Role of fat mass and muscle mass on functional performance of elite Indian junior tennis players

Shibili Nuhmani¹, BN Pati², Abu Shaphe³
¹Department of Rehabilitation Sciences Faculty of Applied Health Science Jamia Hamdard University, India ²Rockland Hospital, New Delhi, India ³Department of Physiotherapy Jazan University, Saudi Arabia

Abstract. Objective of our study was to find out the correlation of fat mass and muscle mass with functional performance of elite Indian junior tennis players. Material and Method. Setting: Tennis academies all over Delhi and National Capital Region. Subjects: 100 elite Indian junior tennis players. Measurement: The anthropometric data (fat mass and muscle mass) of each athlete has measured and has been correlated with all the three functional performance tests. Results and Conclusion. Pearson's correlation test was used to correlate the anthropometric data and functional performance test results. The study result showed that there was positive correlation exists between muscle mass and the entire three functional performance tests. At the same time there is an inverse correlation exist between fat mass and functional performance. Key words: anthropometry, functional performance, junior tennis players.

Introduction
Tennis is a world class competitive sport attracting millions of players and fans worldwide. It is the only major sports to be played on a variety of surfaces with different ball types and matches are played of best of three or five sets. Tennis is an immensely popular global sport with 205 nations affiliated to the international governing body, the international tennis federation (ITF) and over 25 million active players in USA alone. The general consensus on fitness development was that tennis players should incorporate flexibility, strength and endurance training in their programmes to minimise asymmetry and injuries, while simultaneously enhancing performance (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 (4-6). Athletic performance is, to a large degree, dependent on the athlete's ability to sustain power (both anaerobic ally 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
Role of fat mass and muscle mass on functional performance of elite Indian junior tennis players

Shibili Nuhmani & all

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.

Material and 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 Singania University approved all the procedures.

The subjects who match the criteria will be selected for the study. Anthropometric and body composition measurement will be taken for the entire 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 cooperation and to do the procedures to their best of the ability. The entire research protocol consist of 2 phases: pre-test measurement and protocol or intervention pre-test measurement included measurement of fat mass and muscle mass.

Both muscle mass and Fat mass was measured by using Bio impedance analyzer.

The following functional performance tests were measured for each athlete after anthropometry:
- Sargent chalk jump test
- 40 yard sprint test
- t test

One minute of rest period was allowed between all functional performance tests. 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 (fat mass and muscle mass) 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 I).

Fat mass and functional performance: the mean value of fat mass was 8.055 ± 5.7392; the result shows that there is negative correlation exist between fat mass and functional performance (Table II).

<table>
<thead>
<tr>
<th>Tests</th>
<th>P value</th>
<th>R value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sergeant chalk jump test</td>
<td>.000</td>
<td>.989</td>
</tr>
<tr>
<td>40 yard sprint test</td>
<td>.000</td>
<td>-.992</td>
</tr>
<tr>
<td>t test</td>
<td>.000</td>
<td>-.987</td>
</tr>
</tbody>
</table>

Significance level <0.05

Table 1. Correlation of muscle mass and functional performance tests

Figure 1. Correlation of muscle mass and Sargent jump test

Material and 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 Singania University approved all the procedures.

The subjects who match the criteria will be selected for the study. Anthropometric and body composition measurement will be taken for the entire 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 cooperation and to do the procedures to their best of the ability. The entire research protocol consist of 2 phases: pre-test measurement and protocol or intervention pre-test measurement included measurement of fat mass and muscle mass.

Both muscle mass and Fat mass was measured by using Bio impedance analyzer.

The following functional performance tests were measured for each athlete after anthropometry:
- Sargent chalk jump test
- 40 yard sprint test
- t test

One minute of rest period was allowed between all functional performance tests. 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 (fat mass and muscle mass) 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 I).

Fat mass and functional performance: the mean value of fat mass was 8.055 ± 5.7392; the result shows that there is negative correlation exist between fat mass and functional performance (Table II).

<table>
<thead>
<tr>
<th>Tests</th>
<th>P value</th>
<th>R value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sergeant chalk jump test</td>
<td>.000</td>
<td>.989</td>
</tr>
<tr>
<td>40 yard sprint test</td>
<td>.000</td>
<td>-.992</td>
</tr>
<tr>
<td>t test</td>
<td>.000</td>
<td>-.987</td>
</tr>
</tbody>
</table>

Significance level <0.05

Table 1. Correlation of muscle mass and functional performance tests

Figure 1. Correlation of muscle mass and Sargent jump test
Fat mass and functional performance

The mean value of fat mass was 8.055 + 5.7392

The result shows that there is negative correlation exist between fat mass and functional performance

<table>
<thead>
<tr>
<th>Tests</th>
<th>P value</th>
<th>R value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sergeant chalk jump test</td>
<td>.000</td>
<td>-.988</td>
</tr>
<tr>
<td>40 yard sprint test</td>
<td>.000</td>
<td>.975</td>
</tr>
<tr>
<td>T test</td>
<td>.000</td>
<td>.991</td>
</tr>
</tbody>
</table>

Significance level <0.05
Discussion
The purpose of the study was to find out the correlation between body composition (BMI and fat mass) and functional performance of Indian junior tennis players. A total number of 100 elite junior tennis players from different parts of the country participated in the study.
The anthropometric data’s like 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 there was a positive correlation exist between fat mass and functional performance tests. The result of the study indicated that there was an inverse correlation exist between fat mass and functional performance tests.

The anthropometric data’s like 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 there was an positive correlation exist between muscle mass and functional performance tests. The result of the study indicated that there was an positive correlation exist between muscle mass and functional performance tests.

References


**Corresponding author**
Shibili Nuhmani  
Faculty of Applied Health Science,  
Hamdard University, New Delhi, India  
E-mail: vakeri@gmail.com  
Received: 11 March 2012  
Accepted: 25 June 2012