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Role of Muscle Mass and Waist Hip Ratio on Functional Performance of Junior Tennis Players

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ABSTRACT

Objective of the study was to find out the correlation of muscle mass and Waist- Hip ratio with functional performance of junior tennis players. A total number of 100 junior tennis players (Mean age 15.34± 2.16years, mean height 170.54 ± 5.43 centimetres, and mean weight 65.36 ±3.41kilogram) participated in the study. Subjects were recruited from different tennis academies all over Delhi and National Capital Region and written parental or guardian consent were obtained before the players were permitted to participate. The anthropometric data (muscle mass and waist hip ratio) of each athlete has measured and has been correlated with all the three functional performance tests. The functional performance tests used in the study were sergeant chalk jump test, 40 yard sprint test and T test. The best score from each functional performance test were taken from each test and recorded. Pearson's correlation test was used to correlate the anthropometric data and functional performance tests. The study result showed that there was no correlation exists between Waist hip ratio and the entire three functional performance tests. Waist – Hip Ratio can be considered as a health indicator than a performance indicator. At the same time there is a positive correlation exist between muscle mass and functional performance.

KEYWORDS: anthropometry, functional performance, muscle mass, junior tennis players

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INTRODUCTION

Tennis is the most popular racket sports in the world and is characterized by explosive activities interspersed with short interval of intermittence activity over a long period involving a great variety of abilities and movements[1]. It demands a complete physical conditioning program including exercises to develop flexibility, agility, cardio respiratory capacity, speed, strength, power and muscular endurance.[2, 3]

The interest in anthropometric characteristic and body composition of the players of different sports has increased over last decades. It has been well described that there are specific physical characteristics in many sports such as anthropometric profile that indicate whether the player would be suitable to compete the highest level in specific sports.[4,5,6]

Athletic performance is, to a large degree, dependent on the athlete's ability to sustain power (both anaerobically and aerobically) and to overcome resistance, or drag. Both of these factors are interrelated with the athlete's body composition. Coupled with the common perception of many athletes who compete in sports where appearance is a concern for the athlete and the common perception of these athletes (swimming, diving, gymnastics, and figure skating), attainment of an ideal body composition often becomes a central theme of training. Besides the aesthetic and performance reasons for wanting to achieve an optimal body composition, there may also be safety reasons.

During past two decades great changes have taken place in tennis with respect to technique and tactic, even more with respect to physical performance of the players. Most of the scientific literature has focus on physiological and biomechanical characteristic of the players. At present there is no data available regarding body composition and anthropometry of junior players of India and regarding their performance. There for the aim of this study was to find out how anthropometry &body composition of elite Indian junior players influence their functional performance

METHODS

Subjects were recruited on the basis of voluntary participation through informed consent Subjects were recruited from different tennis academies all over Delhi and National Capital Region.

Procedure

The subjects from different tennis academies were being informed of the study. Subjects and their parents were informed about the nature, purpose, importance and possible risk of the study. Written parental or guardian consent were obtained before the players were permitted to participate. The research committee of the CMJ University approved all the procedures. The subjects who match the criteria were selected for the study. Anthropometric and body composition measurement were taken for the entire subject.

Instruction to the subject

Subjects were refrained from strenuous exercise at least 48 hours prior to the testing and procedure and consume their normal pre training diet prior to the testing session Subjects were asked to report any discomfort during the session. The subjects were asked for their full co operation and to do the procedures to their best of the ability.

Protocol

The entire protocol consist of 2 phases

a. Pre-test measurement
b. Protocol or intervention

Pre test measurement included measurement of Muscle mass and waist – hip ratio. Muscle mass was measured by using Bio impedance analyser (SN BS300626E, AC 100-120/200-240V, 50-60Hz, 0.4/2Amp). Waist circumference was measured in standing position at the midpoint between lateral iliac crest and the lower rib. Hip circumference was measured at the level of major trochanter.

The following functional performance tests were measured for each athlete after anthropometry.

A. Sergeant chalk jump test
B. 40 yard sprint test
C. T test

One minute of rest period was allowed between all functional performance tests[7]. Three trials of functional performance test were performed with 30 seconds rest period between each trial[7]. The best score from each functional performance test were taken from each test and recorded.

RESULTS

A total number of 100 elite Indian junior tennis players participated in the study. Mean age, height and weight of the athletes were 15.34± 2.16, 170.54 ± 5.43, and 65.36 ±3.41 respectively. The anthropometric data (Muscle mass and waist – hip ratio) of each athlete has measured and has been correlated with all the three functional performance tests.

