Original Article

Correlation of Hand Grip Strength with Hand pan of Bangladeshi Male Cricket Batsman

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Abstract

Human hand is a prehensile part of upper limb capable with grasping and prehension movements for skilled works. Cricket is one of the popular game in Bangladesh. Grip strength, forearm strength and shoulder power are essential components contributing to upper limb strength. Stronger upper limb give more power in shots. The estimation of hand grip strength is of immense importance in sports where a sufficient degree of power grip is necessary for success. The aim of the present study was to determine hand anthropometry and average hand grip strength of Bangladeshi male cricket Batsman to find out correlation between them that may be used as a baseline for other professions as well for future research in our country. The present study was undertaken to measure the correlation between hand grip strength and hand span of Bangladeshi male cricket batsman. This cross-sectional analytical type of study was performed in Department of Anatomy, Dhaka Medical College, Dhaka from July 2015 to June 2016 on 50 adult Bangladeshi male sprinters(Group A) and 50 adult Bangladeshi male cricket batsman (Group B). Sample collection was done by convenient purposive sampling technique. History of any injury of hand during playing was excluded to construct standard measurement. Hand span was measured with the help of ruler. Hand grip strength Dynamometer was used to measure the hand grip strength. Paired Student's t test, unpaired student's t test and Pearson's correlation coefficient test were done for statistical analysis of the result. The mean right and left hand grip strength was significantly higher in the cricket batsman than in the sprinters. Hand span was found to be significantly higher in the cricket batsman than in the sprinters. Right and left hand grip strength showed significant positive correlation with hand span in both hand. In conclusion, the study findings suggest that regular physical exercise and training increase hand grip strength.

Key word: *Hand grip strength, hand span, hand grip dynamometer, male cricket batsman, male sprinters.*

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Introduction

The power grip is the forceful flexion of all finger joints with the maximum voluntary force that the subject is able to exert under normal biokinetic conditions[1]. Power grip is the result of four sequences which are opening of the hand, positioning of fingers, approaching the fingers to the object and maintaining a static phase[2].The strength of power grip in proportional to the range of flexion in the smallest joints. The final torque of this power grip in grasping objects comes from thenar and

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hypothenar muscles. The little finger is mechanically very important in power grips as it adds to the breadth of the palm and increases strength of power grip. The power grip is used by cricket, handball, baseball, volleyball, football players and tennis, badminton, hockey, golf players and wrestler. Batsman uses power grip to hold a cricket bat. Batsman also required hand to hand coordination, upper limb power, power grip strength and the coordinate movements of shoulders, arms, and wrist. Grip training plays an important role for the batsman to increase hand grip strength. Batsman with a weak power grip is prone to injury as the strength of one's power grip plays a vital role in prevention of injury.. The muscles of forearm and hand are involved in gripping activities. Grip strength depends on hand dominance, posture, hand size, forearm strength, age, body weight, height. Grip strength also depends on physical activity, occupation, grip span, position of the thumb, position of the elbow, position of the arm, contact surface orientations, object shape and size[3]. Heavy manual workers have greater hand grip strength than office workers. Grip strength measurement is an objective index of the functional integrity of the upper limb[4]. Improving grip strength can positively impact on many athletes, is not only the quality of their workouts but also the results they achieve. Right and left hand grip strength bear a positive correlation with anthropometric variables like arm, hand, palm length and hand span[5]. Cricket is one of the most popular team sports[6]. It is a game of endurance as well as strength[7]. So the importance of studying correlation of hand grip strength with anthropometric variables of hand carry immense practical application in anthropometry. So far it is known, there is no available literature on correlation of hand grip strength with anthropometric variables of the male cricket batsman in our country. So the present study will carry great importance since Bangladesh cricket is developing day by day.

Materials & Methods: Convenient purposive sampling was done.Upper limb bones get completely ossified usually by the age of 20 years. So the hand achieves its adult and fixed measurements by 20 years of age. For ensuring the adult measurements of upper limb as well as to avoid any confounding variable of the normal ossification process, no subject less than 20 years was included in the present study. Hence the present study was conducted on population ranging from 26-35 years of age. In this study upper limit of age was 35 years because after 35 years the performance of the players decline approximately 10%.The group B required repeated use of power grip throughout the practice and playing period where as the group A was not required so. History of any injury of hand during playing was excluded from this research.

Collection of sample :

a) Group A (adultBangladeshi male sprinters): 50 adult Bangladeshi male sprinters were selected from Bangladesh Athletic Federation. The sprinters do not uses power grip during the practice and playing period.Their age ranging from 26-35years and also having 5 years working experiences. Their age was confirmed by the national ID cards.

b) Group B (adult Bangladeshi male cricket batsman): 50 adult Bangladeshi male cricket batsman age ranging 26-35years having 5 years working experience was selected from different cricket foundation and club at Dhaka, e.g: Kalabagan Foundation, Abahani Club, Udayan Academy. Their age was confirmed by the national ID cards. The batsman uses power grip to hold a cricket bat and to play shots. The batsman uses whole upper limb strength during batting.

