

A comparative study of some physical characteristics among football players rated under 20 years of age according to the age variable

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Abstract

The object of the study aims to identify potential differences in some fitness components between football players for the age group under 20, by comparing their results in applied physical tests. For this purpose we used a case study methodology on a sample composed of 26 players for the first year and 26 players for a third year, was chosen intentionally, and for data collection, we used the testing tool, after collecting the results and having treated them statistically with the "T student test" to indicate the differences, we conclude that there are statistically significant differences between the results of the two samples in the periodic respiratory endurance tests and the explosive strength of the leg muscles in favor of the older, and on this basis the study recommended that the age group not contain more than two years, and it is preferable to each category includes only one age, adapting physical work individually or in a converged group system.

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I. Introduction

Modern training is a planned educational process, based on sound scientific grounds, that works on helping players achieving complementarity in their football performances. Consequently, training goals are achieved (i.e. Winning games,) which requires planning, organizing the players' physical, technical, and mental abilities, as well as their moral, psychological, and volitional characteristics. All of the above a unified framework to help the players attain the highest level of athletic performance, notably during games. (Mokhtar, 1974)

Moreover, the players' physical training and preparation is the chief duty of a trainer. For if lacking physical abilities, the players would not be able to perform in games with the required precision and technical complementarity. (Mokhtar, 1974) What distinguishes football players now, is their ability to skilfully performances during their training (in movement and running). There is no longer room for slow players in any team, and if we would analyse the reason behind this, we would conclude that games are now characterized by speed. (Mokhtar, 1974)

Based on the above, physical fitness is an individual process, meaning, it is closely related to the phenomenon of individual differences. Physical fitness is a relative process, in the sense that the individual who meets normal physical requirements, successfully deals with them in their daily life and with the least degree of fatigue. (Al-Bassir, 1999), Most of the professional football academies are seeking to optimize the early detection and physical development of their young football players according to age and playing position. (Emmanouil Smpokos, 2019)

Since the growth of organs and tissues of the human body is not carried out equally, the study of the nature of these processes is therefore of great importance for building training programs that suit the nature of the different stages of growth. Each of these stages differs from the other and is not repetitive in the human lifetime. Trainers must understand the nature and how to deal with each stage, in terms of organizing and planning the appropriate training load.

A low fitness status during childhood and adolescence is associated with important health-related outcomes, such as increased future risk for obesity and cardiovascular diseases, impaired skeletal health, reduced quality of life and poor mental health. (P De Miguel-Etayo, 2014)

It must be noted that the physiological characteristics of each relative stage are individually different, due to the mismatch in the biological age and the

chronological age (according to the birth certificate) The human's biological age characterizes the biological features of those in that age. If these features align with the chronological age, then the level of growth is deemed "normal." However, in the case of individual differences, we notice an increase in the biological age over the chronological age. For example, the height and weight of a child exceeds that of their peers, and sometimes it's the other way around. (Al-Fattah, 1998) The features of human body growth appear in the growth of functional glands, internal organs and their different functions and in bones growth and muscular strength as well as the effect of these aspects on height and weight growth." (Al-Sayyid, 1975) Given the youth teams' low scores and results in playoffs for the various international tournaments and championships, it had crossed my mind that the physical growth of our young players may not meet the requirements of modern football. Along with the fact that the selection is affected by the growth and maturity in this age, it may explain the failure of our youth teams in the international tournaments. (Williams, 2010) sought through his investigation to determine whether there was a relative age impact in the U-17 World Cup. The birth dates of the competing players, in the last six competitions, were examined, from 1997 to 2007. The birth months, in all competitions, are significantly different from what was expected; with more number of players born in the first months of the year compared to subsequent months, for the entire group of players, 40% were born in the first quarter of the year while only 16% were born in the last three months. It seems that a small part of this impact, is due to the physical position of the players.

