Relationship between speed, agility and anaerobic power of 14-16 years elite soccer players

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ABSTRACT: Identifying the physiological characteristics and existing relationships between these variables as the most effective factors for assessing and selecting the soccer players. The present study seeks the answer to this question that is there any relationship between speed, agility and anaerobic power of 14-16 years elite footballers? In order to achieve the study purpose, 20 elite soccer players from the adolescents football league in Tehran (mean age, 15.25±1.15 years, height 172.3±2.90 cm and weigh 61.1±2.97 kg) volunteered to participate in the study a week before the 88-89 season of football league competition. To assess the anaerobic power of the subjects, Sargent vertical Jump, to measure the speed, 10 m sprint test and to assess the agility, 9×4 m tests used. Inferential data analysis and Pearson correlation test using 11.5 version of SPSS software and the significance level of \( \alpha = 0.05 \) used to data analyzing. The results showed that there were significant relationships between the speed and anaerobic power (r=0.904, p=0.001), speed and agility (r=0.976, p=0.001) and anaerobic power and agility (r=0.884, p=0.001) of 14-16 years elite football players.

In the present study, significant relationships observed between the measured factors and this indicates on football coaches' attention to these factors and identical training programs to improve these factors in soccer players.

Keywords: Agility, Anaerobic power, Soccer players, Speed.

Introduction

Football is a sport that has attracted more attentions by the people around the world. For example, over 3 billion people on worldwide watched the World Cup finals in France 1988 (Moeini, 1995). Soccer is also one of the interesting and important sports in Iran. Soccer enthusiasts, particularly fans of this sport go to the gyms every week to watch and encourage their favorite teams and many of the people watch football games on TV. In recent years, several professional football schools have been established for the education of young players around the world, especially in European countries (Stroyer et al., 2004) that indicates the growing soccer among youth in the world. And now, can be seen countries with a professional attitude to the soccer where they have focused on the basic age categories and have developed strong teams in these age categories. So, this issue has caused performing a lot of studies on physiological needs of young players in this field (Bunc and Psotta, 2001; Gil et al., 2007; Gravina et al., 2008; Yasuaki et al., 2006; Wong et al., 2009).

Over the past two decades, considerable scientific information about the physiology and medicine in football has been collected. But this information is mainly about the physiological profile of elite soccer players in America and West Europe, while this information is limited about players from other parts of the world (Ostogic, 2003). Professional football is a difficult sport in which various activities such as fast sprints, shooting, hitting and tackles are done in soccer (Kargarfard and Keshavarz, 2005). Based on
various research results, physical and physiological characteristics of soccer players are required to such a high level of anaerobic power, aerobic capacity, speed, muscular strength, agility and flexibility (Chaleh Chaleh, 2007; Minasian, 1997; Arnason et al., 2004; Bangsbo et al., 1991). The assessment and determination of the anthropometric and physiological characteristics are essential to a successful achievement of a soccer team not only during a game, but also along the whole sportive season, and such information can and must be used by the coach to change the player’s function or even the tactical formation of the whole team with the purpose to maximize the performance, once each positioning presents specific features (Shephard, 1999).

Several studies have been performed abroad to determine the relationship between these variables and also obtained conflicting results (Little and Williams, 2009; Wisloff, 2004). But more researches have been done on adults' ages while, not inside and not outside the Iran, a study which was assessed the relationship between the physiological factors in basic age category is not performed yet.

Parnou et al. (2005) studied national football team players and concluded that there is a positive relationship between agility with 10 m speed running while no significant relationship was found between agility and 20 m speed running. Erin (2009) also reported that high jump results of collegian female footballers are associated with 20 and 40 m sprint meters but not statistically significant [13]. Paolo et al. (2000) found a significant correlation between the results of 40 m speed and agility of male and female football students.

Buttifant et al. (1999) and Yang et al. (1996) reported that there is no significant correlation in speed and agility between Soccer and Australian football.

Little and Williams (2009) claimed that, in professional footballers, maximum speed and agility are two independent variables.

Now, according to developments of Iranian footballers in international arena and its increasing growth among teens and young, it is require looking at this issue profoundly for identifying and removing possible obstacles using the scientific method (Bangsbo, 1992). The importance of this issue as well as the listed factors for evaluation and selection of players have confirmed by the sport experts (Reeves et al., 1991). On the other hand, because no study has been performed on the physiological factors of teen soccer players to define their relationships, and because of football progression toward professional levels, it is essential to study the physiological characteristics of teenage football players for providing valuable information. Using these results, views of the physical condition of young players will be more cleared. Such studies can be designed with providing better training programs to help this age group. It can also prepare athletes to achieve maximum performance and further pursue their goals and taking steps towards the professional levels of football. Furthermore, via this way and accurate planning, it can also make a bright future for our football. Since, the physiological as well as physical characteristics are important considerations in player performance (Bell and Rhodes, 1998); the purpose of this study was to assess the relationship between speed, agility and anaerobic power of 14-16 years elite footballers in Iran.

