Correlation Between Anthropometric and Physical Fitness Traits:
A Case Study in Hamedan Kabaddi Team

Mahdi Majlesi, Elahe Azadian and Hosein Rashedi

Department of Physical Education and Sport Sciences,
Hamedan Branch, Islamic Azad University, Hamedan, Iran

Abstract: The game of kabaddi has been in existence for over 4000 years. It is a game played throughout Asia with very minor changes and totally new to the other parts of the world. Kabaddi is an outdoor team sport. It requires stamina, both mental and physical skills, extraordinary reflexes and exceptional eye-hand-leg coordination. The purpose of this study was to determine the correlation between anthropometric and physical fitness traits. The agility, dynamic balance, VO2 max and body composition measure for determined kabaddi player. Research was carried out on a sample of 18 teen age Hamedan kabaddi players (aged 18.1± 1.5). Significant relationships were found between balance test and length of leg and hand (r=0.381), as well as a negative relation with body fat (r=-0.461). The result showed that the Players right and left sides have better agility than the other players. Generally Hamadan kabaddi team members were found to have good body compositions but did not assess in an ideal amount in the physical fitness components especially aerobic capacity and agility.

Key words: Kabaddi Player • Anthropometric Characteristics • Fitness

INTRODUCTION

Kabaddi is a one of traditional games in Iran, played by thousands of people in cities and villages. This game has different names in various parts of Iran. For example, is called Shirindudu in Gilan, Khorasan, Golistan and Mazandaran, Zou, Khuzestan Eshtiti and in Sistan and Baluchestan is called Kabaddi.

In Kabaddi, two teams compete with each other for higher scores, by touching or capturing the players of the opponent team. Each team consists of 12 players, of which seven are on court at a time and five in reserve. The two teams fight for higher scores, alternating defence and offense turns. The court is as large as that for a dodge ball game. The game consists of two 20-minute halves, with a break of five minutes for change of sides. It needs a small playing area and no special equipment is required. The kabaddi playing area is 13m x 10m, divided by a line into two halves. The side winning the toss sends a 'raider', who enters the opponents' court chanting, 'kabaddi-kabaddi'. The raiders aim is to touch any or all players on the opposing side and return to his court in one breath. The person, whom the raider touches, will then be out. The aim of the opposing team, will be to hold the raider and stop him from returning to his own court, until he takes another breath. If the raider cannot return to his court in the same breath while chanting 'kabaddi', he will be declared out. Each team alternates in sending a player into the opponents' court. If a player goes out of the boundary line during the course of the play, or if any part of his body touches the ground outside the boundary, he will be out, except during a struggle. The team scores a lona (a bonus of two points), if the entire opposition is declared out. The game then continues by putting all the players on both sides. Matches are staged on the basis of age-groups and weight. Seven officials supervise a match - one referee, two umpires, two linesmen, a time keeper and a scorer [1].

Athletic performance in kabaddi is a function of aerobic fitness, anaerobic fitness, dynamic balance, agility, individual proficiency, neuromuscular coordination, lung capacity, quick reflexes, intelligence and presence of mind on the part of both attackers and defenders [2]. During a match a player frequently performs activities that require rapid development of force, such as reaction and quickly changing direction.
Kabaddi is a game which combines the actions of wrestling, judo, rugby and gymnastics. The important body movements in this game involve catching, holding, locking and jumping, thus the possession of desirable anthropometric and physiological characteristics will have a greater advantage in executing a better performance in competition [2]. There are a few biomechanical and physiological studies on kabaddi players on national or international players.

Dey et al. [2] reported the total body fat percentage of the kabaddi players was higher than the judokas, boxers, weightlifters, wrestlers and footballers 6. The higher fat percentage in these kabaddi players may be due to their greater age. The kabaddi players were found to be lower in the mesomorphic and higher in the endomorphic rating compared with the above mentioned sports.

Arvind et al. [3] compared psychological and anthropometric factors kabaddi players with athletes basketball, volleyball and handball. In their study results showed that psychological parameters of kabaddi players are better than others athletes. Also anthropometrics data in kabaddi players are higher than in basketball, volleyball and handball players.

The participants of inter-university "Kabaddi" competition showed higher values of height, weight and surface area than average Indian population, indicating better attainment of growth in them. Further, the values of respiratory efficiency tests like, FEV, MEF and PEFR were also observed to be more in these players, probably due to training effect. The grip strength values were high in comparison to those of Indian football goalkeepers and hockey players [4]. The results of study of Verma et al. [5] indicates that in case of 50 yard dash, standing broad jump and shuttle run Kabaddi Players were having average in scores. In case of standing broad jump kabaddi Players scored above average.

The present investigation of Hamedan kabaddi players was to study anthropometric parameters and physical fitness tests.

**MATERIALS AND METHODS**

**Subjects:** A total of 18 adolescent male kabaddi players, chosen by age (16 to 19 years) and locality (Hamedan province, north west of Iran), entered the study. At a clinical examination before the start of the study we found no abnormalities that excluded any of the players from participating in the study. The mean age of the players was 18.1± 1.5 years.