This relative age effect was held for all geographical regions designated by the FIFA except for Africa. The African region showed a reverse relative age effect, with a relatively large portion of the players born in the last quarter of the year, especially in December of the appropriate age category. The results of this investigation show that at the highest level of youth football, there is a strong bias towards including players born early in the year. (Dellal, 2013) confirmed that throughout the games, the young football player exhibits less physical activity than adults. Professional players cover more total distance than young football players. In addition, U-16 players would excel and surpass younger player categories (U15-U14-U13-U12) in athletic activities, including total high-intensity distance and speed activity (Haley & al, 2010). In a study conducted in youth population (aged 17 years) of elite football players it was found that they have covered 5-7 km

A comparative study of some physical characteristics among football players rated under 20 years of age according to the age variable.

during an official match (Castagna C. M., 2010), of which approximately 15% (0.4-1.5 km) with high-intensity activities and the ability to perform in intermittent fitness tests was related to the total distance (TD) covered, as well as with the distance covered in high intensity activities. (Castagna C. I., 2009)

Performance in physical tests such as 10m or 30m is not only associated with age, but also with the level of maturity, puberty, and growth of young players. In fact, based on physiological developments, significant differences appear at the V02max level, velocity traits, performance in explosive strength testing, weight, height, and strength characteristics, etc. The physical differences are more pronounced depending on the occupied positions (Gill et al, 2007) and the time of year in which the player was born.

However, the question raised concerns the level of athletic fitness of these players. Starting from the fact that they all receive the same suggested training, in the same doses and loads. Their responses surely differ, and from another perspective, their physical fitness levels differ between players of the same age category, let alone from those who are older, despite them being a part of the same age group. On this basis, we raise the following problematic:

Are there statistical differences in the fitness components between first year and third year football players, in the U-20 category?

II. Method and Materials

Prospective study and its fields:

This study was conducted with the aim to corroborate the scientific validity of each of the basic physical tests nominated by the experts, identify the suitability of these tests for the research sample as well as the validity of the tools used in the tests. In addition to identifying possible errors that may arise during the conduct of these tests, in order to avoid them during the fundamental study.

Scientific Research Methodology:

Methodology means the set of foundations and rules followed by the researcher in their study of the problem, in order to uncover the truth. (Bouhouch, 2007) The aim of the current study is to identify the differences in the athletic fitness levels between players of the same age group U-20, according to the age variable, comparing between first year and third-year players. The nature of this study requires the search for differences on the

basis of an age variable, thus, the use of the case study methodology, is the most suitable for the study.

2.1. Participants

The study society are football players of the U-20 category. Chosen from all the clubs in the province of Skikda, that belong to the Constantine Regional Football League. They are a total of five (05) clubs, with 130 players. The sample was chosen intentionally.

Table n (01) Research community and the distribution of the study sample

Research community	Distribution of study sample				
	Code	Team	Numbers of players		
			First year	Second year	Third year
Jil Jadid Azzaba (26 players)	JJA	Jil Jadid Azzaba 26 players	07	11	08
R. El Harrouch (27 players)					
NR. Beni Oulbane (28 players)	REA	R. El Harrouch 27 players	10	08	09
Mamarrat Skikda (25 players)					
N. Bekkouche Lakhdar (24 players)	NRBBO	NR Beni Oulbane 28 players	09	10	09
Community size 130 players					
	Total		26	29	26

2.2. Materials

Tests and Measurements: The physical tests were applied on some participating teams from the province of Skikda, in the regional section for Constantine Ligue, for U-20 category. The tests and measurements on all players were applied on teams with the help of the technical staff of each team

Scientific tool conditions:

Test Objectivity: objectivity means remaining unbiased and unaffected by the correctors' self-judgment, and that the result of the study be completely based on the facts related to the subject study alone. The latter means that the individual's degree must not differ according to the different correctors who evaluate the tests. (Farhat, 2003).

In this study, it is possible to clarify the objectivity of the tests through their correlation, and type of activity chosen (football).

Reliability and Validity of Measurement: In order to corroborate the validity of the measurement and its adequacy to this age group, the researcher presented the tests to a group of arbitrators from teachers and

A comparative study of some physical characteristics among football players rated under 20 years of age according to the age variable.

trainers. The validity of the content and the tests were approved, as the tests were proven to serve their purpose. Self-honesty is the most accurate experimental degree for the real degrees free of measurement errors, that is tested by the square root calculation of the test stability coefficient. (Hasnin, 1995)

Table n (02) Exposing selected physical tests

Suggested physical tests	
Running test Cooper's 12 minutes	Respiratory periodic endurance
Sprinting test - (30m - straight line)	Transitional speed
Standing Vertical Jump Test - Sargent Jump	Explosive Strength
Zigzag Running (Illinois)	Agility

2.3. Design and Procedure

Human field: The sample was chosen intentionally. They are the first- and third-year players for each of the clubs of Jil Azzaba, Rea Al Harrouch and Nejm Beni Oulbane, where their number reached (26 first year players / 26 third year players).

