



Contents lists available at ASJP (Algerian Scientific Journal Platform)
Academic Review of social and human studies
 journal homepage: www.asjp.cerist.dz/en/PresentationRevue/552



The Relationship Between Certain Body Measurements and Speed Attribute in Soccer Players Under 19 Years Old

علاقة بعض القياسات الجسمية بصفة السرعة لدى لاعبي كرة القدم أقل من 19 سنة

Dahmani Moussa Abdelkarim^{1,*}, Bennour Maamar², Bekachout Ahmed³.

¹University of Chlef, Laboratory of Creativity and Motor Performance, Algeria.

²University of Chlef, Laboratory of Creativity and Motor Performance, Algeria.

³University of Chlef, Laboratory of Creativity and Motor Performance, Algeria.

Article info:	Abstract
Article history: Received :03-10-2024 Accepted : 09-12-2024 Key words: Anthropometric measurements Speed Soccer players.	This study focused on exploring the relationship between specific anthropometric standards such as height and weight, in addition to the Body Mass Index (BMI), and the speed attribute in young soccer players under the age of nineteen. To achieve this aim, we utilized a descriptive analytical approach, targeting a randomly selected sample comprising 25 players from the ASO team's intermediate age groups. The research was conducted by applying a 10-meter speed test, along with several anthropometric measurements. The study concluded a significant positive correlation between the examined measurements and the players' speed level.

الكلمات المفتاحية:	ملخص
القياسات الانثروبومترية السرعة لاعبي كرة القدم.	هدفت الدراسة إلى التحقيق في العلاقة بين بعض القياسات الانثروبومترية (الطول، الوزن ومؤشر الكتلة) وصفة السرعة لدى لاعبي كرة القدم أقل من 19 سنة، استخدمنا المنهج الوصفي على عينة تم اختيارها بالطريقة العشوائية البسيطة بلغ حجمها 25 لاعب لفريق ASO فئة الأواسط، حيث طبقنا اختبار السرعة 10 متر وبعض القياسات الانثروبومترية، وتوصلنا إلى وجود علاقة طردية ارتباطية بينهما.

1. Introduction

The intersection and substantial progress in various sciences have led to fundamental transformations in all aspects of life, including the sports sector, which is gaining increasing importance and a continuous pursuit of achievements and their enhancement. In this context, experts and researchers specialized in sports have delved into studying all aspects affecting athletic performance, benefiting from contributions of biomechanics, measurement, evaluation, and other related sciences, aiming to determine the conditions necessary for excellence in physical, skillful, and bodily measurements of athletic skills. (Sabri et al., 2009)

Football training fundamentally employs movement principles aimed at enhancing attributes such as speed and endurance, by organizing physical activity that combines phases of moderate-intensity work with others of high-intensity intermittent effort, leading to substantial metabolic heat production. To succeed in team sports, players need an optimal mix of technical, tactical, physical, and mental motivation characteristics. In fact, many experts in this field, like football coaches and scientists, believe that the success of this sport may be linked to the human characteristics of the players, where football coaches have long believed that the game selectively favors players with certain morphological traits (Ben Brahim et al., 2013).

There is a well-known growing interest in improving athletes' performance as well as identifying talents, strengths, and weaknesses, assigning player roles, and assisting in designing training programs. Most coaches look for specific criteria that help enhance player performance, requiring an appropriate physical form and body composition to achieve football success (Popovic et al., 2013).

Body measurements are a fundamental pillar for understanding weight and height data across various age stages, closely related to many significant life dimensions. An individual's physical structure strongly affects health, social and psychological performance, and notably influences academic performance and intelligence levels. Studies conducted by Kolar et al.

(2017), Bouchard et al. (1993), and Nikituk (1998) have shown a close relationship between bodily growth and muscular development in children. Generally, anthropometric measurements are a branch of science specializing in the measurement and study of the human body's dimensions and parts, such as lengths and weights (Al-Hakim, 2014).

Body height and mass are also linked to physical performance in children and youth, found to be determinants of rapid running performance and agility among the most important performance variables in youth football (Mathisen, G. & Pettersen, 2015).

