

Original Research Article

Comparison of Handgrip Strength between Right-Handed and Left-Handed Badminton Players

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ABSTRACT

Background: Badminton is a popular sport worldwide that requires fast and powerful shots and agile footwork. It is one of the fastest racket sports in the world; the speed of badminton smashes can be as high as 30m/s. Badminton wrist action is extremely important in producing powerful Shot. Badminton is all about the wrist and the true power from any badminton shot comes from a combination of your wrist action and the racket swing. The research data has shown that left-handed athletes do better in sports like cricket, baseball, squash, badminton, and tennis. However, there is no detailed information on comparing the handgrip strength difference between right-handed and left-handed badminton players. Aim of the study: To compare the handgrip strength between right-handed versus left-handed badminton players.

Method: Through convenience sampling 30 badminton players of 15 players of right-handed and 15 players of left-handed were recruited after screening for inclusion and exclusion criteria. All subjects were assessed for their handgrip strength using a hand-held dynamometer. A thirty minute of rest was given before assessing forehand smash speed. The players were asked to perform forearm smash and the smash speed was recorded using the Ling Bu app. The best of three attempts forearm smash speed was recorded. Three trails were given for each of the participants and an average score was recorded.

Data Analysis: Descriptive statistics of handgrip strength and forehand smash speed performance were analyzed in the term of mean and standard deviation. Pearson's correlation coefficient between age, handgrip strength and ankle muscles and forehand smash speed scores were correlated.

Results: A significant difference between the left-handed and right-handed handgrip strength was noticed with a mean of 69 ± 9.44 and 58 ± 12.02 kgs respectively. The left-handed forearm smash speed was recorded faster than the right-handed forehand smashes with a mean of 196 ± 29.15 and 166 ± 25.53 km/hr respectively. Further, Pearson's coefficient correlation was found between the age, handgrip strength and forearm smash speed.

Conclusion: The result of this study indicates the significant difference between the handgrip strength among left-handed and right-handed badminton players and this could be the reason for higher forearm smash speed and better performance of left-handed players in badminton.

Keywords: Badminton players, Handgrip strength, left-handed players, badminton smash speed

INTRODUCTION

Badminton is a popular sport worldwide that requires fast and powerful shots and agile footwork. It is one of the fastest racket sports in the world; the speed

of badminton smashes can be as high as 493kph. ^[1] The badminton shots can be played both on the forehand and backhand sides and drop shot, slow drop shot & fast drop shots require good wrist control. ^[2]

Badminton wrist action is extremely important in producing powerful Shot. Good wrist movement maximizes power and improves control over the direction of the shuttle. Badminton is all about the wrist and the true power from any badminton shot comes from a combination of your wrist action and the racket swing. The flicking of the wrist with a 'fast snapping motion' to create extra power in your badminton shots is essential to generate the maximum power in any type of shots. It is very useful to train the players to improve their wrist action to generate the snapping motion of your wrist and badminton backhand, overhead stroke depends on strong wrist action to generate the power. [3]

Badminton strokes are performed by holding the racket while the wrist is in different degrees of orientation and depending on the strokes and type of shot being hit by players and they have to manage grip force and racket control while hitting the shuttlecock. Grip forces exerted by fingers flexor muscle are isometric and accordingly to the force-length relationship a badminton player should hit the shuttlecock. Badminton wrist action is extremely important in producing powerful shots. Good wrist movement maximizes power and improves control over the direction of the shuttle. [4]

Motor skills can be defined as an activity or task that has a specific purpose or goal to achieve. One of the motor skills in racquet sports is hand grip strength. This handgrip strength requires flexor musculature of the forearm and also hand. These motor skills play as a key role in injury prevention and overall strength development. Sakurai 2000 reported that the proximal muscles of the unskilled participant had a similar pattern of activity to that of the skilled player. It is reported that controlling the distal muscles appears to be important for achieving the accurate performance of the smash in badminton. [5]

The research data of rankings and handedness stats for the top 100 players in six sports over multiple seasons, and

combined these with video analysis of professional matches Left-handed athletes do better in sports and Left-handed athletes do better in sports like squash, badminton, and tennis. [6]

Badminton manufacturers are producing the rackets for left-handed players with a special grip made only for left-handed badminton players. Strengthening the handgrip muscles will increase the overall strength which in turn will increase your badminton smash. There are a lot of anthropometric and hand grip strength studies comparing the hand dominance in sports activities. 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 badminton players.

Aim of the study

Aim: To compare the handgrip strength between right-handed and left-handed badminton players.