Timeline: Represents the period of time during which a specific job was accomplished, as the study was conducted in the period between November and December 2014.

Space: The tests and measurements were made in the municipal stadium of each club

Identifying research variables:

Independent Variable: chronological age (first-year players/third-year players)

Dependent Variable : physical shape

2.4. Statistical Analysis

The goal of the statistical study is attempting to reach meaningful indicators, that help analysing, interpreting, and judging the validity of the hypotheses, as Microsoft Excel was used in the calculation process, and organizing data and information. The researcher used the T Student test to calculate the differences between two equal groups that were unrelated between the results of the applied test scores, and **Pearson's** correlation coefficient to reveal the relationship of obtained results with the age variable.

III. Results:

Table n (03) Running test Cooper's 12 minutes "Oxygen tolerance"

Running test Cooper's 12 minutes "Oxygen tolerance" travelled distance								
Variables	Numbers	Arithmetic mean (m)	Standard Deviation	Calculated T value	T Value Table	Degrees of Freedom	Significance Level	Statistical decision
First year	26	2627.58	107.724	3.45	2.01	50	0.05	Significant
Third year	26	2776.15	185.75					

Table n (04) Standard degrees of Running test results - Cooper's 12 minutes

Standard Grades	1	2	3	4	5
Evaluation	Very Weak	Weak	Medium	Good	Excellent
Traveled distance	>2300 m	>2500 m	>2700 m	>3000 m	> 3000 m

Source (Ayesha and Hamada, 2008)

The outcome from the results of Cooper's 12 minutes running test, is that there are statistical differences between the arithmetic mean results of the first-year and third-year U-17 U-19 players, at a degree of freedom of 50, and a significance level of 0.05 for the third-year players, as calculated T value reached (3.45), which is higher than T table value (2.01).

Table n (05) Sprint Test results - 30 m

Sprint Test - 30m distance from standing								
Variables	Numbers	Arithmetic mean (s)	Standard Deviation	Calculated T value	T Value Table	Degrees of freedom	Significance Level	Statistical decision
First year	26	4.83	0.59	1.03	2.01	50	0.05	Insignificant
Third year	26	4.67	0.45					

Table n (06) - Standard scores for Sprint test 30 m

Standard score	1	2	3	4	5
Evaluation	Very Weak	Weak	Medium	Good	Excellent
Elapsed time (s)	Over 4,6	[4,5 - 4,6]	[4,3 - 4,4]	[4,0 -4,2]	Less than 4,0

Source (Mackenzie, 2005)

The outcome from the maximum transmission speed test results, is that there are no significant statistical differences, as calculated T value reached (1.03) which is a smaller value compared to T Value Table (2.01) in a significance Level of 0.05, and a degree of freedom of 50.

Table n (07) “Sargent” Test results:

Explosive Strength test - Standing Vertical Jump								
Variables	Numbers	Arithmetic mean (cm)	Standard Deviation	Calculated T value	T Value Table	Degrees of freedom	Significance Level	Statistical decision
First year	26	41.92	9.41	2.15	2.01	50	0.05	Significant
Third year	26	46.92	7.18					

Table n (08) Standard scores for Sargent Test

Standard score	1	2	3	4	5
Evaluation	Very Weak	Weak	Medium	Good	Excellent
Jump level (cm)	Less than 30	Less than 40	Less than 50	Less than 65	65 and above

Source (Mackenzie, 2005)

The results showed statistical differences in the standing vertical jump test, in favor of third year players, because calculated T value estimates at (2.15) is higher than T table value (2.01).