Khater and Al-Baik (1976) indicated that these measurements provide the possibility to recognize the physical composition among athletes in different physical fields, aiding in determining levels and characteristics of physical growth and examining their dynamic transformations under the influence of physical activity practice (Kamash and Abu Kheit, 2006).

Evaluating and determining physical characteristics (height, weight and mass index) is essential to the success of a soccer team not only during a single match but also throughout the entire sports season, as this information allows the coach to use it to change the player's job or even the entire team's tactical formation, with the aim of maximizing performance (Al-hazaa, 2009).

Body composition affects the physiological characteristics of performance. If body composition characteristics are not suitable for the sport, it is almost impossible to reach the required performance levels. However, body composition is only one of the factors that enable players to demonstrate high-level performance. Physical attributes such as speed and strength are also associated with body composition and positively affect the player's performance (Mathisen, G. & Pettersen, 2015).

When high-cost, high-tech technology is not available and impractical for most sports scientists, descriptive human characteristics offer a unique wealth of information that can be used to analyze the size and proportionality of the athletic body in team sports and identify the relationships between anthropometric

measurements and the physical capabilities of soccer players (Brocherie et al., 2014).

1.1 Literature Review

The study by Ben Brahim et al. (2013) aimed to understand the relationship between physical, technical, and tactical performance and anthropometric factors in Tunisian soccer players according to different playing positions. The sample included 130 players under 13 years of age, who underwent physical tests and body measurements. The results showed a strong correlation between height and weight with the 20-meter sprint and aerobic endurance tests. The researcher concluded that body measurements have scientific importance that can facilitate coaches' tasks in selecting young players suitable for soccer activity based on their physical and technical abilities.

The study by Popovic and colleagues (2013) aimed to describe the human characteristics and body composition of elite basketball and soccer players, along with making comparisons between them. The descriptive method was used on 71 players, divided into three groups [twenty-six soccer players, fourteen basketball players, and thirty-one control group individuals]. Body measurements were conducted to calculate body composition variables, and the results indicated no significant difference in BMI among the groups.

However, significant differences were found in body height, weight, and all three measured body components (muscles, bones, and fat) among the groups. Basketball players were significantly taller and heavier than soccer players, with a considerable difference also between the weight of soccer players and the control group individuals, who were much heavier. The muscle and bone contents in the bodies of the control group were significantly lower than all other individuals, while there was no difference between soccer and basketball players.

The study by Brocherie and colleagues (2014) aimed to identify the potential relationship between body measurements and the ability to repeat sprinting efforts. The sample included 16 players from the Qatar national soccer team who underwent physical tests including RSA (Repeated Sprint Ability), speed, and explosive strength tests, along with measuring the

fat mass index.

The results showed a strong correlation between the latter and physical tests, concluding that the cross-sectional muscle area of the mid-thigh, fat, 20-meter straight-line sprint, maximal sprinting speed, and CMJwA (Countermovement Jump with Arms) are the strongest indicators for Sdec (sprint decrement) and TT (total time) during RSA testing. In the Qatari soccer team, players were associated with attributes related to strength and RSA, underscoring the importance of explosive power for soccer players and the greater importance of neuromuscular traits determining RSA.

The study by Mathisen and Pettersen (2015) aimed to explore the relationship between anthropometric measurements, speed, and agility in soccer players under 16 years of age. The study sample included 130 players divided into three age categories: 10-12 years (average 10.8 ± 0.50), 13-14 years (average 13.9 ± 0.50), and 15-16 years (average 15.5 ± 0.24), where they underwent a 10-meter sprint test, agility tests, and body measurements. The research concluded that height and body mass are significantly correlated with sprint performance in male soccer players between 13 and 16 years.

However, individuals between 10 and 12 years showed no significant relationship between rapid sprint performance and human measurements, except for a minor correlation in the 10-meter race, possibly due to maturity, with significant differences in body height and mass due to varying growth spurt patterns. Agility performance related to anthropometric measurements was not significant, except for a moderate correlation among children between 13 and 14 years.

