



RELATIONSHIP BETWEEN PEAK LEG POWER AND PERFORMANCE OF ELITE SHOT-PUTTERS

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ABSTRACT

The purpose of the study was to find out the association between the independent variable peak leg power and the dependent variable performance in shot put.

Selection of Subject: Total 10 elite Indian male Shot putters were selected as sample on the basis of their performance in various Senior National Athletics Championships held during the years 2018-19 for the present study on the basis of purposively sampling technique. The age of the Shot Putters were above 18 years. Statistical Technique: To find out correlation between Independent Variables (Peak Leg Power)

and dependent variable (Performance of Shot Put) descriptive statistics and Product Moment correlation was used. All statistics were calculated with SPSS 21.0. Level of significance was set at 0.05. Findings: Significant relationship observed between Performance of Shot Putters with Peak Leg Power ($r = .792, < 0.05$) Conclusion: The results indicate there is significant relationship between Performance of Shot Put and Peak Leg Power



KEYWORDS: Peak Leg Power, Shot Put.

INTRODUCTION

Strength is perhaps the most important motor ability as far as putting the shot to the maximum distance is concerned and we know that it is the direct product of muscle contractions. All movements in sports are caused by muscle contractions and therefore strength is a part and parcel of all motor abilities, technical skills and tactical actions (Singh, 1997). In simple terms individual's strength ability is defined as the ability of an individual muscles group to generate force and apply it against resistance, when needed. It's one of the very essential motor ability which should be developed if somebody is looking forward to improve the athlete's performance. Although strength development in primitive form was employed by athletes preparing to compete in the ancient Olympic Games, there are still many coaches who do not take advantage of its benefactor role. Strength training is an ingredient of paramount importance in athlete's development.

Since force is an instantaneous measure and all human movements are performed over a certain span of time, the entire force-time continuum not just the force at a given instant of time, typically what interests coaches and athletes (Zatsiorsky, 1995).

In Track & Field putting the shot put is one of the very attractive and famous event and is almost practiced in all over the world. The demand for type of strength ability in this event is power, a combination of strength and speed. Power can be defined as work/time or force x velocity. In both instances power is measured in watts (W). Muscular peak power (PP) (i.e. maximal strength speed) has been designated as the maximum potential product of strength and speed and is demonstrated as the highest power output attainable during a given movement/repetition (Komi, 1992). Given that PP is related both to force generation and movement velocity, muscular PP capacity has been viewed as an exceedingly important testing variable and training objective in most sport conditioning programs and especially for those sports that involve sprinting and jumping (Peterson, 2006)

OBJECTIVES:

The problem is entitled as "Relationship between peak leg power and performance of Indian International Shot-putters."

METHOD AND PROCEDURE

SELECTION OF SUBJECTS

Total 10 Shot Putters were selected as a sample: Indian elite male Shot Putter who had represented the country at International level or got national medals were selected as a sample based on performance in preceding competition. The age of all the subjects were above 18 year.

SELECTION OF VARIABLES:

Peak leg power and performance in shot put were selected as independent and dependent variables for the study.

ADMINISTRATION OF TEST

Ten Indian elite male Shot Putters who had represented the country at national and international level were selected as a sample. All the selected subjects were asked to put the shot with their full potential and accurate technique. They were well directed, informed and prepared for the study. Six chances were given to every Putter. They were asked to put the shot in the natural way as they actually use to perform. It was ascertained that subjects possess reasonable level of technique. Throws were measured with the steel tape as per the rules of IAAF. Peak Leg Power was calculated with the help of Counter movement vertical jump (Peak leg power was estimated using equation developed by Sayers et al. $PP (W) = 60.7 \times \text{jump height [cm]} + 45.3 \times \text{body mass [Kg]} - 2055$).

To find out correlation between Independent Variables (Peak leg power) and Dependent Variable (Performance of Shot Put), descriptive statistics and Product Moment correlation was used. All statistics were calculated with SPSS 21.0. Level of significance was set at 0.05.

RESULTS AND FINDINGS OF THE STUDY:

TABLE-1 Descriptive Statistics of Dependent Variable (Performance of Shot Put) and selected Independent Variables (Peak Leg Power)

Sl. No.	Variable	N	Mean	SD
01.	Peak Leg Power	10	6833.90	935.42
02.	Performance (Shot Put)	10	18.11	1.14

Table-1 indicates the descriptive statistics i.e. Mean, and SD, of selected independent variables (Peak Leg Power) and dependent variables (Performance of Shot Put)

TABLE-2 Correlation between Dependent Variable (Performance of Shot Put) and Independent Variables (Peak Leg Power)

Sl. No.	Independent Variable	Coefficients of correlation	R. (Sig.)
01.	Peak Leg Power	.792**	0.006

Table - 2 clearly indicates that there is significance relationship between Performance of Shot Put and Selected Independent Variables i.e., Peak Leg Power as the p-values were less than 0.05.

DISCUSSION OF THE FINDINGS:

In this study Peak Leg Power showed significant relationship with the performance of elite shot putters. Landolsi et. al. (2014) also conducted study on shot putters and found that Shot-put performance was significantly correlated with peak leg power tested on ergocycle Monark ($r=0.72$, $p < 0.001$). Similarly, Bouhlel et al. (2007) found high correlation between peak leg power and javelin performance ($r = 0.76$, $p < 0.01$). Kyriazis et. al. (2009) investigating changes in shot put performance, muscular power, and neuromuscular activation of the lower extremities, between the preseason and the competition found that shot put performance was significantly correlated with muscular power and take-off velocity during the CMJ (countermovement jump), ($r = 0.66$, $p < 0.05$ and 0.70 , $p < 0.05$) in competition period. From our study it's evident that the development of lower body power for shot putters can't be neglected. Technically a thrower generates power with the help of his leg muscles in momentum building phase and transfer it to the implement in delivery phase to achieve maximum throwing distance. The putter with more power puts the shot to the greater distance.

Most of the studies were conducted on sprints, jumps or other sports. In the past very few studies have been conducted on the relationship of lower body power with performance of throwers. McCoy et. al. (1984) stated that elite shot putters are often off the ground at the moment of release. The explosive lifting of the body at the time of the delivery position contributes to the shot's vertical velocity during the delivery phase. A better thrower transfers the force to the implement faster by quickly applying vertical forces against the ground. Our study also supports this statement because ability to apply quickly vertical forces against ground needs good power or speed strength in lower body. According to Komi (1992) muscular peak force (PP) (i.e., maximal speed strength) has been designated as the maximum potential product of strength and speed and is demonstrated as the highest power output attainable during a given movement/repetition.

CONCLUSIONS:

Within the limitation of the present study and on the basis of findings the following conclusion has been drawn –

Significant relationship was observed between Performance of Shot Put of Indian International Putters and Peak Leg Power ($r = .792$, $p < 0.05$).

Initially it was hypothesized that there will be no significant relationship between the Peak Leg Power and the Performance of Shot Put, which was rejected at 0.05 level of significance.

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