Right hand dominant batsman were seleted. To avoid any error of result of measurements of present study, height of both group A and B was selected ranging from 168 cm (5 feet 6 inch) to 176 cm (5 feet 9 inch).

Procedure of measurement of hand grip strength:

Hand grip strength dynamometer (Camry, USA) was used to measure the grip strength. The subject sat on a chair with the elbow flexed at 90° and forearm in semi-prone position, lying on an arm-rest. He was requested to squeeze the dynamometer three times with each hand. To overcome fatigue of hand muscles, the

subject was given one minute resting period between each squeeze. Mean value of three squeezes were taken into account. Hand grip strength was measured in kg.

Fig.-1: *Photograph showing measurement of hand grip strength*

Procedure of measurement of hand span:

First place the ruler on the table then asked the subject opened his hand as wide as possible and put the thumb finger of hand on the ruler from '0' mark. Then measurement was taken from the tip of the thumb to the tip of the little finger in cm.

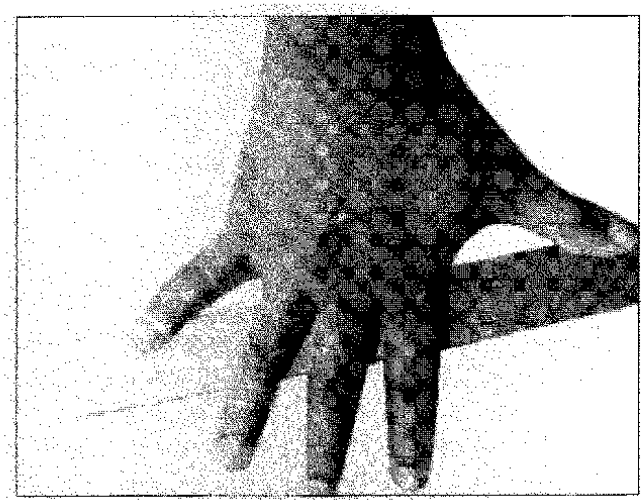

Fig.-2: *Photograph showing measurement of hand span*

Results

Table-I

Comparison of grip strength between group A and group B

Group	Grip strength (kg)		*P value*
	Right hand (Mean±SD)	Left hand (Mean±SD)	
A	39.77 ± 1.24	38.53 ± 1.19	0.001*
(n=50)	(37.16 – 41.89)	(36.13 – 41.25)	
B	43.05 ± 1.52	41.46 ± 1.23	0.001*
(n=50)	(38.93 – 45.87)	(38.50 – 44.21)	
P value	0.001*	0.001*	

Figures in parentheses indicate range. SD= Standard Deviation
Comparison between values of right and left hand of same group was done by Paired Student's 't' test
Comparison between group A and group B was done by Unpaired Student's 't' test.
ns= not significant, *= significant
Group A (Adult Bangladeshi male sprinters)
Group B (Adult Bangladeshi male cricket batsman)

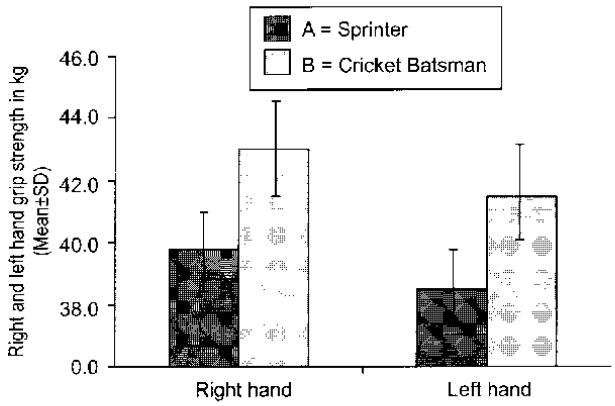

Fig.-3: *Comparison of right and left hand grip strength between group A and group B*

Table-II

Comparison of hand span between group A and group B

Group	Hand span in cm		*P value*
	Right (Mean±SD)	Left (Mean±SD)	
A	23.33 ± 1.29	23.33 ± 1.29	0.237 ns
(n=50)	(20.81-25.71)	(20.82-25.72)	
B	25.84 ± 1.32	25.78 ± 1.33	0.155 ns
(n=50)	(22.80-27.90)	(22.81-27.89)	
P value	0.001*	0.001*	

Figures in parentheses indicate range. SD = Standard Deviation
Comparison between values of right and left hand of same group was done by Paired Student's 't' test.
Comparison between group A and group B was done by Unpaired student's 't' test.
ns= not significant, *= significant.
Group A (Adult Bangladeshi male sprinters)
Group B (Adult Bangladeshi male cricket batsman)