The study by Philips (2016) aimed to determine the relationship between body fat percentage and Body Mass Index (BMI) among individuals suffering from obesity in Africa. Samples from both women and men aged between 20 and 79 years (51.2% 805 women, and 48.2% 706 men) were taken. Height and weight were measured to calculate BMI and body fat percentage. The research found a very strong relationship between body fat percentage and BMI.

From the above, it is evident that most research focused either on amateur players or professional adult players, prompting us to work with young soccer players

under 19 years of age, in the pre-puberty stage. The information in this regard might be useful for coaches to enhance player performance and in their selection process. Additionally, most of the descriptive data on soccer player characteristics come from America and Western Europe, despite the lack of data from North Africa. This study aims to describe the physical characteristics to discover the potential relationship between these indicators and the speed attribute in intermediate-class soccer players. Previous studies showed that older youth soccer players performed better in 30m and 40m sprint field tests, while limited data exist on 10m sprint performance, with a lack of results for distances shorter than 30 meters.

In light of the above, we pose the following question:

1.2 General Question

- Is there a positive correlation between anthropometric measurements (height, weight, and BMI) and the speed attribute in soccer players under 19 years old?

1.3 Sub-questions

- Is there a positive correlation between height and the speed attribute in soccer players under 19 years old?

- Is there a positive correlation between weight and the speed attribute in soccer players under 19 years old?

- Is there a positive correlation between Body Mass Index (BMI) and the speed attribute in soccer players under 19 years old?

1.4 Hypotheses

1.4.1 General Hypothesis

- There is a positive correlation between certain anthropometric measurements (height, weight, and BMI) and the speed attribute in soccer players under 19 years old.

1.4.2 Study Hypotheses

- There is a positive correlation between height and the speed attribute in soccer players under 19 years old.

- There is no positive correlation between weight and the speed attribute in soccer players under 19 years old.

- There is a positive correlation between Body Mass Index (BMI) and the speed attribute in soccer players

under 19 years old.

1.5 Research Objectives

- To determine the relationship between maximum speed and certain anthropometric indicators in soccer players under 19 years old.

- To obtain body measurements and utilize them in identifying the best future soccer players.

- To demonstrate the importance of anthropometric measurements in soccer and the fitness level tests for players.

1.6 Significance of the Study

• To highlight the importance of studying the relationship between anthropometric measurements and maximum speed attribute in soccer players under 19.

• To apply the results of this study in the scouting, selection, and orientation process of players in the under-19 team of Chlef in the future.

1.7 Research Terms

A. Anthropometric measurements

Derived from the Greek language, where “Anthropos” means human, and “logia” means science, explaining the term “anthropology” as the science that studies humans. (Taleb, 2011) Operational definition: These are standardized body measurements that measure lengths and widths representing the distance between two points or measuring perimeters or skinfold thickness.

B. Speed

Defined by Abu Al-Ala as the ability to execute movement of the limbs, part of the body, or the entire body in the shortest possible time. (Abu Al-Ala, 2009)

Operational definition: It is the maximum distance a player can cover in the shortest possible time.

C. Body Mass Index (BMI)

Defined by William Fowler as “the ratio in meters and this index is used to classify individuals as well as their physical health and degree of obesity.” (Al-Hazaa, 2009) Operational definition: It is a mathematical formula to identify the normal weight of a person, which is the result of dividing the body mass by the

square of the height.

2. Method

2.1 Study Methodology

Given the study's focus on the relationship between anthropometric measurements and the maximum speed attribute in the under-19 team of Chlef association, the appropriate approach is descriptive. Due to the researcher's interest in uncovering the nature of the correlation between several anthropometric measurements and the maximum speed attribute in the performance of soccer players under 19, it was necessary to conduct these measurements with great care, considering the unique characteristics and specifications of the sample individuals. In this study, we relied on a set of anthropometric measurements that included height, weight, Body Mass Index (BMI), and a 30-meter sprint test.