Methodology

The aim of this study was to investigate the relationship between some physiological characteristics of 14-16 years old footballers. In order to achieve the study purposes, 20 soccer players of adolescents football league in Tehran (mean age, 15.25±1.15 years, height 172.3±2.90 cm, and weigh 61.1±2.97 kg) volunteered to participate in the study a week before the 2010-2011 season of football league in Tehran. All subjects completed an informed consent form before participating and completing in this study. Subjects were informed about the purpose, requirements and the experimental protocol of the investigation. Experimental procedures were demonstrated to allay their apprehension. To assess the anaerobic power of the subjects, Sargent vertical Jump, to measure the speed, the 10 m sprint test and to assess the agility, 9×4 m tests were used. Inferential data analysis and Pearson correlation test using 11.5 version of SPSS software and the significance level of α=0.05 were used.

Results

Results regarding to the relationship between anaerobic power and speed of the subjects are shown in table 1. Results show that the relationship between anaerobic power and speed of the subjects is statistically significant. Figure 1 also shows this relationship.
Table 1. Relationship between speed and anaerobic power of subjects.

<table>
<thead>
<tr>
<th>Variable</th>
<th>df</th>
<th>p</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic power</td>
<td>19</td>
<td>0.001</td>
<td>0.904 (** )</td>
</tr>
<tr>
<td>Speed</td>
<td></td>
<td></td>
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</tbody>
</table>

Figure 1. Relationship between speed and anaerobic power in soccer players.

Table 2 shows that there is a significant correlation between anaerobic power and agility of the subject. The values of the relationship between anaerobic power and agility are shown in figure 2 and show a statistically significant relationship.

Data in table 3 shows the significant correlation between speed and agility of subject. The values of the relationship between speed and agility are shown in figure 3 and shows this relationship is statistically significant.

Discussion

The present study aimed at assessment the relationship between speed, agility and anaerobic power of 14-16 years elite footballers in Iran. Study findings showed that there is a significant relationship between anaerobic power and speed of 14 to 16 years elite footballers. The present results are consistent with the results of Erin (2009). Erin also studied female soccer player students and reported a correlation between anaerobic power and speed, but the relationship was not statistically significant. Power is one important factor in muscle fitness programs that can represent the combination of speed and power. The increase in strength or speed or both can cause an increase in power and this leads to the athlete can do more work in shorter time (Salimi, 2000). So, the significant correlation between anaerobic power and speed is expected. The differences between results of present study and Erin's research can be attributed to different sex and age of the subjects.
The other main finding of the present study is significant relation between speed and agility of the soccer players. This result is supported by Parnou et al. (2005), Little and Williams (2009) and Paolo et al. (2000) findings and is rejected by the results of Buttifant et al. (1999), Yang et al. (1996) and Little and Williams (2003). One of the possible reasons for differences between the present results with other researches can be age differences or the type of exercise; because Buttifant et al. (1999) research was conducted on Australian football players. However, it should be considered that the nature of agility movements is very close to the speed. In fact, agility is one of components of the velocity which is done based on tension-shortening cycle for rapid increase in power and the power-time curve transfer to the left and up sides (Gaeini and Rajabi, 2004). So a relation between these two factors can be expecting.

Results of statistical analysis of data showed that there is a significant relationship between subjects’ anaerobic power and agility. Because the nature of the agility and anaerobic power is based on the fast and explosive movements and the agility and anaerobic capacity can increase over the age of 25 years, and the study subjects were in this age duration, so the relationship between agility and anaerobic power could be expected.

Considering the relationship between speed, agility and anaerobic power in 14 to 16 years old soccer players, it can be expected that low level of one of these three factors, can also affects another. Also, considering the importance of each factor in the performance of soccer players, development of such characteristics in soccer players should be paid more attention by coaches and experts.

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<td>Anaerobic power</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agility</td>
<td>19</td>
<td>0.001</td>
<td>0.884</td>
</tr>
</tbody>
</table>

Figure 2. Relationship between speed and power in soccer players.
Table 3. Relationship between anaerobic power and agility of soccer players.

<table>
<thead>
<tr>
<th>Variable</th>
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<th>p</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic power</td>
<td>19</td>
<td>0.001</td>
<td>0.976 (**)</td>
</tr>
<tr>
<td>Agility</td>
<td></td>
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Figure 3. Relationship between speed and agility in soccer players,

References


Salimi, A. (2000). Effects of plyometric training on anaerobic power and agility of volleyball players. Master's thesis, Faculty of Physical Education and Sport Sciences, University of Shahid Beheshti University of Tehran, Iran (Persian).


