

A COMPARATIVE STUDY OF DIFFERENCES IN EXPLOSIVE STRENGTH IN ATHLETES OF 100 METERS, 400 METERS AND LONG JUMPERS

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Article Info	Abstract
<p>Received: 22/02/2025 Revised: 12/03/2025 Accepted: 20/03/2025</p> <p>Keywords: Jump, Athlete, Strength, Fitness.</p>	<p>Athletes want to jump higher, run faster, and increase their explosiveness for sports. There has been a vast improvement in the overall speed, size and power displayed in all sports over the last 10 years. (Hatfield, F.C. Ed. 1998) Various forms of weight training may help by increasing leg strength and explosive strength, and elasticity (Paul Rogers, 2007). Long jumping is all about explosive power. The more power you can generate through your legs, the higher and farther you'll be able to jump.</p>

INTRODUCTION:

Explosive power is a combination of speed, muscular endurance and muscular strength, all the which can be developed through targeted exercises and activities such as running sprints, lifting weights and performing Plyometric (Jody Braveman, 2011) The explosive strength deficit was defined by Mel Siff in his book Super training, as "the percentage of maximal strength potential which is not used during a given motor task" (Mel Sliff, 2000) Explosive strength is defined as the rate of force development (RFD) at the onset of contraction. There are different exercises, designed to increase explosive strength and power specific to these movements. Weighted jumps have similar speeds, angles and mechanics to sprinting and jumping and have similar coordination patterns. (McBride J, McBride T.,2000)

Methodology Selection of subjects:

For the purpose of the study to total of 30 subjects (10 in each group, 100 meters Runners, 400 meters Runners and Long Jumpers' age) age ranged from 18 to 25 years were selected from K D singh Babu Stadium Lucknow.

Selection of variables:

Through both the critical and allied literature pertaining to the problem under consideration and physical variable selected for the study was explosive of legs. The selection of this variable was also based on the feasibility criteria and the equipment available, as well as the scholar's owns experience in conducting the test and measurement to these variables.

Administration of the test:

The Explosive Strength of the subjects was measured by standing broad jump, (given in AAHPERD test,

American Alliance for Health Physical education and recreation and dance). The subjects were properly guided and assisted by the Researcher. Proper instructions regarding the objectives of study and procedure were given and the subjects were motivated by their concerned coaches. The subject stand behind a line marked on the ground with feet slightly apart. A two-foot take-off and landing is used,

with swinging of the arms and bending of the knees to provide forward drive. The subjects attempt to jump as far as possible, landing on both feet without falling backwards. The measurement is taken from take-off line to the nearest point of contact on the landing (back of the heels). Record the longest distance jumped, the distance of the broad jump was measured in meters and three trials were given to each and every subject and best one was recorded.

Results:

The obtained data was analyzed by applying One Way Analysis of Variance (ANOVA). The descriptive table for the data obtained is shown as below.

Table 1

Descriptive statistics for the data on Explosive Strength in Athletes of 100 Meters, 400 Meters and Long Jumpers

runners	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
400 mt	10	2.5570	.5498	0.1739	2.5177	2.5963	2.45	2.65
100 mt	10	2.5910	.14625	.04625	2.4864	2.6956	2.30	2.75
Long jumper	10	2.8540	.07633	.2414	2.7994	2.9086	2.75	2.95
Total	30	2.6673	.16615	.03034	2.6053	2.7294	2.30	2.95

Table 1 shows that the mean of the Explosive Strength of long jumpers is higher (2.8540) and the mean of 400 meters is lowest (2.5570).

Table 2

Analysis of Variance (ANOVA) for Difference in Explosive Strength in Athletes of 100 Meters, 400 Meters and Long Jumpers

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.528	2	.264	26.215	.000
Within Groups	.272	27	.010		
Total	.801	29			

* F.05 ratio at df (2,27) H” 3.35

Table 2 reveals that there was a significant difference found among the Athletes of 100 Meters, 400 Meters and Long Jumpers, as the calculated value (26.215) was greater than the tabulated value (3.35).

Table 3

Post hoc LSD TEST in comparison of means using LSD test for Difference in Explosive Strength in Athletes of 100 Meters, 400 Meters and Long Jumpers

groups	(J) runner groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
400 mt	100 mt runners	-.03400	.04490	.45500	-.1261	.0581
	long jumper	.29700*	.04490	.000	-.3891	
400 mt	400 mt runners	.03400	.04490	.45500	-.1261	.1261
	long jumper	.26300*	.04490	.000	-.3551	-.1709
long jumper	100 mt runners	.29700*	.04490	.000	.2049	.3891
	100 mt runners	.26300*	.04490	.000	.1709	.3551

* The mean difference is significant at the 0.05 level.

Table 3 reveals that the difference between 400 meters Runners and Long jumpers is significant as the p-value for this mean is 0.000 which is less than 0.05. Similarly, the mean difference

between 100 meters and long jumpers is also significant as the p-value for this mean is 0.000, which is less than 0.05. However, there is no difference between the means of 400-meter Runners and 100-meter Runners as the p-value for this mean is 0.455, which is greater than 0.05.

Discussion of Findings

This study was done to compare the Explosive Strength of 100-meter Runners, 400-meter Runners and Long jumpers. The ANOVA table was found significant in all the variables at a level of significance 0.05 and by using the post hoc LSD test it was found that the long jumpers have better explosive strength in comparison to 100 meters runners and 400 meters runners. Long jumpers frequently use extensor muscles and they tackle more resistance during the training movements, the nature of exercise and intensities of sub-maximal explosive exercises done by the long jumpers is much more as

Conclusion:

In this study, it may be concluded that the Long Jumpers are better in Explosive Strength,

compared to 100-meter runners and 400-meter runners throughout the training.

The 100-meter runners have better explosive strength than 400-meter runners as they have a similar nature of training workout for the development of physical fitness variable required by the jumpers. Jumpers should have developed better ATP-CP energy systems due to more anaerobic training, the nature of strength training and plyometrics training. The nature of the training of jumpers allows them to develop a good ratio of maximum strength, and explosive power, helping them to gain more advantage on overall jumping movement, whereas 400 meters athletes generally have a greater proportion of endurance in their workout. In 100-meter events, there is an emphasis on the development of endurance as it has the maintenance phase. The jumpers also have an advantage over the athletes of 100 meters and 400 meters as they have a higher extent of coordinative movement, as in the case of Jumpers.

followed by the 100-meter athletes and 400-meter athletes.

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