2.2 Pilot Study

One of the essential stages researchers must undertake to ensure the suitability of the study location and the appropriateness of the used tool, we conducted a preliminary study at the Mohammed Boumezrag stadium of Chlef association team. The aim of this study was to collect information closely and directly related to the study variables, inspect the used tools, know the training times, and help with the research sample, which is the under-19 category of Chlef association, to outline the necessary testing programs.

2.3 Study Population and Sample

The study involves soccer players under 19 years old from the first professional league. The sample included 25 male soccer players under 19 years old, selected randomly, representing 12.13% of the population.

Table 1: Physical Characteristics of the Sample

Characteristics	Unit of Measurement	Study Sample (n = 25)	
		Mean	Standard Deviation
Age	years	18.20	0.408
Training Age	years	6.92	0.812
Height	cm	176.04	6.985
Weight	kg	66.91	5.880
BMI	kg/m ²	21.73	1.753

Source: The researcher using SPSS software

2.4 Data Collection Methods

The research team used various tools and devices to obtain data from the body measurements, including:

- A device for measuring height in centimeters.
- A medical scale for measuring weight in kilograms.
- Stopwatch, cones, and whistle.
- Forms for recording and noting the data.

2.5 Psychometric Properties

Table 2: Validity and Reliability of Study Measurements and Tests

Coefficients Variables	Reliability	Face Validity	Critical Value	Degrees of Freedom	Significance Level
30-meter sprint test	0.86	0.93	0.71	23	0.05
Height measurement	0.99	0.99	0.71	23	0.05
Weight measurement	0.99	0.99	0.71	23	0.05
BMI measurement	0.99	0.99	0.71	23	0.05

Source: The researcher using SPSS software

It is evident that the obtained values for both reliability and validity of the study measurements are high and close to (1), with reliability coefficients (0.86, 0.99, 0.99, 0.99) and face validity values (0.93, 0.99, 0.99, 0.99), indicating that the measurements used in the study are highly reliable and valid

2.6 Study Fields

A. Human Field: Included 25 soccer players under 19 years old from Chlef association.

B.Temporal Field: The research was conducted between January 2023 and March 2023.

C. Spatial Field: The field study was carried out at the Martyr Mohamed Boumezrak stadium in Chlef.

2.7 Statistical Tools

- Mean
- Standard deviation
- Pearson's coefficient.

3. Results

3.1 Results of the First Hypothesis

Table 3: Correlation Results for Height Measurement and 10-Meter Sprint Test

	Height (cm)	10-Meter Sprint Test (sec)	Correlation Coefficient
Mean	176.04	2.29	0.54
Standard Deviation	6.98	0.45	
Maximum Value	192	3.02	
Minimum Value	167	2.01	

Source: The researcher using SPSS software

We observe that the maximum height measured was 192 cm, while the minimum was 167 cm. Regarding the 10-meter sprint test, the highest result achieved was 3.02 seconds, and the lowest was 2.01 seconds. The mean and standard deviation for height were estimated at 176.04 and 6.98, respectively, while the average for the 10-meter sprint test was 2.29 with a standard deviation of 0.45. The correlation coefficient, estimated at 0.54, demonstrates a strong relationship between height and the 10-meter sprint test.

3.2 Results of the Second Hypothesis:

Table 4: Weight Measurement and 10-Meter Sprint Test Results

	Height (cm)	10-Meter Sprint Test (sec)	Correlation Coefficient
Mean	66.91	2.29	0.074
Standard Deviation	5.88	0.45	
Maximum Value	79.10	3.02	
Minimum Value	53.90	2.01	

Source: The researcher using SPSS software

The maximum weight measured was 79.10 kg, while the minimum was 53.90 kg. For the 10-meter sprint test, the highest result was 3.02 seconds, and the lowest was 2.01 seconds. The mean and standard deviation for weight were 66.91 and 5.88, respectively, while for the 10-meter sprint test, the average was 2.29 with a standard deviation of 0.45. The correlation coefficient, estimated at 0.074, indicates a weak relationship between weight and the 10-meter sprint test.

