Case Report

The relationship between height and weight of motor fitness factors in students

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ABSTRACT
The aim of this study is to investigate the relationship between measures of height and weight, motor fitness factors (speed, agility, balance) in middle school students (13 to 15 years old) city of Sara van in the 2016-2015 school year. The population of this study included all male students in secondary schools (1413 patients) which of this number, 150 were selected by cluster sampling from five schools randomly. This research a descriptive and correlational research. For data analysis, descriptive statistics and Pearson correlation coefficient was used to examine the relationship between variables. All information gathered analyzed statistically by the software SPSS version 18. The findings show that there is a significant inverse correlation between height and static balance but between height and speed as well as the height and agility no significant relationship was observed. In addition, it was found that between weight and speed, agility and balance, there is a significant inverse relationship.

Keywords: motor fitness, height, weight, agility, balance, speed

INTRODUCTION
The biggest gift of life which forms all of human existence, is health and knowing how to live healthy. Having a fitness levels show you more beautiful and more powerful. Presence of individuals in sports fields is the sense of liberation from suffering, being away from disease and overall whatever upsets in peace. The human need to move and work during his life has always been associated with experiences and explore new ways. Sports in the history of human life have emerged in some ways. Sport is an integral component of education and the means to achieve physical and mental health of the young generation. The main objectives of physical education in the history of human life are health and extend health, increase strength, prepared for defense activities, acquire vitality and joy and success in the big sport squares. Many parents want their children to experience sports success and even some of them interested to see their children in high-level sports championship and expectations of the international community about the presence of athletes at various competitions has grown. This requires identifying and selecting talented people which have physical qualifications, skills, behaviors, drive for success in a particular sport. The process of discovering talented athletes to participate in an organized training program is one of the most valuable topics that has been raised in the sport. Everyone can learn to sing, paint or play a musical instrument or a sport but few people achieve high levels of expertise. So in physical education and sport in the form of an art, discovering talented individuals at an early age, selection, and then guiding them, monitoring and control and evaluation in promotion to the highest level of skills, is extremely important (Ibrahim and Hallaji, 2007).Motor capabilities such as speed, agility and balance which consider the concept of moving in them, has a wide variety in different sports and play an important role in the implementation of excellent motion skills. The speed of movement is necessary physical capability for high levels of performance in many sports. Speed is the move and the distance traveled by a member of the body or the whole body. Most coaches want to know these things in the preliminary stage that do the
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athletes have speed in sprint or other activities or not (Rajabi and Gaeini, 2004). Speed components including reaction time, acceleration, maximum speed, endurance, and speed and departure time that speed test in this study is related to the departure time (Bahramnezhad, 2012).

Agility is very important factor in most sports. The athlete must have high maneuverability capabilities. Fast switching ability of a person in motion, balance and understanding the position shows his high agility. Also balance is a gesture capability that it’s extremely important to do different sports movements (Rajabi and Gaeini, 2004) Balance has two kinds. Dynamic balance: Maintaining a stable level of reliance while a described move runs and static balance: the ability to maintain the center of gravity within the reliance (Sadeghi et al., 2009). On the other hand capacity of the structural and physical (height, weight and body mass index) are qualifying criteria are factors that affect the fate of the athlete. Through the body investigation sports scientists will be able to obtain the necessary information about physical form, physical fitness and physical condition of athletes (Ibrahim and Hallaji, 2007). Many already detailed projections about the performance of individual and team sports, during the past two decades has been based on height and body mass. Anthropometric measurements or size and physical dimensions according to many experts are one of the determinants of position in sport and included dramatically in the process of finding new talent (Rajabi and Gaeini, 2004). Expressed importance of anthropometric indices and the ability to predict the future in motor sport preparation of teenager, make researcher to examine the relationship between these two aspects. So the main question of this research is that is there a relationship between the indexes of height, weight and body mass motor fitness factors of secondary school students of the city of Saravan?