The result of the study shows as follows

Muscle mass and athletic performance

The mean value of muscle mass was 37.32± 5.09

The result shows that there is positive correlation exist between muscle mass and functional performance of the athletes

Table 1: Correlation of Muscle mass and functional performance tests

Tests	P value	R value
Sergeant chalk jump test	.000	.989
40 yard sprint test	.000	-.992
T test	.000	-.987

Significance level ≤0.05

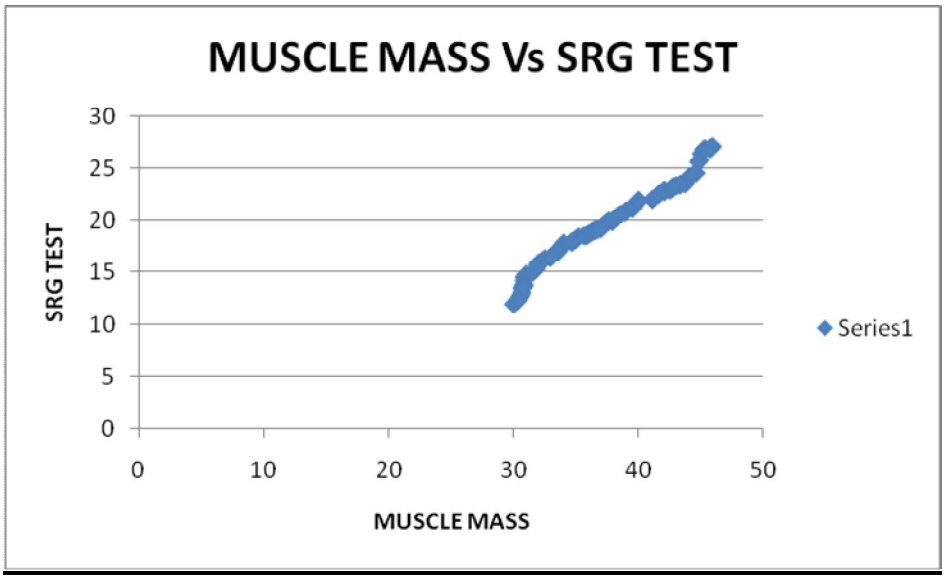

Fig. 1 - Correlation of Muscle mass and Sergeant Chalk jump test

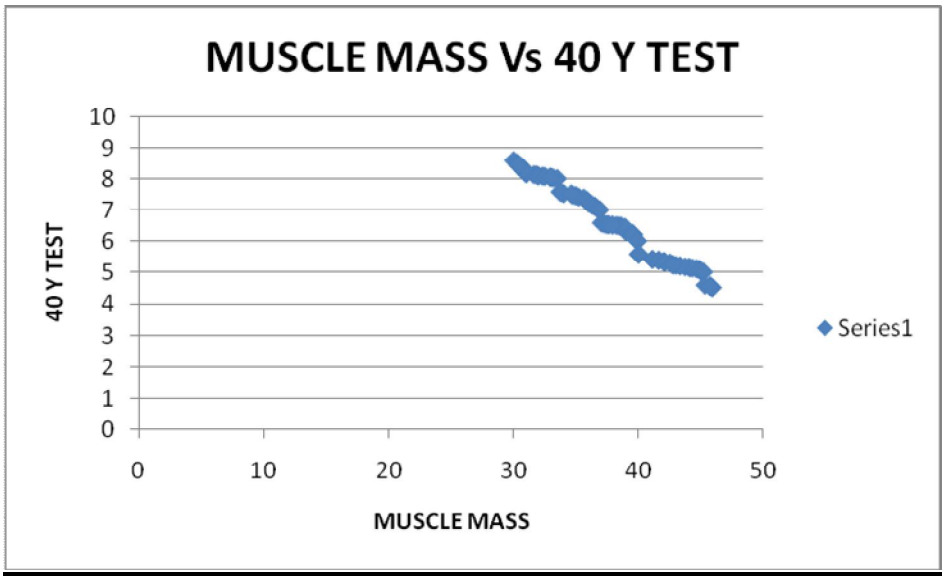

Fig. 2 - Correlation of Muscle mass and 40 yard sprint test

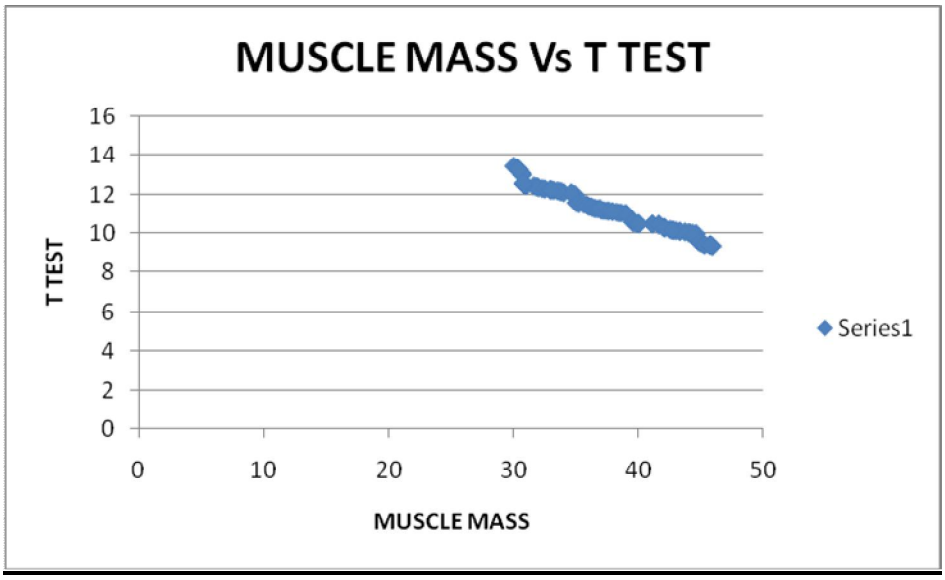

Fig. 3- Correlation of Muscle mass and T test

Waist – Hip ratio and performance

The mean Waist – Hip ratio of 100 athletes was .88

The result shows that the was no correlation exist between Waist – Hip ratio and all the three functional performance test

Table 2- Correlation of Waist – Hip ratio and functional performance tests

Tests	P value	R value
Sergeant chalk jump test	.932	.009
40 yard sprint test	.868	-.017
T test	.859	.018

