

# A STUDY ON ANTHROPOMETRIC VARIABLES CONTRIBUTING TO SUCCESS IN HOCKEY

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## **Abstract**

Studies proved that elite players of different sports require different body proportions with respect to their events. The purpose of this study was to find out the relationship of the selected anthropometric variables contributing to success in hockey viz; striker, defender and mid fielder. Thirty male hockey players who represented Sivagangai district in hockey tournaments were randomly selected for this study. They were further divided into three equal groups as per their playing position i.e. 10-striker, 10 defenders and 10 mid fielders. The grading and performance were judged in the light of ten point scale by a panel of three professional judges. The score was average rating of three experts. Anthropometric measurements including linear measurements, diameters and circumferences were taken by following the standard techniques of Tanner et al. (1969). The relationship of fifteen anthropometric measurements with performance in striker, defender and mid fielder were studied. Coefficient of correlation was computed to find the relationship of various anthropometric measurements to performance in hockey. It was analysed that performance in striker is more a function of arm length, leg length, and shoulder width and forearm girth. Height and shoulder width helps the defenders to perform better and mid fielders need to be shorter to excel in the game of hockey. It has been established that attainment of such characteristics helps the hockey players to perform better during competitions.

**Key words:** *Anthropometric, Physical Capacity and Body Composition*

## **Introduction**

Successful performance in field hockey is influenced by morphological and anthropometric characteristics such as body size and composition, functional parameters (physical capacity) (Scott, 1991; Singh et al., 2010) and fitness (strength, speed, anaerobic and aerobic capacity, agility) (Nikitushkin & Guba,1998). The role of physique is very important in the view point that morphological constitutions and its proportions in the human body are genetically determined and it cannot be changed under normal circumstances. It is believed that physical fitness is trainable factor but the influence of one's physique and body composition seems to play a great role in its determination as achievement of high level performance is only possible in an individual with adequate genetic predisposition and under optimal environment condition.

Field hockey is an intermittent endurance sport involving short sprinting as well as movement with and without ball (Manna et al., 2009). In field hockey, players are to bend forward to the ground for the maximum groundwork and to cover a wider range all around during the game (Sodhi, 1991) and maximum strain comes over the back muscles as well as abdominal muscles during the entire duration of the game. Estimation of back strength of Indian inter-university male hockey players and significant positive correlations of back strength with height, weight, BMI, hip circumference, % lean body mass and abdominal muscle endurance was reported (Koley et al., 2012). Evaluation of anthropometric, physiological and skill related a test for talent identification in female field hockey was also reported (Keogh et al., 2003). Hockey players playing in different positions found to differ on some anthropometric measurements and body composition (Karkare, 2011). Relationship of anthropometric characteristics and position wise hockey performance remained less reported, especially in Indian context. To fulfil the lacuna of knowledge, the present study was planned with the hypothesis that there would be significant relationship of anthropometric characteristics studied with field hockey positions.

## **Methodology**

Thirty male level District hockey players from Sivagangai district were selected for this study. They were further divided according to their playing position i.e. 10-striker, 10-defenders and 10- mid fielder. The grading and performance were judged in the light

of ten point scale by a panel of three professional judges. The score was average rating of three experts. Anthropometric measurements including linear measurements, diameters and circumferences were taken by following the standard techniques of Tanner et al. (1969). Coefficient of correlation was computed to find the relationship of various anthropometric measurements to performance in hockey.

## Results and Discussions

### Relationship of Selected Anthropometric Measurements with the Performance of Striker, Defenders and Mid Fielders

Measurements	Striker ' <i>r value</i> '	Defenders ' <i>r value</i> '	Mid Fielders ' <i>r value</i> '
Body Weight	0.43	0.41	0.37
Height	0.48	0.69*	-0.67*
Arm Length	0.78*	0.66*	0.26
Fore Arm Length	0.61	0.67*	0.32
Upper Arm Length	0.12	0.69*	0.28
Foot Length	0.19	0.19	0.61
Leg Length	0.73*	0.73*	0.12
Fore Length	0.26	0.26	0.19
Thigh Length	0.32	0.32	0.26
Trunk Length	0.28	0.28	0.32
Shoulder Width	0.69*	0.71*	0.28
Upper Arm Girth	0.32	0.32	0.34
Fore Arm Girth	0.71*	0.67*	0.36
Thigh Girth	0.34	0.34	0.43
Calf Girth	0.36	0.36	0.48

The coefficient of correlation between various anthropometric measurements with performance of striker have presented in above correlation table. It is clear from the table that except, foot length and trunk length all the measurements have shown positive correlation with performance of the striker. Since the calculated value of '*r*' in case of leg length, arm length, shoulder width and fore arm-girth with performance is greater than tabulated value ( $r=0.632$ ) therefore significant positive relationship ( $p<0.05$ ) of strikers performance with leg length, shoulder width and fore arm girth was observed. It may be seen that performance of striker is more a function of arm length, leg length, and shoulder width and fore arm girth. The defenders except body weight, foot length, trunk length and calf girth all the measurements have shown positive relationship with performance of the Defenders. Since the calculated value of '*r*' between performance and height, arm length, fore arm length, upper arm length. Shoulder width and fore arm girth are greater than

tabulated value ( $r=0.632$ ), therefore significant positive relationship ( $p<0.05$ ) of defending with above mentioned measurements was observed. Speed and arm power effect the performance in bowling. It may be due to the reason that arm length, fore arm length, upper arm length and fore arm girth helps an individual to gain more speed whereas excess body weight becomes the hindrance. It is clear that above mentioned characteristics helps the defenders to perform better during competition. The relationship between various anthropometric measurements and performance of mid fielders. It is observed from the results that height, foot length and fore leg length have negative ( $p<0.05$ ) relationship with performance and positive relationship with rest of the bodily measurements. However significant negative relationship was analysed between height of the mid fielders and performance. Advantage of short height of mid fielder and performance may be because of the reason that one has to perform quick movement and more agile while playing in their respective position.

### **Conclusion**

Field hockey is a high intensity activity sport with a multidirectional nature. The ability to change direction rapidly while maintaining balance without loss of speed that is, agility-is therefore an important physical fitness component necessary for successful performance in field hockey. It was concluded that apart from the many factors affecting the performance in hockey, the body structure has also important role to play hockey. Performance in striker is more a function of arm length, leg length, and shoulder width and forearm girth. Whereas height and shoulder width help the Defenders to perform better and mid fielder need to be shorter in height to be proficient in the game of hockey. It has been established that having these anthropometric characteristics helps the hockey players to perform better during competition. Elite field hockey players also need high level of technical skills such as being able to dribble without losing running speed. For a technically good player, dribbling is essentially an automatic process, and the better players distinguish themselves by their running speed while dribbling the ball (Reilly et al., 1986). So, quite naturally, strong correlations would be there among the physical fitness components, viz. slalom sprint, dribble test, aerobic strength and handgrip strength. The findings of the present study also supported the existing knowledge. However, future investigation is required considering more sample size to validate the data.

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