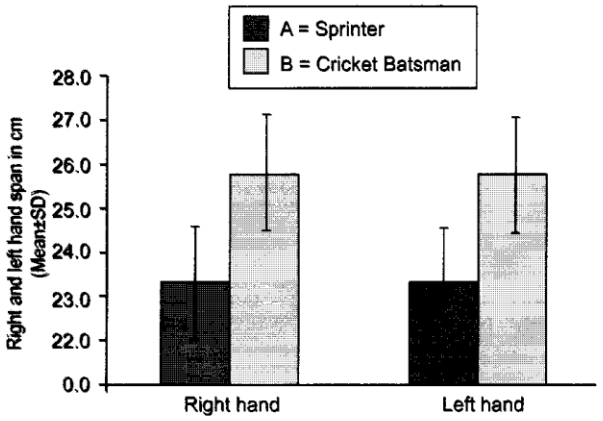

Fig.-4: *Comparison of right and left hand span between group A and group B*

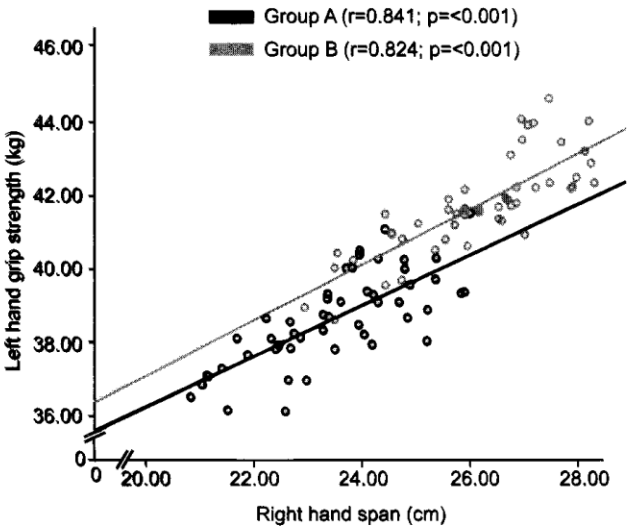

Fig.-5: *Correlation of right hand grip strength with right hand span*

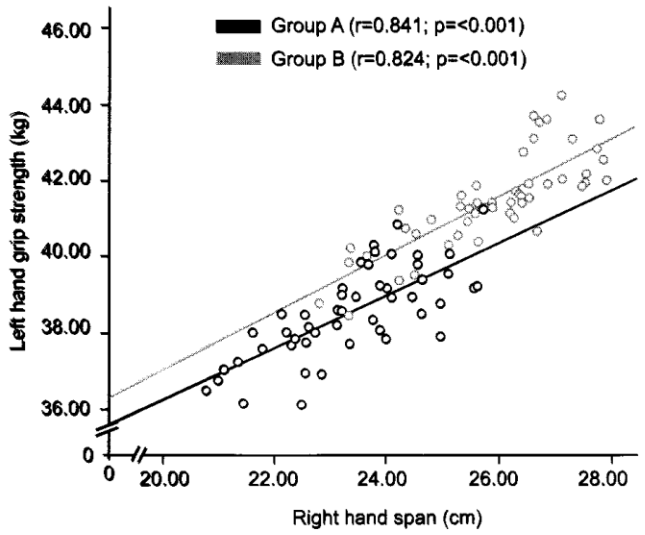

Fig.-6: *Correlation of left hand grip strength with right hand span*

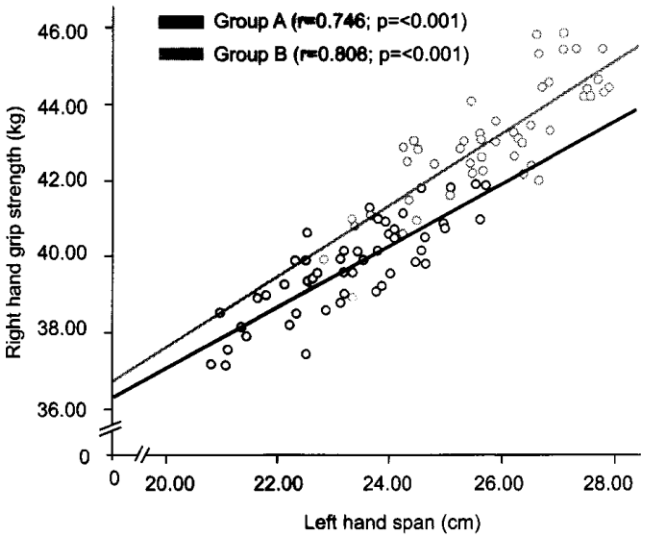

Fig.-7: *Correlation of right hand grip strength with left hand span*

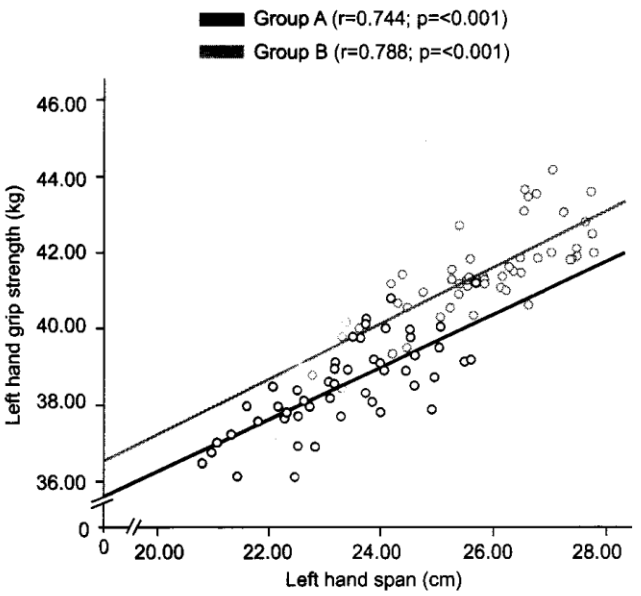

Fig.-8: *Correlation of left hand grip strength with left hand span*

Discussion

The present study was carried out on 50 adult Bangladeshi male sprinters (Group A) and 50 adult Bangladeshi male cricket batsman (Group B). In this discussion, correlation of hand grip strength with hand span was discussed. Male cricket batsman were selected for the present study on the basis of observations that they constantly use power grip to hold the bat and play powerful shot. The sprinters do not uses power grip during practice and playing period.

The results of the present study were compared with the studies carried out by Bhuse and Vyavahare[8] and Chittababu[9].

Bhuse and Vyavahare[8] conducted a study on agricultural workers of 20-60 years age in Maharashtra, India. Cricket players follow regular physical fitness programme throughout the year. They maintain adequate and balanced diet where as the working class people such as agricultural worker do not follow any physical fitness programme and in most instance, cannot fulfill even their nutritional requirements. Due to inclusion of different study subject results are quite different.

Chittababu[9] conducted a study on 144 male interuniversity handball players of 18-28 years of age in Maharashtra, India. Both handball and cricket players go through different training programme. Batsman usually use cylindrical power grip for their practice and playing where handball players use spherical power grip. Due to inclusion of different study subject results are quite different.

Another study conducted by Mohammadian, et al.[10] on 526 male Iranian adults of 20-107 years of age. The subjects of Mohammadianet al[10] were involved in occupation that ranged from light, medium, heavy to very heavy work where as the present study only deals with cricket batsman. It was not clearly mention in the study which types of grip the subjects used.

