



ISSN: 2456-0057

IJPNPE 2023; 8(2): 577-579

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www.journalofsports.com

Received: 03-10-2023

Accepted: 07-11-2023

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A study of relationship between isometric muscles strength and Olympic weightlifting skills snatch and clean & jerk performance of varsity male weight lifters

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DOI: <https://doi.org/10.22271/journalofsport.2023.v8.i2h.2858>

Abstract

The Purpose of this study was to investigate the relationship between Isometric Muscles Strength and Olympic weightlifting skills Performance of 18 to 25 year old 30 male university students, who have participated at university level in weight lifting sport in the last 3years (2020-2023). The Isometric Muscles Strength of the varsity male weight lifters was measured through Plank hold test, three chances to be given and best time (Maximum time to hold) recorded to select a score of the athlete and data of Olympic weightlifting skills Snatch and Clean & Jerk Performance of University weight lifters was collected from university competitions and best performance were taken as data score. The Person's Product Movement Correlation ($p > .05$) was used to find out the relationship. The result of the present study shows that Isometric Muscles Strength (Plank test) is significantly related to Olympic weightlifting skills Snatch ($r = 0.30$) and Clean & Jerk ($r = 0.32$) Performance.

Keywords: Olympic weightlifting, isometric strength endurance, snatch and clean & jerk, plank test

Introduction

Olympic Weightlifting is a dynamic strength and power sports in which two complex lifts are performed in competition; the Snatch and the clean and jerk. During these lifts, weightlifters have achieved some of the highest peak power outputs reported in the literature [6].

The snatch requires a weighted barbell to be lifted from the floor with wide grips to an overhead position in one continuous movement and on the other lift clean and jerk is divided into two main phases, in which first the barbell is to be raised from the floor with shoulder width grip to the front of the shoulder in one continuous movement and the second phase consists of a jerk, in which the barbell is propelled from the shoulders to arm's length overhead by forces produced primarily by the hips and thighs [3].

The Olympic weightlifting sport demand a high level of Physiological, Psychological and technical proficiency from the lifts. Therefore, Weightlifters need to lift heavy loaded weight to exert a force in to the platform through fast coordination of toe, knee and hip movements.

The athletes, Coaches, Sports scientist try to explore specific training methods, Physiological adaptation and muscles to support the increased the performance of skills of weight lifters.

Several factors have been well-established as major determinants for the optimum performance in the Olympic weightlifting, these include rate of force reaction of involved muscle (Muscle Strength and Power), Combination of maximal strength and speed and the movement of pull up and pickup. Isometric Strength endurance is defined as the ability of muscles to act against resistance for longer time. Isometric Muscle contraction, as the length of muscle remains the same as it develop tension. Isometric muscles strength is also known as static strength because in this movement length of muscles doesn't change.

In the sport Olympic weightlifting the movements of arms, shoulders, back, hip and knee contract statically and dynamically, lifter lift the weight assume an erect position [15].

The purpose of this paper was to study the relationship of Isometric Muscles Strength between Olympic weightlifting skills Snatch and Clean & Jerk Performance.

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Methods

30 male (age 18-25) University athletes Olympic weightlifting athletes volunteered to participate in this study.

Procedure

Each subject underwent to Plank hold test used for the measurement of Isometric Muscles Strength. All the subjects received all necessary information about the study procedures in oral and written form. For the test all subjects were given 10 minutes for the warming up and instructions to perform the test. The weightlifting skills performance data was collected from the different level of competitions official record of 2020-2023, where subjects participated in the last 3 years and best performance were taken.

Plank Hold Test

This test is used as a means of evaluate and contribution of the Isometric muscles strength of athletes in the field of weightlifting, throwing events in athletics and Gymnastic sports. In the Plank hold test the subject lies down with back and hip straight in correct position and head should be facing towards the ground and not looking forwards. The stopwatch is started and the command to start is given. The test is over when subject is not able to hold the back straight position or hip is lowered. The score is the total time of hold as much as in correct position [4]. This test involved the erector spine, rectus, abdominals, trapezius cuff, deltoid, pectorals, gluteus maximus, and quadriceps group of muscles.

Statistical Analyses

For the data analyses ‘R’ 4.1.1 statistical software was used to calculate Person’s Product Movement Correlation Coefficient to assess the relationship between Isometric Muscles Strength and Olympic weightlifting skills snatch and Clean & Jerk Performance. The level of significance was .05.

Results

Descriptive statistics Mean, SD and Person’s Product Movement Correlation Coefficient to analysis the relationship between Isometric Muscles Strength and Olympic weightlifting skills Performance.

Findings

The relationship of Dependent variable weightlifting skills

performance and Independent Variables Isometric Muscles Strength (Plank Hold Test). The score of independent variables were correlated with weightlifting performance i.e. Snatch and clean & Jerk and analysis of data pertaining to this presented in Table 1.

Table 1: Snatch and clean & Jerk and analysis of data pertaining to this presented

S.NO	Variables Correlated	Coefficient of Correlation
1.	Isometric Strength Endurance and Snatch	*0.30
2.	Isometric Strength Endurance and Clean & Jerk	*0.32

*Significant at .05 level of confidence.
N=30

Analysis of data in table 1 indicates that Olympic weightlifting skills Performance i.e. Snatch and Clean & Jerk significantly related to Isometric Muscles Strength. The relationship of Olympic weightlifting skills Performance i.e. Snatch and Clean & Jerk to Isometric Strength (Plank hold test) is graphically presented in Figure 1 to 2.