Significance level ≤ 0.05

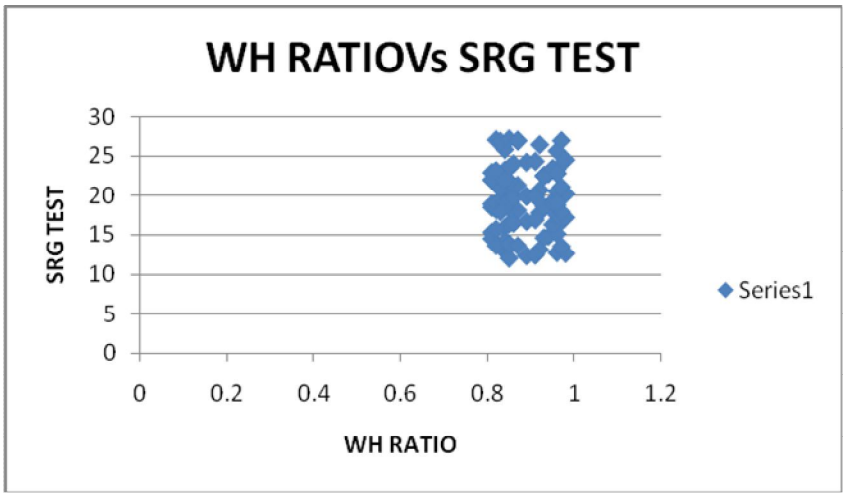

Fig. 4 - Correlation of Waist – Hip ratio and Sergeant Chalk jump test

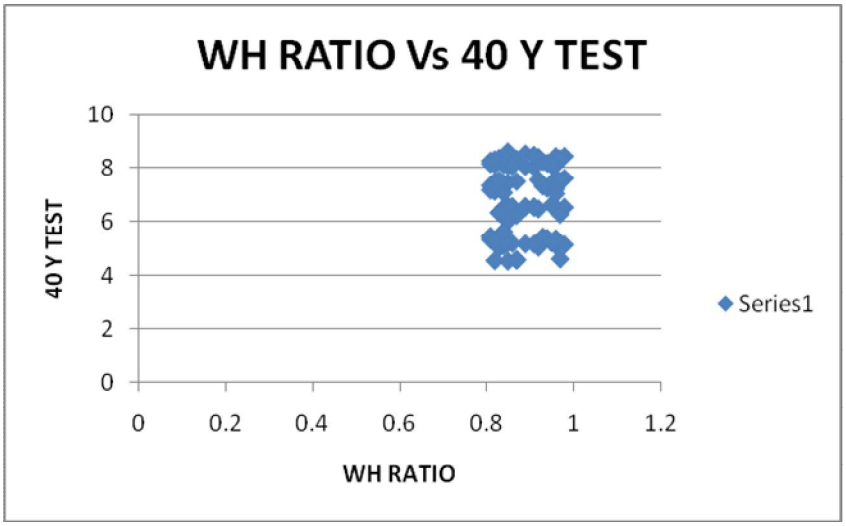

Fig. 5 - Correlation of Waist – Hip ratio and 40 yard sprint test

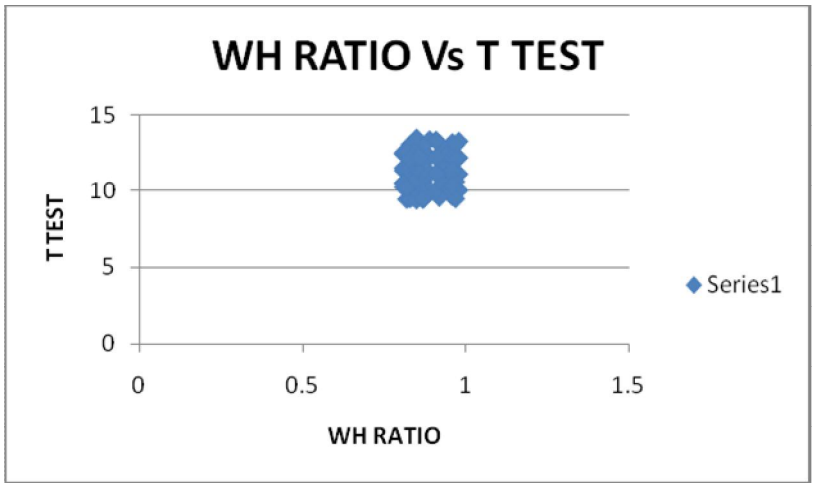

Fig. 6 - Correlation of Waist – Hip ratio and T test

DISCUSSION

The purpose of the study was to find out the correlation between body composition (Muscle mass and waist–hip ratio) and functional performance of junior tennis players. A total number of 100 junior tennis players from different parts of the country participated in the study. The anthropometric data of each athlete has been measured and which has been correlated with the scores of different functional performance test scores of the athletes

The result of the study showed that

1. There was a positive correlation exist between muscle mass and functional performance of the athletes
2. There was no correlation exist between Waist – Hip ratio and all the three functional performance test

Muscle mass and functional performance:

The result of the study indicated that there was a positive correlation exists between muscle mass and functional performance of athletes. Some of the previous studies have shown that the physical performance is negatively correlated with body fat and positively correlated with skeletal muscle mass[8,9]. An excess subcutaneous adipose tissue means that greater muscular effort and therefore increased energy expenditure is required. In runners a high level of adipose tissue leads to a higher body weight and impairment of performance as more weight has