Objectives:

- To assess the forehand smash of both right-handed and left-handed badminton players
- To assess the hand grip strength of both right-handed and left-handed badminton players using hand held dynamometer
- To compare the hand grip strength between right-handed players and left-handed badminton players

METHODOLOGY

Material:

- Digital Handheld Dynamometer
- LingBu app for Badminton smash speed

Research Design

- Cross-sectional study

Sample Size:

- The sample of the study were totally 30 badminton players consisting of

Youth male players right-handed (n=15) and left-handed male players (n=15) with age: (20±2.11)

Data collection

Badminton sports club in and around Navi-Mumbai.

Inclusion Criteria:

- Male badminton players
- Age group 18-25
- Playing for at least 2 years

Exclusion Criteria:

- Novice players [Played for less than 2 years]
- Any recent upper limb injuries or lower limb joints
- Recent wrist fractures
- Elite players

Methodology

The ethical clearance was obtained from the ethical committee of DY Patil college of Physiotherapy. Badminton players were assessed for their eligibility. If the subjects fulfilled the inclusion and exclusion criteria, an information sheet providing details about the study was provided to them. For subjects who were willing to take part in the study, informed consent was obtained from them for the same. Prior to the assessment of BMI, a number of years of playing experience and demographic data were collected. All subjects were assessed for their handgrip strength using a hand-held dynamometer. Three trials were given for each of the participants and an average score was recorded. The subject was made to sit on a chair with the elbow flexed at 90 degrees and the forearm in semi-pronation (neutral position) lying on an armrest. [7] There was a one minute resting period was given in between each squeeze in order to overcome the fatigue. The mean value of three squeezes was recorded.

After recording the handgrip strength, thirty minutes of rest was given before assessing forehand smash speed.

The procedure of forehand smash speed: The players were asked to perform forearm smash and the smash speed was recorded using the Ling Bu app. [8] The best of three attempts forehand smash speed was recorded.

The data obtained were analyzed to compare the hand grip strength between right-handed players versus left-handed badminton players.



Image1. Forehand smash by Left-handed player



Image2. Forehand smash by Right-handed player

Statistical Method

The data collected were entered in Microsoft Excel and statistical analysis was performed using the Statistical Package for Social Sciences (SPSS version 23) software.

Descriptive statistics of handgrip strength and forehand smash speed performance were analyzed in the term of mean and standard deviation.

Pearson’s correlation between age, handgrip strength and forehand smash speed was analyzed.

RESULTS

TABLE 1: Mean and SD of Age, Handgrip strength and forehand smash speed

	Range	Mean	Std Deviation
Age group	18.00 – 25.00	20.00	2.11
Handgrip strength (Right-handed and Left-handed players)	40 – 82	63.80	12.15
Forehand smash speed(Right-handed and Left-handed players)	140-240	181.03	30.96

The above table shows the range, mean and standard deviation of Age group, Handgrip strength and Forehand smash speed of right-handed and left-handed players

TABLE 2: Mean and Standard deviation of comparison of handgrip strength right and left-hand badminton players with forehand smash speed of right and left-handed players

Variables	Handgrip strength		Forehand smash speed	
	Right-handed	Left-handed	Right-handed	Left-handed
Mean	58.00	69.60	166.00	196.06
Std Deviation	12.02	9.44	25.53	29.15

The above table shows the range, mean and standard deviation of Handgrip strength and Forehand smash speed of Right-handed and Left-handed players of samples (n = 30)

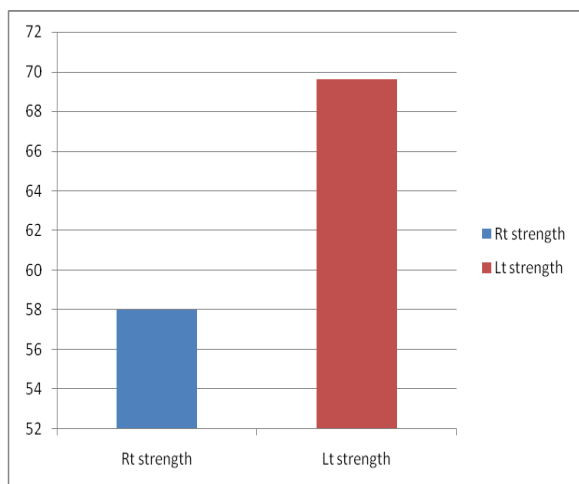


Figure 1: Graphic representation of Mean of handgrip strength of right-handed and left-handed players