Table n (09) Zigzag Running (Illinois) Test Results

Zigzag Running (Illinois) Test								
Variables	Numbers	Arithmetic mean (s)	Standard Deviation	Calculated T value	T Value Table	Degrees of freedom	Significance Level	Statistical decision
First year	26	17.41	1.12	0.47	2.01	50	0.05	Insignificant
Third year	26	17.27	0.94					

Table n (10) standard scores for Zigzag Running (Illinois) agility test results

Standard score	1	2	3	4	5
Evaluation	Very Weak	Weak	Medium	Good	Excellent
Elapsed time (s)	>18,3 sec	18,2-18,1 sec	16,2-18,1 sec	15,2-16,1 sec	< 15,2 sec

Source (Mackenzie, 2005)

Through the previous table - which analyses the results of the players after conducting a zigzag running test, there were no significant statistical differences, as calculated T level (0.47) is less than T table level (2.01) in the degree of freedom 50, and the significance level 0.05.

Table n (11) Correlation coefficients between the players' age and the test results of fitness components:

Variable Players' age	Variable test results for physical traits (fitness components)			
	Mental endurance	Transitional speed	Explosive Strength	Agility
	Copper's test	30M sprint	Vertical Jump	Zigzag Running (Illinois)
Correlation coefficient value	0.446	-0.148	0.291	-0.068
Type of correlation	Medium correlation	Weak inverse	Weak correlation	Weak inverse
sig* value	0.001	0.297	0.036	0.630
Statistical significance	Significant	Insignificant	Significant	Insignificant

The correlation coefficient value between the players' age variables and the test results for the fitness components are as follows:

There is a medium correlation between the players' ages and the Copper 12' running test results, as the value of correlation was estimated at 0.446 in the positive direction. I.e. Whenever the players' age would increase, the test results would follow. Sig value was estimated at 0.001, which is a lesser value than the significance level recorded at 0.05, thus the correlation is statistically significant, which matches with the T significance differences of the same test between first year and third-year players.

There is a weak inverse correlation between the players' ages and the 30m straight line sprint test. As the value reached =0.148 in the negative direction. I.e. The older the players' age, the more the test results decrease. Sig* value was recorded at -0.297, which is a higher value than significance level 0.05. Thus, the correlation is statistically insignificant, which matches with the T significance test results of the same test between first year and third-year players.

There is a weak correlation between the players' ages and the vertical jump test results, as the value of correlation was estimated at 0.291 in the positive direction. i.e. whenever the players' age would increase, the test results would follow. Sig value was estimated at -0.036, which is a lesser value than the significance level recorded at 0.05, thus the correlation is statistically significant, which matches with the T significance differences of the same test between first year and third-year players.

A comparative study of some physical characteristics among football players rated under 20 years of age according to the age variable.

There is a weak correlation between the players' ages and the agility test results, as the value of correlation was estimated at - 0.068 in the negative direction. i.e. The older the players' age, the more the test results decrease. Sig* value was recorded at -0,630, which is a higher value than significance level 0.05. Thus, the correlation is statistically insignificant, which matches with the T significance test results of the same test between first year and third-year players.

IV. Discussion:

Discussing first hypothesis: "There are statistical differences between the results of first year and third year players, in the U-20 category, in the periodic respiratory endurance test (Running - Cooper's 12 minutes)".

After statistical analysis, the researcher finds that the significance of these differences is due to the fact that periodic respiratory endurance in among the physical traits that are affected by the size and quality of training. Third year players received a larger portion of training compared to first-year players, which was confirmed by (El-Mandalaoui, 1990), that in such stage, the growth of internal growth is complete especially the blood circulation and heart vessels, and that the players, aged 18, the functional development of their internal organs reaches adulthood. Also, it is necessary for the players to have sufficient air capacity in order to be able to exert effort throughout the game, during repeated matches over short periods of time and all season, regardless of the level of play. In the other hand, they must be able to sequence various duties, in particular exert intense efforts, with variable times of recovery (active, slightly active, and/or negative) (Dellal, 2013)

Through the previous, we conclude that thanks to this test, the coach is able to identify the player's true capacities on "oxygen" tolerance, which helps in the selection of players who can move forwards with the sports season, in their full physical shape.

Discussing second hypothesis: There are no statistical differences between the results of first year and third year players, in the 30m sprint test from high start.

