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## An analytical study of relationship between leg explosive strength and maximum speed on state level athletes

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### Abstract

**Aim:** The purpose of the present study was to find out the relationship between leg explosive strength (jumping performance) and maximum speed (sprinting performance) on state level male and female athletes. 15 male and 15 female state level athletes (sprinters and jumpers) were purposively selected from Haryana. The age of the subjects ranged between 16 to 22 years. 'Leg Explosive Strength' measured by Standing Broad Jump (S.B.J.) in centimeter and 'Maximum Speed' measured by 30m sprint in second. For the male athletes, leg explosive strength positively effect on maximum speed or the relationship between jumping and sprint performance of male athletes are positive and for the female athletes, leg explosive strength negatively effect on maximum speed or the relationship between jumping and sprint performance of female athletes are negative but both the value of positive and negative relationship was negligible.

**Keywords:** Leg explosive strength, maximum speed, standing broad jump and sprint

### Introduction

The common definition of strength is the ability to exert a force against a resistance. The strength needed for a sprinter to explode from the blocks is different from the strength needed by a weightlifter to lift a 200kg barbell. Therefore, it implies that there are different types of strength. Explosive strength is the ability to overcome a resistance with a fast contraction. It can be measured by (i) laboratory test and (ii) field test. For example, leg explosive strength can be measured in the lab by Vertical Jump and it can be measured in the field by Standing Broad Jump. Explosive strength can be developed with conditioning exercises, medicine ball exercises, plyometric exercises and weight training. Speed is the rate of change of motion of an object or we can define speed is that sense that covers any distance in minimum possible time. Maximum speed should be understood as the high possible speed for moving from one place to another, for a short distance by an individual. Maximum speed measured by anaerobic work. The anaerobic and lactic energy system is best challenged as an athlete approaches top speed between 40m to 70m while running at 95% to 100% of maximum. In the study researcher was interested to find out the relationship between leg explosive strength and maximum speed on state level male and female athletes. Researcher was also interested to find out the relationship between sprinting and jumping performance of male and female performer.

### Objectives of the Study

To find out the relationship between leg explosive strength and maximum speed on state level male and female athletes. To find out the relationship between sprinting and jumping performance of male and female performer. Help the athletic coaches to understand how the leg explosive strength effect on sprint performance and vice versa.

### Methodology

Total 30 (15 male and 15 female) state level athletes were purposively selected from Panipat District, Haryana. The age of the subjects ranged between 16 to 22 years. All the athletes are sprinters or jumpers.

'Leg Explosive Strength' measured by Standing Broad Jump (S.B.J.) in nearest centimeter and 'Maximum Speed' measured by 30m run from a 100m distance i.e., 40m to 70m in second.

To compute the Mean and Standard Deviation of sprint time & jumping distance descriptive statistics was employed and to find out the relationship between leg explosive strength & maximum speed co-efficient of correlation (r value) test was employed.

### Result and Discussion

In the present study sprint time of 30m distance i.e., 40m to 70m from 100m distance and the distance of standing broad

jump of present male and female subjects were tested. The mean and S.D. have been presented in Table 1 and Table 2.

**Table 1:** Mean and S.D. of 30m Sprint Time from 100m Running Path i.e., 40m to 70m and Standing Broad Jump of Male Athletes

Variable	Mean	S.D.
30m Sprint time	3.37sec.	0.31sec.
Distance of S.B.J.	2.44m	0.26m

Table 1 shows that the mean values of 30m sprint time (40m to 70m distance of 100m straight path) and standing broad jump of male subjects i.e.  $3.37 \pm 0.31$ sec. and  $2.44 \pm 0.26$ m.

**Table 2:** Mean and S.D. of 30m Sprint Time from 100m Running Path i.e. 40m to 70m and Standing Broad Jump of Female Athletes

Variable	Mean	S.D.
30m Sprint time Distance of S.B.J.	3.90sec.	0.41sec.
Distance of S.B.J.	2m	0.11m

Table 2 shows that the mean values of 30m sprint time (40m to 70m distance of 100m straight path) and standing broad

jump of female subjects i.e.  $3.90 \pm 0.41$ sec. and  $2 \pm 0.11$ m.

**Table 3:** Co-Efficient of Correlation Between 30m Sprint Time from 100m Running Path i.e., 40m to 70m and Standing Broad Jump of Male Athletes

Number of the Subjects	Sum of 30m Sprint Timing ( $\Sigma X$ )	Sum of S.B.J. ( $\Sigma Y$ )	$\Sigma XY$	$\Sigma X^2$	$\Sigma Y^2$	r
15	36.6m	50.5sec.	116.92	60.39	230.58	0.15

Table 3 shows the co-efficient of correlation between 30m sprint time and standing broad jump of male athletes, where

'r' value was 0.15.

**Table 4:** Co-Efficient of Correlation Between 30m Sprint Time from 100m Running Path i.e., 40m to 70m and Standing Broad Jump of Female Athletes

Number of the Subjects	Sum of 30m Sprint Timing ( $\Sigma X$ )	Sum of S.B.J. ( $\Sigma Y$ )	$\Sigma XY$	$\Sigma X^2$	$\Sigma Y^2$	r
15	36.6m	58.52sec.	122.19	90.25	170.71	-0.12

Table 4 shows the co-efficient of correlation between 30m sprint time and standing broad jump of female athletes, where 'r' value was -0.12.

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### Conclusion

From the observation and findings of the study the following conclusion may be drawn: For the male athletes, leg explosive strength positively effect on maximum speed or the relationship between jumping and sprint performance of male athletes are positive but the value of positive relation was negligible. For the female athletes, leg explosive strength negatively effect on maximum speed or the relationship between jumping and sprint performance of female athletes are negative but the value of negative relation was negligible.

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