Evaluation of Maximal Isometric Hand Grip Strength in Different Sports

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Abstract

Background: Grip strength has proven to have a positive effect on sports performance in which a sport implement is grasped in the hand.

Objective: To compare Hand Grip Strength in males of different sports.

Materials and Methods: 400 male sportsmen, 100 in each sport (Cricket, Hockey, Tennis and Badminton) aged 18-25 yrs volunteered to participate in this study were engaged. Each participant was asked to perform at least three maximal isometric grip strength measurements using a Jamar Handgrip Dynamometer and the average of the three grip strength trials readings was recorded.

Statistical analysis: R-Programming Language Software was applied for statistical analyses of the data; the results were statistically analyzed by ANOVA.

Results: The findings of the present study showed that the maximum grip strength measured in both hands is higher in Cricket players than in Hockey, Tennis and Badminton players ($P<0.05$).

Conclusion: In the present study hand grip strength might have increased due to regular training. It would be beneficial to the sportsmen in terms of optimizing training programs separately for particular sports.

***Key Words**: Hand Grip Strength, Jamar dynamometer, sports*

Introduction

Grip strength has proven to have a positive effect on sports performance in which a sport implement is grasped in the hand [9]. Sporting success depend on conditional and coordinative ability such as strength, speed, endurance, mobility and skills, technical- tactic ability, personal abilities, physical characteristics and health factors [18]. In sports, strength is known to increase sporting success and performance. Especially, hand grip strength (grasping strength) the most important determinant. Hand grip strength is a physical trait that plays an important role providing effectiveness and efficiency during daily work and sports activities. For all the ball games in which the use of the hand is essential, hand morphology and functional properties could be important for the performance[10].Moreover, in terms of performance, hand grip is an important indicator in many sports. Hand grip strength is a general term used by strength athletes, referring to the muscular strength and force that they can generate with their hands. The strength of a hand grip is the result of forceful flexion of all finger joints, thumbs, and wrists with the maximum voluntary force that the subject is able to exert under normal bio kinetic conditions[21]. Assessment of handgrip muscle strength tests has been a popular form of testing muscle function in sports and exercise as well as in

other movement related sciences for several decades. It is often used as an indicator of the overall physical strength. The aim of athletic strength testing has been to provide normative values for particular sport disciplines, to select young athletes, to distinguish among different performance levels, or to evaluate the effects of physical exercise in athletic training procedures. The assessment of hand grip strength is important in a number of situations.

Many researchers have evaluated on the gross anthropometrics measurement such as BMI, arm circumference, skin folds, arm length and comparison of muscle strength, pattern of movements between hand dominance in sports. So this study is designed to compare the hand grip strength difference between right-handed and left-handed players.

There are many sports where your hands get quite stressed i.e. in cricket, badminton, volleyball, basketball and tennis. All these sports require good grip strength which is very important to avoid injuries of any kind.

Nowadays, strength and strong athletes are evaluated according to the ratio of the body characteristics and body weight, its preparation to the power they produce [22].Consequently, the purpose of this study is to research the athletes hand grip strength of different sports.

Methodology

The Participants in this study were males (N =400) intermediate level players. The players age ranged from 18 to 25 years, hundred each from Cricket, Hockey, Tennis and Badminton, who are actively engaged in sports .All the participants were informed about the aim and methodology of the study and they volunteered to participate in this study. A written consent was obtained from the subjects. Demographic data –age, height, weight were collected and BMI was calculated.

Exclusion and Inclusion criteria

All the participants were selected on the basis of inclusion and exclusion criteria. The players with cardiovascular and respiratory disorders and those who had a history of fracture in the past 3 months or a deformity in the upper arms were excluded. The students who were between the ages of 18-25 years, those who had a BMI below 30 and those with no history of smoking or alcoholism were included in the study.

Outcome Measure

The instrument used for grip strength measurements was the Jamar handgrip dynamometer, which is considered the gold standard for measurement of grip strength [7]. The participant performed a standardized warm-up that included two to three preliminary trials for familiarization with the recording procedure and instrumentation. The data were collected under natural environmental conditions. The study was approved by the ethical committee of Maharaj Vinayak Global University Jaipur, India.