Theoretical Fundamentals

The purpose of the practice on motor fitness factors is increasing speed and the ability to apply maximum force during fast movements (muscle power), improving the efficiency of nerve, body spatial awareness, motor skills and reaction time which helps prevention of injury. That's why practicing on factors such as agility, speed, running, speed of movement of various body organs and power are common planning of the most athletes (Rajabi and Gaeini, 2004).

1- Speed: the ability to move the whole body (two) or an organ (the speed in boxing) in minimum time (in direct relation to inheritance) (Mohajer Ansari, 2007). Movement speed is essential physical feature for high levels of performance in many sports. Speed of contraction of the muscles of the foot of persons is different. It’s possible that the speed of foot movement of person A be more than person B while the speed of hand movement of person A be less than person B. It is therefore easy to understand that speed is a specialized capabilities. Speed in athletes largely depends on their percentage of FT muscle fibers that the percentage of these fibers depends on their genetics (Ibrahim and Hallaji, 2007).

2- Agility: the ability to change direction and speed of mobile sudden balance (Mohajer Ansari, 2007). Agility is coordination between the muscles and the central nervous system, change the position of the constant state to motion state in minimum time with high reaction and balance maintenance is called agility.

Agility types:

1. Dynamic agility: the ability to move the body in the runs (round trip running)
2. Static agility: the shape of body in situ (the drive badminton)
3. Balance: the ability to maintain body balance in space. Also balance has two kind, static (balance) and dynamic (walking on balance beam) (Mohajer Ansari, 2007).

The human body is balanced when the balance exists between various forces. The center of balance is in the inner ear but the eye and various receptors in the joints, tendons, muscles of the neck and other body parts all are included in the balance and improve it. The ability to
balance and agility are closely related. Thus improving each leading to improvement of performance of excellent skills exercise. For running static balance test the Demoiselle test is used (Ibrahim and Hallaji, 2007).

4. Power: the use of maximum force in minimum time (in fact, is the same explosive power or plyometric) (Gaini and Rajabi, 2008).

5. Coordination: ability to combine a sense of visual, auditory and proprioceptive receptors between movements with motor function to create precise movements, smooth and subtly (Gaini and Rajabi, 2008).

Kabiri (2008) examined the relationship between some anthropometric characteristics of peak aerobic power in physical education students. The results showed that there is no significant relationship between width and depth of the chest and peak aerobic power, subjects. $r = 0.12$ (Institute of Physical Education, 2002).

Description of anthropometric characteristics and readiness of elite Taekwondo was held by Kashani (2006). The results are:

- In some subjects between the mean of variables with the lowest and the highest (range) distance is seen.
- The subjects were not equal in terms of physical fitness. Some subjects some of variables relatively showed low standard, while others showed a high standard.
- The best records were records that registered better than the average participants.
- Average agility, movement speed, reaction, balance and muscle power are higher than variables that are determining the relative success of athletes. In particular, it seems subjects which had a better measure of the average of these variables will have relative success. (Kashani, 2006).

Mohammed, et al (2008) measured anthropometric index performance to develop talent in young handball players in both groups under 14 years of age and under 16 years of elite and non-elite and came to the conclusion that elite players under 16 years have taller height, more weight and bigger muscles in compared to non-elite peers. Elite handball players had a better score in speed, power and agility. Physiological characteristics comparison and anthropometric of Iran Premier League players in different positions were investigated by Salahi (2008). 26 Premier League players were selected for this study. Anthropometric characteristics: height, weight, body fat percentage and body mass index. Physiological features: aerobic capacity (20-meter shuttle run), anaerobic power test (Bosco), speed (20 m), the agility test (Illinois). The results showed that there is no significant difference between the amounts of aerobic and anaerobic power, speed, agility and body mass index of Iran Premier football League Player Position.