The mean right and left hand grip strength of group A and B in the present study was 39.77±1.24 kg, 38.53±1.19 kg and 43.05±1.52 kg, 41.46±1.23 kg respectively. Significant difference (P<0.001) was observed between mean grip strength of right and left hand in both group A and B where the mean grip strength was higher in the right hand. There was significant difference (P<0.001) was observed between group A and group B in the mean grip strength in both hand where the mean grip strength was higher in the group B than the group A.

Chittababu[9] found 71.63±7.87 kg and 67.62±7.45 kg mean hand grip strength of right and left hand respectively in male handball players which was significantly higher (P<0.001) than group B of the present study.

Another study was carried out by Bhuse and Vyavahare[8] on agricultural workers. The reaserchers reported 28.01±6.75 kg and 27.9±7.75 kg mean grip strength of right and left hand respectively. This findings was significantly lower (P<0.001) than group B of the present study findings.

In the present study, the mean right and left hand span of group A was 23.33±1.29 cm and 23.33±1.29 cm and group B was 25.84±1.32 cm and 25.78±1.33 cm respectively. Mean hand span were significantly higher (P<0.001) in group B than group A. In this study right (r=+0.840, P<0.001) and left (r=+0.808, P<0.001) hand grip strength showed significant positive correlation with right hand span. In relation to the left hand span showed significant positive correlation with both right (r=+0.824, P<0.001) and left (r=+0.788, P<0.001) hand grip strength.

In contrary to these Mohammadian, et al[10] reported 22.54±1.31 mm, 22.41±1.40 mm mean right and left hand span where mean hand span was significantly lower (P<0.001) than group B of the present study. The researchers also showed significant positive correlation in dominant hand grip strength (r=+0.047, P<0.05) with dominant hand span.

Conclusion: The mean right and left hand grip strength was significantly higher in the cricket batsman than in the sprinters. Hand span was found to be significantly higher in the cricket batsman than in the sprinters. Right & left hand grip strength showed significant positive correlation with hand span in both hand.

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