3.3 Results of the Third Hypothesis:

Table 5: Correlation Results for BMI Measurement and 10-Meter Sprint Test

	BMI (kg/m ²)	10-Meter Sprint Test (sec)	Correlation Coefficient
Mean	21.73	2.29	0.44
Standard Deviation	1.75	0.45	
Maximum Value	25.00	3.02	
Minimum Value	17.50	2.01	

Source: The researcher using SPSS software

The largest BMI measurement was 25 kg/m², and the smallest was 17.50 kg/m². The highest result in the 10-meter sprint test was 3.02 seconds, and the lowest was 2.01 seconds. The mean and standard deviation for BMI were estimated at 21.73 and 1.75, respectively, while the mean and standard deviation for the 10-meter sprint test were 2.29 and 0.45. The correlation coefficient, estimated at 0.44, indicates a moderate relationship between BMI and the 10-meter sprint test.

4. Results and discussion

Considering the general hypothesis of the study, “Is there a relationship between anthropometric measurements: height, weight, BMI, and the speed attribute in soccer players under 19 years old?” which is connected to sub-hypotheses stating:

- There is a correlational relationship between height and the speed attribute in soccer players under 19 years old.
- There is no correlational relationship between weight and the speed attribute in soccer players under 19 years old.
- There is a correlational relationship between BMI and the speed attribute in soccer players under 19 years old.

The validity of the general hypothesis is related to the validity of these associated sub-hypotheses.

Referring back to the first hypothesis results, and to verify its validity in light of the correlation coefficient calculated at 0.54, it indicates a strong relationship between height measurement and the 10-meter sprint

test. This means that as height increases, the time achieved in a 10-meter sprint decreases. Hence, the hypothesis suggests a relationship between height index and speed attribute in football players under 19 years of age.

Training scientists believe that there are some important factors indicative of speed, most notably the constitutive characteristics of muscle fibers. A longer muscle fiber can shorten during its contraction twice as much as a shorter muscle fiber can in the same duration. This means that muscles with longer fibers are characterized by a greater muscle contraction speed than those with shorter fibers. Our study's results are consistent with the study by Ben Brahim and al. (2013), which concluded that body measurements have scientific importance in aiding coaches in selecting suitable young players for football based on their physical and technical abilities.

This is also in agreement with the studies by Mathisen and Pettersen (2015), and Brocherie and al. (2014), which concluded that the cross-sectional muscle area of the mid-thigh, fat, straight 20-meter line, maximum sprint speed, and CMJwA are the strongest indicators of Sdec ($r^2 = 0.89$) and TT ($r^2 = 0.95$) during RSA testing in the Qatari football team, thus verifying the hypothesis.

To verify the second hypothesis, the correlation coefficient calculated at 0.074 indicates a weak relationship between weight measurement and the 10-meter sprint test. It is evident that with an increase in a player's weight, there is an increase in the recorded time, thereby validating the hypothesis that there is no correlation between the weight index and speed attribute in football players under 19 years of age.

Overweight players lack the ability to move quickly, which is attributed to the extra weight due to fat accumulation in the body, representing a burden that requires greater strength to move. The adipose tissues within the muscles do not contract but rather cause internal friction in the muscle and hinder muscular contraction for better kinetic speed. Players with an average body type, classified as having a lean muscle pattern, are preferred.

Our results concur with the study by Philips (2016), which found a very strong relationship between body fat percentage and body mass index, and the study by Popovic and al. (2013) that found a significant difference in weight between football players and control group players, who were much heavier. The muscle and bone contents in the bodies of individuals in the control group were significantly less than those in the others, with no difference between them.

For the third hypothesis results, to verify its accuracy, the correlation coefficient was calculated at 0.44 with a significance level of 0.05, indicating a moderate relationship between body mass index measurement and the 10-meter sprint test. This shows that with an increase in body mass index, there is a parallel increase in the recorded time, thus confirming a correlation between the body mass index and the speed attribute in the sample individuals.

