the pre-test was not significant at 0.05 level for the degree of freedom 2 and 57.

The post-test mean of Upper Body Strength Endurance were 42.050 for Strength Training Group, 40.150 for Strength cum Psychological Training Group and 32.550 for control group. The obtained "F" ratio of 12.962 was higher than the table F-ratio 3.159. Hence the post -test was significant at 0.05 level for the degree of freedom 2 and 57.

The adjusted post-test mean of Upper Body Strength Endurance were 40.222 for Strength Training Group, 41.203 for Strength cum Psychological Training Group and 33.325 for Control group. The obtained "F" ratio of 41.764 was higher than the table F-ratio 3.161. Hence the post -test was significant at 0.05 level for the degree of freedom 2 and 56.

Table 2: Means and Least Significant Difference of Upper Body Strength Endurance for Strength training, Strength cum Psychological training and Control Group

Mean			MD	CD
Strength Training	Strength cum Psychological Training	Control Group		
40.222	41.203		-0.981	1.877
40.222		33.325	6.897*	
	41.203	33.325	7.879*	

Significance level at 0.05, A= Strength training, B= Strength cum Psychological training, C= Control Group

In the Table 2 shows the Scheffe's post -hoc test result. The adjusted mean difference for Upper Body Strength Endurance of experimental groups Strength Training Group, Strength cum Psychological Training and Control group were tested for significant at 0.05 level against confidential interval value. There was a mean difference of 6.897 between the Strength Training Group and the Control group, and 7.879 between the Strength Cum Psychological Training Group and the Control group. It was seen to exceed the 1.877 confidential interval value.

The comparisons above were therefore important. However, the mean difference between the Strength Training Group training and the Strength Cum Psychological Training Group training was -0.981, which was smaller than the non-significant confidential interval value of 1.877.

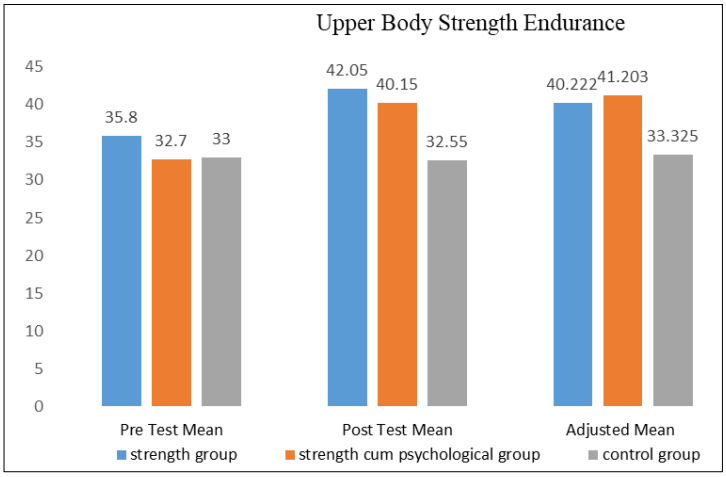

Fig 3: The Mean Value of Upper Body Strength Endurance is Shown Graphically in

Discussion of Finding

The data shown in Tables 1 and 2 provide valuable information about how various interventions, including strength training and strength-com psychological training, affect upper body strength endurance both before and after the intervention.

Table 1 statistics of the pre-test mean show that there were no statistically significant distinctions in the groups mean Upper Body Strength Endurance scores prior to the intervention.

Thus, it can be claimed that the participants were distributed evenly across all groups, ensuring that the groups were equal at the start of the study. Table 1 post-test mean and adjusted mean statistics showed that both experimental groups' mean scores on the static Upper Body Strength Endurance performance test significantly improved following the intervention. Similar findings were reported in earlier research works like Sharma *et al*. (2015) [8], Singh and Lhee (2016) [11], Lin *et al*. (2010) [10], Lau *et al*. (2020) [9], etc. Therefore, the search results validate that the hypothesis, which was developed at the start of the study, "There will be a positive significant difference on mean scores of static Upper Body Strength Endurance of Strength training group and strength cum Psychological training group," has been validated and is acceptable.

The LSD statistics in Table 2 highlight that, compared to the control group, the archers' static Upper Body Strength Endurance variable was more affected by the Strength training group (mean deviation of 6.897*) than by the Strength cum Psychological training group (mean deviation of 7.879*).

5. Conclusion

According to the results, archery players' upper body strength endurance was enhanced by practicing certain strength training.

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