According to the researcher, there is no significance in the differences, as this feature (speed) is amongst the physical traits that is affected by genetics in matters of controlling its results, as it is a neuromuscular feature. Through

the existing differences in the muscular pattern to the muscle fibre quality, it is possible for third year players to be faster than first year players, and vice versa.

Performance in physical tests such as 10m or 30m, is related to age, as well as the level of maturity, puberty, and growth of young players. As matter of fact, based on physiological developments, and major differences all appear at a $\dot{V}O_2$ max level, as well as speed features, performance in explosive strength, weight, height, and strength. (Dellal, 2013)

Discussing third hypothesis: There are statistical differences between the results of first year and third year players, in the Sargent Standing Vertical Jump test.

which the researcher attributes it to the development in the level of growth, The level of growth and the process of biological development in the tissues and organs of the body vary from year to year, and the growth of physical characteristics develops according to the development in age, which is corroborated in the studies of each of (Faycal, Braiki, 2020) and (Nassima, 2015) who state that older individuals, in some stages excel over those who are younger, in physical features, and in another hand, muscular strength is directly proportional to the size of the body, and the physiological section of the muscles. (Hasnin, m. 2001)

Discussing fourth hypothesis: there are statistical differences between the results of first year and third year players in the Agility Test (Zigzag Running - Illinois)

Fitness or agility are one of the most important physical components for the football, that requires changing in the body directions or its positions in the air, or on the ground, or even a quick launch, then sudden halt. Meaning, it requires merging several skills in one frame or kinetic performance, that is characterized by variation in circumstances of great complexity, and change to a large extent, whether it be of speed, accuracy, or compatibility. The researcher attributes this result to the fact that agility is mainly related to the efficiency of the nervous system's work, especially the motor nerves. The higher an individual's ability is in rapid motor, the higher their ability is to change according to the speed of compatibility between the nervous and muscular systems. The senses play an important role in developing agility among the players, as they help to clearly visualize, which contributes to mastering the required motor performance. (Al-Hawi, 2002). Naturally, it is a genetic matter that can be improved by regular and systematic training,

A comparative study of some physical characteristics among football players rated under 20 years of age according to the age variable.

that takes into account the specifics of each age group. It is one of the characteristics that must be worked on from a young age, in order for the player to be able to carry out their tasks on the field ground to the fullest.

Discussing fifth hypothesis There is a statistically significant correlation between the age variable of football players in the U-20 category (first year - third year), and their test results in physical tests.

It is possible to say that this statistical analysis exhibited the extent of correlation between the players' ages and the results of their fitness components, but this correlation is statistically significant only in two cases: The endurance tests, and vertical jump. It is insignificant in speed and agility tests.

Thus, and according to results deduced, the fifth partial hypothesis is rejected, and we accept the alternative hypothesis that there is no correlation in general.

V. Conclusion:

From the previous results we can conclude the following:

- ▣ There are statistical differences between the results of first year and third year players, in the periodic respiratory endurance test (Running = Cooper's 12 minutes) in favor of the third-year players.
- ▣ There are statistical differences between the results of first year and third year players, explosive strength (Sargent's Vertical Jump) in favor of the third-year players.
- ▣ There are no significant statistical differences between the results of first year and third year players, in the 30m sprint test from high start.
- ▣ There are no significant statistical differences between the results of first year and third year players in the Agility Test (Zigzag Running - Illinois)
- ▣ There is a medium correlation between the players' age and the results of the 12-minute running (Cooper) running test.
- ▣ There is a weak inverse correlation between the players' ages and the results of the 30m sprint test.
- ▣ There is a weak correlation between the players' age and the results of standing vertical jump test.
- ▣ There is a weak inverse correlation between the players' ages and the agility test.

It is often shown that the development of chronological age exceeds biological for most high-level players. That is why depending on the level of performance and chronological age is incorrect in the selection process. For the physical abilities represent the level of fitness elements such as aerobic and anaerobic endurance, muscle strength, speed of all kinds, flexibility and agility, that the young player moves forwards according to their dynamic development of physical abilities, until the stage of maturity is fulfilled. The player's ability level indicates the extent of their deviation from the development path, and this is an important guide in the selection process, taking into account the abilities affected by genetics in determining its level (speed). (Al-Busati, 1998).

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