Discussion of findings

The present study investigated the relationship between Isometric Muscles Strength and Olympic weightlifting skills Performance of varsity Male Weight lifters. The analysis of data in respect of relationship of Olympic weightlifting skills Snatch and clean and Jerk to independent variable isometric Muscles Endurance (Plank Hold Test) has shown that the study has been found to be significantly related for criterion variables. The relationship between Plank tests and athletic performance is found significantly related [10]. Tong, T.K, *et al.* [16] study suggested that the sports specific endurance plank test is valid to assessing core muscles strength endurance.

Many research finding have shown that efficiency of Isometric Strength Endurance (Core Muscles) spine, rectus, abdominals, trapezius cuff, deltoid, pectoralis, gluteus maximus and quadriceps group of muscles strength as Isometric strength endurance is main contributor for optimum sporting results in Olympic weightlifting Skills. Isometric strength has a strong role in weightlifting performance [8].

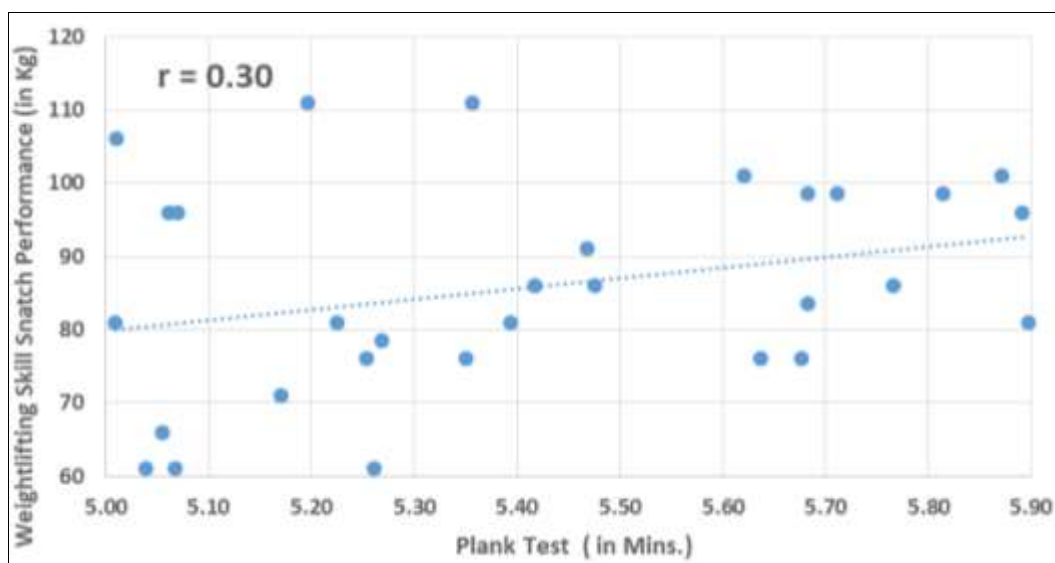


Fig 1: Relationship between Snatch and Isometric Muscles Strength (Plank Hold Test)

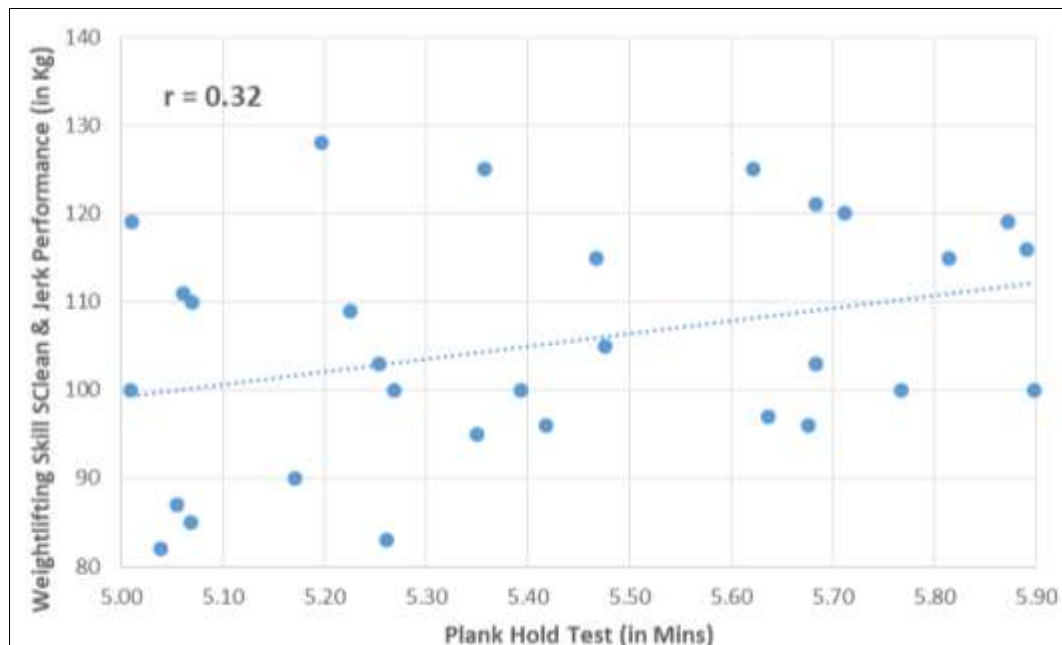


Fig 2: Relationship between Clean & Jerk and Isometric Muscles Strength (Plank Hold Test)

Conclusion

The aim of this study was to investigate the relationship between Isometric Muscles Strength and Olympic weightlifting skills Performance i.e. Snatch and Clean & Jerk. Within the limitations of the study the conclusions appeared justified as per the results obtained that Isometric Muscles Strength significantly related to weightlifting skills performance snatch and Clean & jerk.

Implication of Research findings

This study had several limitations that may suggest Isometric Muscles Strength training protocol to Olympic Weightlifting Sport Coaches, Sports Scientists and athletes themselves-consider systematic training program and preparation to help in optimum performance in the different level of competitions.

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