Participants were seated with the shoulder at 0° abduction and 0° flexion, while the elbow was at 90° flexion, as recommended by American Society of Hand Therapists [23].The participants were instructed on proper technique (i.e. hand placement) for the grip strength measurements. The participants allowed acquainting themselves with the Jamar by grasping and squeezing the Jamar prior to the execution of study trials. The participants were informed to execute a maximal grip effort for 3 seconds during the grip test trials. Verbal encouragement was provided by the test administrator to the participants during the tests trials. There were three trials of maximal grip collected with each trial separated by approximately 1-2 minutes. The greatest maximal grip from the three trials was used for subsequent analysis.

Statistical Analysis

Statistical analyses and its evaluation were made using R-Programming Language Software. Descriptive statistics (mean ± standard deviation) were determined, ANOVA was tested for the comparisons of data among 4 group players. A 5% level of probability was used to indicate statistical significance.

Results

The findings of the present study showed that the maximum grip strength measured in both hands is higher in Cricket players than in Hockey, Tennis and Badminton players ($P<0.05$).

Table: Jammer hand Dynamometer Right and left hand grip values in all groups

Sportsmen	N	Left hand grip strength (kg)	Right hand grip strength (kg)
Cricket	100	50.6864 + 4.90140	55.6900 + 5.79897
Hockey	100	48.9431 + 4.75536	54.4235 + 4.72357
Tennis	100	47.3634 + 4.16756	53.3863 + 4.27568
Badminton	100	42.5401 + 3.72517	48.5060 + 4.00065

Discussion

In the present study the participants showed significant difference of right and left hand grip strength in different sports ($p< 0.05$). Among the four groups the maximum grip strength measured in both hands is higher in Cricket players than in Hockey, Tennis and Badminton players. In sports, strength is known to increase sporting success and performance. Especially, hand grip strength (grasping strength) the most important determinant.

Hand grip is an important, though often overlooked, component of strength in sports [2]. Before a player begins playing a hand grip strength test is important for determining a player's workout.[6] Hand grip strength determines a player's readiness for sports. In hockey, hand grip strength is used to angle the shot of the puck, whether they are passing the puck or shooting for a goal. Hand grip strength is essential for the execution of skills in hockey[1].Nowadays, strength and strong athletes are evaluated according to the ratio of the body characteristics and body weight, its preparation to the power they produce [22]. Gender, age and weight are the factors that impact grip strength [11]. Different sports have no significant difference of right and left hand grip when comparing grip strength .[3]

The aim of athletic strength testing has been to provide normative values for particular sport disciplines, to select young athletes, to distinguish among different performance levels or to evaluate the effects of physical exercise in athletic training procedures. The assessment of hand grip strength is important in a number of situations. Many athletes and coaches believe that the forearm plays a significant role both in hitting and throwing the ball. Many studies describe upper extremity characteristics of baseball players[25, 24, 27]and reports related to morphological/anthropometric characteristics and hand grip strength of softball players are available. Handgrip strength is important for catching and throwing the ball in different team sports [8].

The grip strength is measured in several sports disciplines and its importance to success is clearly identified. The estimation of hand grip strength is of immense importance in sports like wrestling, tennis, badminton, cricket, handball, basketball, hockey, baseball and softball, where sufficient degree of grip strength is necessary to be successful. Dopsaj, Koropanovski (2007) confirmed that men showed significantly greater maximal hand grip force in both dominant and non-dominant hands than women. [19] Observed that hand grip strength correlated with throwing speed in experienced pitchers. Hand grip strength plays an important role to predict the performance in various sports activities especially in baseball [15], tennis [13] and in cricket [9].Grip strength is often used as an indicator of overall physical strength[16,12], hand and forearm muscles performances[26] The hand morphology and functional properties play an important role in performance [4].The grip strength was reported to be higher in dominant hand with right handed subjects, but no such significant differences between sides could be documented for left handed people [17].The purpose of this study is to research the athlete's hand grip strength of different sports. Based on results the study statistically proved significant difference among players hand grip strength. This finding indicates that specific training of these sports may influence handgrip strength.

Conclusion

It may be stated from the findings that not much difference were there among players may be due to structural and physiological, as well as the training program among them. The findings of the present

study carry immense practical application in sports anthropometry. It may be concluded from the present study that and should be useful in future investigation on player selection, talent identification in players and training program development. Future studies are required considering vast sample size with numbers of anthropometric traits.

Ethical Clearance- Taken from Maharaj Vinayak Global University committee.

Source of Funding -Self

Conflict of Interest - Nil

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