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# IMPACT OF BACK-LEG STRENGTH AND GRIP STRENGTH ON THE PERFORMANCE OF INDIAN HAMMER THROWERS

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## ABSTRACT

*The purpose of the study was to find out Association between back-leg strength, grip strength and dependent Variable (Performance of Hammer Throw). Selection of Subject: Total 10 Indian male national level hammer throwers were selected as sample on the basis of their performance in various Junior and Senior National Athletics Championships held during the year 2018-2019 on the basis of purposive sampling technique for the present study. The age was ranging between 18 to 27 years. Selection of Variables: Under independent variables researcher has selected the following variables i.e., back-leg strength and grip strength as independent variables. Under dependent variables performance of Hammer throw was assessed during the various Junior and Senior National Athletics Championships held during the years 2018-19. Statistical Technique: To find out correlation between Independent Variables and Dependent Variable (Performance of Hammer Throw), 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 Hammer Throw with Back-Leg Strength ($r = .745$, $p < 0.05$), Grip Strength ($r = .746$, $p < 0.05$). Conclusion: The results indicate that there is significant relationship between Performance of Hammer Throw and Back-Leg Strength and Grip Strength.*

**KEY WORDS :** *Back-Leg Strength, Grip Strength, and Hammer Throw.*

## INTRODUCTION :

The Hammer Throw is an event which needs strength and speed and is quite popular all around the globe. It requires a good physique and lots of explosive strength. While performing the rotation in hammer throw, the thrower needs to rotate the hammer and himself very fast, which in turn needs strength and coordination in an athlete. While rotating the hammer, thrower needs to pull the hammer towards the centre, whereas due to centrifugal force the hammer wants to move away from the centre. To hold the hammer while rotating, an athlete needs a good grip strength while keeping arms straight and relaxed. To achieve good results in the event like hammer throw, the coaches must understand the requirements of the event. We need to know what are the important areas in which we must work to get fruitful results The role of back-leg strength and grip strength must be studied, so that the athlete and coaches can design the training programme accordingly and get better results.

## OBJECTIVE OF THE STUDY: -

The purpose of the study was to find out Association between back-leg strength, grip strength and dependent Variable (Performance of Hammer Throw )

## METHOD AND PROCEDURE:

**Selection of Subject:** Total 10 Indian male Hammer Throwers were selected as sample on the basis of their performance in various Senior and junior National Athletics Championships held during the years 2018-19 for the present study on the basis of purposively sampling technique. The age was ranging between 18 to 27 years.

**Selection of the Variables:** Under independent variables researcher has selected back-Leg Strength and Grip Strength and under dependent variables performance of Hammer Throw was assessed from various Junior and Senior National Athletics Championships held during the years 2018-19.

**Statistical Technique:** To find out correlation between Independent Variables and Dependent Variable, descriptive statistics and Product Moment correlation was used. All statistics were calculated with SPSS 21.0. Level of significance was set at 0.05.

## ADMINISTRATION OF TEST

Ten Indian elite male Hammer Throwers, who had represented their respective states in various National Athletics Championships held during the year 2018-2019 were selected as a sample. All the selected subjects were asked to throw the hammer with their full potential and accurate technique. They were well directed, informed and prepared for the study. Six chances were given to every thrower. They were asked to throw the hammer in the natural way as they actually use to perform. It was ascertained that subjects possess reasonable level of technique. Throws were measured in meters (m) with the steel tape as per the rules of IAAF. Leg strength was estimated using leg lift dynamometer and grip strength was estimated using grip dynamometer recorded in kilograms (Kg) of force.

To find out correlation between Independent Variables (Back-Leg Strength and Grip Strength) and Dependent Variable (Performance of Hammer Throw), 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 Hammer Throw) and selected Independent Variables (Back-Leg Strength and Grip Strength)**

| Sl. No. | Variable | N | Mean | SD |
|---|---|---|---|---|
| 01. | Back-Leg Strength | 10 | 225.00 | 45.16 |
| 02. | Grip Strength | 10 | 65.70 | 6.31 |
| 03. | Performance (Hammer Throw) | 10 | 57.13 | 4.15 |

Table-1 indicates the descriptive statistics i.e. Mean, and SD, of selected independent variables (Back-Leg Strength and Grip Strength) and dependent variables (Performance of Hammer Throw)

**TABLE-2 Correlation between Dependent Variable (Performance of Hammer Throw) and Independent Variables (Back-Leg Strength and Grip Strength)**

| Sl. No. | Independent Variable | Coefficients of correlation | R. (Sig.) |
|---|---|---|---|
| 01. | Back-Leg Strength | .742** | 0.007 |
| 02. | Grip Strength | .746** | 0.007 |

Table - 2 clearly indicates that there is significance relationship between Performance of Hammer Throw and Selected Independent Variables i.e., Back-Leg Strength and Grip Strength as the p-values were less than 0.05.

## DISCUSSION OF THE FINDINGS:

Back-Leg Strength and Grip Strength showed significant relationship with the performances of hammer throw. As far as technique of Hammer Throw is concern, the Thrower uses his leg strength to generate speed so that he can rotate himself and the hammer with maximum velocity and due to this he will get the help of angular velocity of hammer during the release and the hammer will travel to a good distance after the release. Reviewing the literature, no study was found on hammer throw performance relationship with back leg strength and grip strength tests. Although Lawrence W Judge, L. W., Bellar D. M., McAtee, G., & Judge, M. (2010) in their study found that back squat for testing leg strength is a significant predictor for achieving good distance in hammer throw. Reviewing different research data on isometric strength testings Stone, M.H., Sanborn, K., O'Bryant, H., Hartman, M., Stone, M.E., Proulx, C., Ward, B., Hruby, J. (2003) suggested that the PF (Peak Force) achieved during an IMTP (Isometric Mid-Thigh Pull) test or back leg strength test can provide significant insights into an athlete's lower body strength levels and how this strength relates to shot put and weight throw performances.

As far as grip is concern the result of the study show that this also affects the performance in hammer throw. Basically, the amount of force generated depends on the number of muscle group involved in that particular movement. Shea (2007) emphasized that there are 35 muscles involve in forearm and hand, with most of these muscles are related to gripping activities. Other than that, the anatomy of gripping movement consists of flexion and extension. The study highlighted that, flexor mechanism of the finger 62% stronger than extensor mechanism. Rozella, A. R., Kee, K. M., Raja, N. J., Nur, A. M. K., & Nuraimi, O. (2018) and Takahashi et al. (2001) also support the results of this study as they say that hand grip strength helps in increasing the velocity of throws.

## CONCLUSIONS:

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

Significant relationship was observed between Performance of Hammer Throw of Indian elite Hammer Thrower and Leg Strength ($r = .742$, $p < 0.05$). Significant relationship was also observed between the performance of Hammer Throw and the Grip Strength ($r = .746$, $p < 0.05$).

Initially it was hypothesized that there will be no significant relationship between the independent variables (Leg Strength and Grip Strength and the Performance of Hammer Thrower, which was rejected at 0.05 level of significance.

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