**Data Collection:** The following are the proposed variables for the proposed study:

**Anthropological Components:**
- Height
- Height leg
- Sitting height
- Body Weight
- Arm-span
- Fat percentage

**Physical Fitness Components:**
- Agility
- Y- balance test
- VO₂ max

**Body Fat Percentage:** Subcutaneous body fat was measured at 3 sites (chest, abdominal and thigh) with a Tan-Ara caliper (Tan-Ara Instrument Company, Iran). Body fat percent was computed through the formula developed by Jackson and Pollock [6, 7]. The score on the Body fat percentage if based on the following formula:

\[\text{Db (g/cc)}^2 = 1.109380 - 0.0008267 \times \text{sum of 3 SKF} + 0.0000016 \times \text{sum of 3 SKF} - 0.0002574 \times \text{AGE}\]

**Agility Test:** The shuttle run test was included as a measure of the ability to sprint and change direction. With the 4 × 9-m shuttle run, subjects stood behind a starting line, on command, they started the 9-m run. At the end of the 9-m section, subjects were asked to stop with 1 food beyond a marker while reversing running direction and sprinting back to the start where the same reversing of movement direction was required. After the fourth 9-m section, when the subjects passed a finish line time stopped by hand-held stopwatch (Joerex, ST4610-2). The better of 2 consecutive trials was used for the statistical analysis. Three minutes rest between attempts was provided for each subject [8, 9].

**Y-Balance Test:** In this test 3 directions (anterior, posteromedial, posterolateral) are in a central plate. Angles of these 3 directions are determined according to the instrumented bars, which are fixed in lateral sections of plate in three directions and an indicator is installed on every bar. Before beginning the test, the subjects' better foot is determined, so that if right foot is the better limb, test will be performed in clockwise direction and if left foot
RESULTS

The average of body composition and anthropometric variables of subject are listed in Table 1. Also Table 2 had a testing results for dynamic balance, agility and maximal oxygen uptake.

The results of Multivariate test based on the rule of players in team, revealed that the rule has not any effect on variable (P>0.05) except in the case of agility test, the significant difference according to the playing area of participants had been observed in team (P= 0.000; F =10.91).

Correlation results between anthropometric variables indicated that body fat percentage (BF%) is in negative relation with height, sitting height and arm-span. Also according to expect all sizes of length of body had a positive and significant correlate whit each other (P< 0.05). The same results relating to sitting height and dynamic balance had been repeated (r= 0.551; p =0.018).

DISCUSSION AND CONCLUSION

The results of the research had shown that the arm-span of the subject was 2 cm more than his height. Because having long arm is a mechanical advantage in kabaddi for touching techniques in attack and increase the possibility of accessibility and obtaining the point in attack situation.

Also the body fat percentage for the subject in this study had been obtained between 7.5 to 12 kg and this quantity is above 80 percent national norm. Comparing of body fat percentage of player in Hamadan young kabaddi team with international norm in other sport shown that the BF% in this player is almost similar with sprint runner, Basketball, diver and swimmers. Ideal BF% justified the better performance of athletes that must compete in sport.

The subject was taller than the average of Indian kabaddi team players (176 cm versus 171 cm) [3]. This height difference might have given him the mechanical advantage that led to successes. As it can observe in table 1 the average of weight subjects is equal 68 kg (in out of the season) that it is more than the average of kabaddi player. Calculation of body mass index (BMI)

---

**Table 1: Main characteristics of subjects (mean ± SD).**

<table>
<thead>
<tr>
<th>Variable</th>
<th>BMI</th>
<th>Arm-span (cm)</th>
<th>Leg height (cm)</th>
<th>FP%</th>
<th>Sitting height (cm)</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>2.3± 22.01</td>
<td>9.5± 178</td>
<td>5.5±99.6</td>
<td>3.4± 9.25</td>
<td>3.5±92.58</td>
<td>5.2± 68.2</td>
<td>7.3± 176</td>
</tr>
</tbody>
</table>

**Table 2: Agility test, dynamic balance and Vo2max variable (mean ± SD).**

<table>
<thead>
<tr>
<th>Test</th>
<th>Vo2max</th>
<th>Y-balance Test</th>
<th>Agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>6.6± 46.99</td>
<td>11.2± 123</td>
<td>0.5± 9.01</td>
</tr>
</tbody>
</table>

---
indicated that BMI in India kabaddi player was more than the subject in this research (22.54 versus 22.04). Height and weight in subjects are in the average of international norm of height and weight. The result of 4×9 m (agility test) were lower than national norm, was in the 50% rank [16]. Multivariate test indicated that, the agility depends on the rule of subjects in team, for instance, players who play in 1 and 2 post of each side most have the greater agility. This result showed that players 1 and 2 post of each side has the best results in test and when compared with national norm, they classify them 95% rank.

The result of Harvard Step Test and compared with related norm show this factor was a weakness in subjects [16]. Concerning the effective function of aerobic system in kabaddi due to time which is active during play, reinforcing of this factor is necessary.

Correlation between balance test with characters body indicated that, balance has a negative relation and almost significant with body fat percentage (r = -0.461; p =0.005); and has a positive significant relation with the length of hand and foot (r = 0.381; p =0.024). Having the larger length in feet and hands, lower body fat percentage and higher Physical fitness cause a better performance of techniques in kabaddi game.

Generally Hamadan kabaddi team has a good body composition but in the physical fitness components especially aerobic capacity and agility, did not assess in an ideal amount. Recently kabaddi sport, set in important continent and global games and different countries are programming to develop this sport. Advanced researches must be done in the field of Biomechanics, psychology and physiology in the national and international levels.

REFERENCES