In another study the investigation of the relationship between anthropometric characteristics and motor functions 6 to 8-year-old student with experience and without experience of kindergartens of the city of Arak was performed by Khalaji (2006). Research findings showed that there is a significant relationship between some anthropometric parameters and motor performance of children with experience in kindergarten and without experience in kindergarten. In addition, this study showed that there is no significant difference between the anthropometric characteristics and motor functions of children with experience in kindergarten and without experience in kindergarten. Leone Lariviere Comtois (2003) evaluated the motor and anthropometric variables of female elite adolescent athletes with an average age of 14 years in four sports, tennis, swimming, volleyball and skating. They examined weight, height, width, thigh and arm, leg and five-fold of skin around the relationship between motor maximum aerobic power, muscular endurance, flexibility and upper body among the anthropometric variables and stated that 88% of elite athletes are correctly sorted in the sport appropriate to motor abilities and anthropometric.Koch, Weber and Dalton (2003) assessed anthropometric - physiological measurements and tested related tests to the skill for talent identification for women in hockey in the 2 groups of local players or amateur and club players that it became clear there is no difference between two groups in measures of height, body mass, interval running record 4*6 meter, hand...
strength and acceleration bumps. But we can say that the percentage of body fat, accelerate in speed, agility, dribbling control, muscle strength, aerobic and accurately throw are global factors which can be used for talent identification of hockey players. King Hume Milburn Guttenbeil (2009) conducted a study to characterize the anthropometric and physiological rugby players. They concluded that weight, some folds of skin, muscle power, speed, agility and maximum aerobic power are the most important indicators of rugby field. According to this study, the weight of players depending on their role (attacker or defender) is different. They also compared the introduced factors between amateur and professional players upon which the anthropometric and physiological characteristics level of these players is associated with increasing in the level of their participation in that field. By analyzing the results of studies regards the connection between height and weight of motor fitness factors can be deduced that most probably each indicator of height and weight can have a role in determining the readiness of the individual to get into a sport field. So by performing this research can reach clearer results in this area.

Hypotheses
1. There is a significant relationship between height and speed in Sara van city middle school students.
2. There is a significant relationship between height and balance in Sara van city middle school students.
3. There is a significant relationship between height and agility in Sara van city middle school students.
4. There is a significant relationship between weight and speed in Sara van city middle school students.
5. There is a significant relationship between weight and balance in Sara van city middle school students.
6. There is a significant relationship between weight and agility in Sara van city middle school students.

Research Methodology
This research is descriptive and its type is correlation, which aims to examine the relationship between height and weight of the preparation motion (speed, agility, balance) in male students aged 13 to 15 years. The population consisted of all male students Sara van city schools is the number of 1413 people were studying in the years 2015-2016. Sampling Method was multistage random cluster which first 5 school and then from each school three classes and from each class was randomly selected 10 person. Sample size according to the number of male students in city schools of Sara van using Morgan table was calculated 150. Data collection tools included consent and health questionnaire according to participants, height gauge Seca with 1.0 cm precision made in Germany, Kadio Chinese stopwatch to setting records, balance model Beurer with 0.01 kg made in Germany, whistle or flag, 5*5*15 cm cube with dimensions wood for agility test.

Data analysis method
To determine the average of main indicator and standard deviation distribution, descriptive statistics were used. Also, since the data are real quantitative variable. To realize the validity of hypotheses and analyze the information and determining the significance of difference of the mean, inferential statistics of Pearson correlation test was used. In addition to the analysis of information software SPSS 18 was used.

### Data analysis

#### Descriptive analysis of data

<table>
<thead>
<tr>
<th>Standard Deviation</th>
<th>Average</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/01</td>
<td>154/23</td>
<td>176</td>
<td>139</td>
<td>Height (cm)</td>
</tr>
<tr>
<td>10/33</td>
<td>49/36</td>
<td>87</td>
<td>29</td>
<td>Weight (kg)</td>
</tr>
<tr>
<td>.78</td>
<td>10/25</td>
<td>13/96</td>
<td>8/63</td>
<td>Agility (s)</td>
</tr>
<tr>
<td>.59</td>
<td>5/65</td>
<td>9/67</td>
<td>5/09</td>
<td>Speed (seconds)</td>
</tr>
<tr>
<td>11/83</td>
<td>8/55</td>
<td>48/35</td>
<td>1/23</td>
<td>Static balance (s)</td>
</tr>
</tbody>
</table>

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Inferential analysis of data

Hypothesis 1
There is a significant relationship between height and speed in Saravan city middle school students.