to be moved, which does not contribute to the power development. In a recent study conducted by Arrese AL et al (2006)[10] it has been noted that the loss of body fat is specific to the selected muscle group used during training and the race performance is enhanced with decreased skin fold thickness at lower limb. Body fat seems to have a special effect on African athlete's especially African runners. It was noticed in a study conducted by Bosch AN et al (1990)[11] in study conducted among African athletes. They have a lower skin fold thickness at legs and arms suggesting a smaller mass of subcutaneous adipose tissue. But in other studies effect of body fat on race performance is controversial. Hagan et al[12] found a positive correlation between performance time and body fat in female athletes where as Christensen and Ruhling[13] found that percentage of body fat did not correlate with the performance. The study of Heltland et al[14] demonstrated that regional and total body fat was inversely correlated with performance in treadmill test ($-0.61 < r < -0.52$, $p < 0.0001$). In runners decreased skin fold thickness in lower limb are measured after a longer training period, which may be particularly useful in predicting running performance[15]. In the study of Legas and Eston[15] 3 years of training has decreased the skin fold thickness and change in performance was related to the change in skin fold thickness of the triceps($r= -0.61, P = 0.001$) , front of the thigh ($r = 0 . 74$, $P < .601$) and medial calf($r = -0.66, P<.001$).

Our present study is also in agreement with the study of GJ slator et al (2005)[16] which states that successful lightweight rowers possess more muscle mass and less fat than their less successful counterparts. Leaner athletes with greater total muscle mass were more successful.

***Waist – Hip Ratio*:** The result of the study showed that Waist – Hip Ratio does not have any influence on performance. Waist – Hip Ratio can be considered as a health indicator than a performance indicator.

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