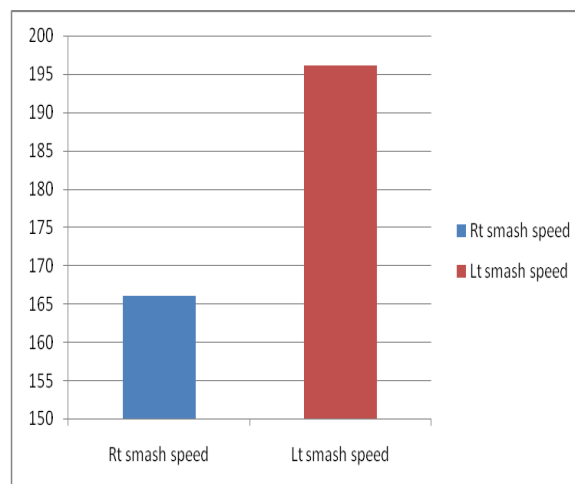


Figure 2: Graphic representation of Mean of forearm smash speed of right-handed and left-handed players

Table 3: Pearson’s correlation between age, handgrip strength and forearm smash speed

Correlations				
		Age_R_L	smashsp_R_L	Strength_R_L
Age_R_L	Pearson Correlation	1	-.096	-.192
	Sig. (2-tailed)		.615	.311
	N	30	30	30
smashsp_R_L	Pearson Correlation	-.096	1	.932**
	Sig. (2-tailed)	.615		.000
	N	30	30	30
Strength_R_L	Pearson Correlation	-.192	.932**	1
	Sig. (2-tailed)	.311	.000	
	N	30	30	30

** . Correlation is significant at the 0.01 level (2-tailed).

The above table shows a significant correlation between handgrip strength and forearm smash speed (p = 0.004) with r =0.932. There is no significant correlation of age with Handgrip strength (p=0.31) and forearm smash speed (p=0.61)

DISCUSSION

The main aim of this study was to compare the handgrip strength and forehand smash speed performance among right-handed and left-handed badminton players. Our result indicates that there is significant between handgrip of right-handed and left-handed players also forearm smash speed with handgrip strength. There was a correlation between the number of years of practice and forearm smash speed.

The result of our study has shown an interesting pattern of the contribution of handgrip strength with a forehand smash. The left-handed player handgrip strength has shown the greater value than the right-handed badminton players with mean of 69 ± 9.44 kgs and 58 ± 12.02 kgs and the forearm smash speed was shown significantly higher scores of left-handed players than the right-handed badminton players with 196 ± 29.15 and 166 ± 25.53 km/hr.

Measurement of hand grip strength is not only the most common assessment method for upper extremity muscle strength, but also it is an important indicator of sports performance. [9] Hand grip strength is heritable, indicative of health status, overall masculinity, and reproductive fitness with a substantial genetic component. [10] Grip strength has long been thought of as a possible predictor of overall body strength. [11] Smith 2005 found a direct correlation in grip strength and overall body strength. So, an increase in handgrip strength determines the physical strength of an individual and this can be applied in racket sports performance. Geschwind 1987 explained that the left-handers have an enlarged brain region in the right hemisphere during development which favours them playing better than the right-handed players. [12] Rossi 1986, Bisiacchi 1985 reported that the performing activities which demand spatial task and attention, the right half of the brain is neuroanatomically highly suitable for the left-handers. [13,14,15]

Further analysis has shown the significant correlation between handgrip

strength and forearm smash speed in both the handed players with $p = 0.004$ and $r = 0.932$. There is no significant correlation of age with handgrip strength ($p=0.31$) and forearm smash speed ($p=0.61$).

CONCLUSION

In conclusion, the result of this study indicates the significant correlation of handgrip strength with forehand smash speed among badminton players. The left-handed player forehand smash speed is greater than right-handed badminton players. The handgrip strength has shown a strong correlation with forehand smash speed. This information can be used as guidance for sports specific training to improve forehand smash performance among badminton players.

Practical applications

From a practical point of view, to improve smash speed, resistive training regime may include strengthening of handgrip muscles. Although the ability of good handgrip is the summation of the synergistic action of flexor and extensor muscles and the interplay of a muscle group is an important factor in the strength of the resulting grip. Therefore, to improve the handgrip strength as a part of badminton training is essential.

Limitation of the study

The sample was recreational badminton players. The study can be done on professional players or elite players. Only male badminton players were recruited, can be carried out among female badminton players.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions:

Kriti Singh - has contributed towards the conceptualization of the study and design, data acquisition and interpretation and drafting the manuscript for its intellectual content.

Nanda Kumar. S - played a role in conceptualization of the research idea, supportive guidance throughout in execution of the study and in the critical and technical revision of the manuscript.

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