This is in line with the study by Julies Philips, which pointed to a lack of strong correlation between body mass index and transitional speed attribute. This is because an increase in I.M.C leads to an increase in fat and consequently an increase in sports weight relative to height, which negatively affects the level of sprinting speed, as the weight index plays an important role in the level of transitional speed.

5. Conclusion

The research findings lead us to conclude that a young soccer player who possesses high physical abilities, especially in terms of speed, has suitable body measurements. Therefore, youth soccer coaches can select players based on their physical characteristics, in addition to the technical abilities they possess. This means that body measurements should be considered when selecting young players to develop their performance.

Conflict of Interest

The authors declare that they have no conflict of interest.

Recommendations

► Regular monitoring of the players' condition, taking measurements, and conducting the required tests for them.

- Considering all aspects that affect the various physical attributes of the player.
- Using anthropometric measurements related to football skills, especially the lower limbs of the player, as a guide.
- Improving body measurements that correlate with soccer skills.
- Other factors, such as psychological skills and specific football skills, should also be considered when selecting young soccer players to develop high-level players in the future.
- Conducting research on larger samples and in different communities to verify the relationship between anthropometric factors and the speed attribute in youth soccer.

- References

- Sabri, Jamal, et al. (2009). "Some body measurements and their relation to the smashing skill in volleyball." *Sports Science Journal*, 3(1), p. 215-229.
- Ben Brahim, M., Bougatfa, R., & Amri, M. (2013). "Anthropometric and Physical Characteristics of Tunisian Young Soccer Players." In S. Research (Ed.), *Advances in Physical Education*, 3(3), 125-130.
- Popovic, S., Akpınar, S., Jaksic, D., Matic, R., & Bjelica, D. (2013). "Comparative Study of Anthropometric Measurement and Body Composition between Elite Soccer and Basketball Players." In Researchgate (Ed.), *International Journal of Morphology*, 31(2), 461-467.
- Kolar, J.C., & Safter, E.M. (1997). "Craniofacial anthropometry." Ed. Amphora, France.
- Bouchard, C. (1993). "De pressjp Tremblay A. Exercise and obesity Research, p. 133-147."
- Nikituk, B.A. (1989). "Anatomy and sport morphology." Ed. Physical Education and Culture, Russia.
- Al-Hakim, Ali Saloum. (2004). "Tests, Measurement and Statistics in the Sports Field." Kuwait: Al-Taif Printing.
- Mathisen, G., & Pettersen, S.A. (2015). "Anthropometric factors related to sprint and agility performance in young male soccer players." *Journal of Sports Medicine*, 337-342.
- Khater and AL-Baik (1976). "foundation for the preparation of footballers." Dar AL-Fikr AL-Arabi. Egypt p.176.
- Kamash, Youssef, and Abu Kheit, Saleh Bashir. (2006). "The contribution of some anthropometric measurements and physical traits to the level of shooting performance in soccer."
- Brocherie, F., Girard, O., & Forchino, F. (2014). "Relationships between anthropometric measures and athletic performance, with special reference to repeated-sprint ability, in the Qatar national soccer team." *Journal of Sports Sciences*.
- Philips, Julies (2016) prevalence of overweight and obesity in adults and young people. Faculty of Medecine Lyon1.
- Mohsen, Taleb Jassim. (2011). "Some body measurements and their relation to the level of serving skill in tennis." *Journal of Physical Education Sciences*, 1(4), p.113-129.
- Abu Al-Ala, Abdel Fattah. (2009). "Physiology of Sports Training." Dar Al-Fikr Al-Arabi, Egypt.

Al-Hazaa, Hazaa. (2009). "The Attribute of Physical Activity in Health and Disease." Saudi Arabia.

How to cite this article according to the APA method

Dahmani Moussa Abdelkarim and others. (2025), The Relationship Between Certain Body Measurements and Speed Attribute in Soccer Players Under 19 Years Old, *Academic Review of Social and Human Studies*, vol 17, number 01, Hassiba Ben Bouali University of Chlef, Algeria, p p: 191-198.