Table 2. Pearson correlation test results to assess the relationship between height and speed

<table>
<thead>
<tr>
<th>Variables</th>
<th>correlation coefficient (r)</th>
<th>The number (n)</th>
<th>significance level (Sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height and speed</td>
<td>-0.039</td>
<td>150</td>
<td><strong>0.01p</strong></td>
</tr>
</tbody>
</table>

According to Table 2 it is observed that there is no significant relationship between the variables of height and speed of research subjects with a correlation coefficient (-0.39). (P=0.634) So the hypothesis is rejected and the null hypothesis is confirmed.

Hypothesis 2
There is a significant relationship between height and balance in Saravan city middle school students.

Table 3. Pearson correlation test results to assess the relationship between height and balance

<table>
<thead>
<tr>
<th>Variables</th>
<th>correlation coefficient (r)</th>
<th>The number (n)</th>
<th>significance level (Sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height and balance</td>
<td>-0.069</td>
<td>150</td>
<td><strong>0.01p</strong></td>
</tr>
</tbody>
</table>

According to Table 3 it is observed that there is a reverse significant relationship between the variables of height and balance of research subjects with a correlation coefficient (-0.69). (P<0.05) So the hypothesis is confirmed and the null hypothesis is rejected.

Hypothesis 3
There is a significant relationship between height and agility in Saravan city middle school students.

Table 4. Pearson correlation test results to assess the relationship between height and agility

<table>
<thead>
<tr>
<th>Variables</th>
<th>correlation coefficient (r)</th>
<th>The number (n)</th>
<th>significance level (Sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height and agility</td>
<td>-0.094</td>
<td>150</td>
<td><strong>0.01p</strong></td>
</tr>
</tbody>
</table>

According to Table 4 it is observed that there is no significant relationship between the variables of height and agility of research subjects with a correlation coefficient (-0.94). (P=0.246) So the hypothesis is rejected and the null hypothesis is confirmed.

Hypothesis 4
There is a significant relationship between weight and speed in Saravan city middle school students.

Table 5. Pearson correlation test results to assess the relationship between weight and speed

<table>
<thead>
<tr>
<th>Variables</th>
<th>correlation coefficient (r)</th>
<th>The number (n)</th>
<th>significance level (Sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight and speed</td>
<td>-0.182</td>
<td>150</td>
<td><strong>0.01p</strong></td>
</tr>
</tbody>
</table>

According to Table 5 it is observed that there is reverse significant relationship between the variables of weight and speed of research subjects with a correlation coefficient (-0.182). (P=0.002) So the hypothesis is confirmed and the null hypothesis is rejected.

Hypothesis 5
There is a significant relationship between weight and balance in Saravan city middle school students.

Table 6. Pearson correlation test results to assess the relationship between weight and balance

<table>
<thead>
<tr>
<th>Variables</th>
<th>correlation coefficient (r)</th>
<th>The number (n)</th>
<th>significance level (Sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight and balance</td>
<td>-0.236</td>
<td>150</td>
<td><strong>0.01p</strong></td>
</tr>
</tbody>
</table>

According to Table 6 it is observed that there is reverse significant relationship between the variables of weight and balance of research subjects with a correlation coefficient (-0.236). (P=0.004) So the hypothesis is confirmed and the null hypothesis is rejected.
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Hypothesis 6
There is a significant relationship between weight and agility in Sara van city middle school students.

Table 7. Pearson correlation test results to assess the relationship between weight and agility

<table>
<thead>
<tr>
<th>Variables</th>
<th>The number (n)</th>
<th>correlation coefficient (r)</th>
<th>significance level (Sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>weight and agility</td>
<td>150</td>
<td>-0.272</td>
<td><strong>0.001</strong></td>
</tr>
</tbody>
</table>

According to Table 7 it is observed that there is reverse significant relationship between the variables of weight and agility of research subjects with a correlation coefficient (-0.272). (P=0.001) So the hypothesis is confirmed and the null hypothesis is rejected.

DISCUSSION AND CONCLUSION

Hypothesis 1: it acknowledges that there is no significant relationship between height and speed. This finding is not consistent with research results of Haj Hadi (1980), Sahin (2005), Danaie (1991), Salimi (1375), Zarpas and colleagues (2008). Above research pointed out this tip that there is a significant relationship between height and speed which they are inconsistent with this research results. On the other hand research results of Biataby (1996) and Taghinejad (2012) are consistent with these findings and matches and expresses the lack of correlation between height and running speed. Possible reasons can depend on importance of height in some fields and fitness factors, why that height in some sports like basketball and volleyball super plays a key role and in some sports such as gymnastics and diving it has negative and preventing role. However, results of this study points out the lack of correlation of height and speed. Studies carried out on fitness show runners have average height and short muscles in the foot. Their body height is normal and their forearm is larger than their arms. It is observed that the world’s top sprinters take steps 5.4 to 5 per second. Such a step taking causes more touch of foot to the ground and resulting greater driving force. This is only possible with short being of lever length of the lower extremities. Because short lever in comparison with higher lever has lower inertia or resistance in movement (Khosro Ibrahim et al., 2002). On the other hand thigh muscle mass distribution speed whatever be closer to the axis of rotation (hip joint), walking speed is more in the champions. With regard to different result it can be said that athletes speed depends on various factors such as reaction time, muscle strength (upper and lower extremities), stride length and step frequency (Taghinejad, 2012). The second hypothesis suggests that there is a significant inverse relationship between weight and speed. Some of the research conducted in this context confirmed the accuracy of this hypothesis. Ziaee (2007), Taghinejad (2012), Hansen et al (1999), Aminian and colleagues (2006), Kazemi (2006). But there were between each of the factors of body composition and each of the selected test no significant correlation in the findings of Tayyebi et al (2009) which is antithetic with the results of this study. According to the results obtained and consistent of most results with the present study, we conclude that factor of weight and body mass index has a significant inverse relationship with sprint record so that the sprint record will improve with a desirable weight. However high weight takes effect if it be associated with high muscle mass and less fat. The third hypothesis: There is no significant relationship between height and agility. The result of this hypothesis is consistent with the results of Taghinejad (2012), Tayyebi (2009), Aminian (2006) and Danayi (1991) and the only inconsistent research with the results of this research is the research for Haj Hadi (1980). Although it’s not found much research on the subject but the validity of this hypothesis can be proved. According to the Agility can be defined that other factors is noteworthy apart from the height including fast paced, ability to change direction quickly, the ability to balance the agility factor. The fourth hypothesis results show a significant inverse correlation between the weight and the record of agility and is consistent with the results of Behpour et al (2010). Of the possible causes of significant correlation between weight...
and agility record, it can be noted that extra weight causes suffering additional charge while running of athlete that reduces athletic performance in athletes and ordinary people.

Fifth hypothesis: The results suggest a significant inverse relationship between height and static balance. This finding is consistent with research results Hodhodi (1999), Ziayi (2004) and Taghinejad (2012) and it’s inconsistent with findings of Shah Heidari (2011). From possible reasons can be pointed out that one of the factors in the height of the center of gravity stability in compared to the range of support area and whatever that the body's center of gravity placed higher and take distance from the support (ground), stability and balance become weaker and less.

Sixth hypothesis: The results of this hypothesis pointed that there is significant inverse correlation between weight and balance. Results of this study is consistent with previous results of Taghinejad (2012), Ziayi (2004), Masaebi (2011) and Salimi (1996). Also the results of this study is not consistent with the results of Sara Shah Heidari et al (2011). From the reasons can be cited for this hypothesis is that Balance is an important factor in most sports fields. In different positions sports athletes can perform better by having a good balance. Based on factors affecting stability and balance whatever person has a shorter height and the center of gravity be closer to the ground the balance will more too.

**Practical suggestions**

It is recommended that coaches and people involved in sports use research results in various fields, especially talent identification.

1. Give enough opportunities to late grades students in terms of growth for greater prosperity.
2. The trainers inform students’ parents of the capability and capacity of their children so that they can support them better.

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