



DEFINING THE MORPHO-FUNCTIONAL INDICATORS FOR THE SELECTION OF FOOTBALLERS ACCORDING TO THEIR PLAY LINES

Chachou Seddaoui¹,

Houar Abdelatif²,

Hadjar Mohamed Kherfane³ⁱ

¹OPAPS laboratory of the IEPS,

Abdelhamid Ibn badis University, Mostaganem, Algeria

²Dr., OPAPS laboratory of the IEPS, Faculty of Human and Social Sciences,

University of Ghardaia, Algeria

OPAPS laboratory of the IEPS,

Abdelhamid Ibn badis University, Mostaganem, Algeria

³Dr., OPAPS laboratory of the IEPS,

Abdelhamid Ibn badis University, Mostaganem, Algeria

Abstract:

This study aims at defining the morphological and functional indicators for the selection of footballers according to the three play lines (defence, midfield, attack) for the category of under 18 years old. We will work on finding the differences in these morpho-functional indicators and their relation with the play lines and their requirements. For this, we made the morphological measurements, namely : height, weight, fat-weight, muscle weight, bone weight, and the functional tests, namely : Luc Leger' Test to measure the maximal oxygen consumption (Vo₂max), the retrieval capacity via Ruffier Dickson Test and Vitality Capacity Test V.C, for 10 first level clubs in the West of Algeria; as we selected 18 players from each team with the average of 6 players of each play line (180 players), making a rate of 32% of the original society as a sample. We also used the descriptive and statistical comparative methods among those indicators and each play line in order to know to what extent those morpho-functional variables cause differences among players according to their play lines, while defining those indicators as a reference to be adopted in the players selection process for this age category in order to support the selection process with observation. The results revealed

ⁱ Correspondence: email mohamed.hadjarkherfane@univ-mosta.dz

clear differences in the morpho-functional indicators among the target category of players according to the differences in their playing lines at the level of the height indicator, as the significance value of selection reached 0.015 which is less than the significance level of the null hypotheses, while we did not find significant differences between the other morphological indicators. Meanwhile, there was a difference in the functional indicator at the level of the retrieval capacity, as the significance value reached 0.011 which is less than the test significance level 0.05; there was no difference at the level the other significances. Thence, the researcher recommends the necessity of consolidating the selection process by the inclusion of observation through the use of some morphological measurements such as height, in addition to functional tests such as the retrieval capacity as important indicators in the players selection process according to the requirements of the play lines for this age category of players, in order to select the best talents that can be beneficial to Algerian football in the future.

Keywords: morpho-functional indicators, player's selection, play lines

1. Introduction

Modern scientific research in the domain of sport training in general and football in particular, is interested in giving data and scientific truths in order to promote the quality of sport results and achievements existing in all the competitions and championships, as the training and form of the athletes has got an important share of researchers and specialists' interest in order to know the main criteria of the athlete's body, including morphological criteria and anthropometrical measurements that are meant to enable him to excel among his peers and contribute in a direct way in making him successful in his specialty or in his play centre, and thus to make him more effective in the team. That is why research in defining these specific criteria varied, (Bengoua Ali, 2004) mentioned that football is one of the sports that attract the majority of spectators, and that it is worth the competition among its coaches and interested people to get benefit from the tests and measurements at all levels, such as skill and physiological measurements of players, while making physical measurement in order to select the most talented youngsters, add to that the fact that football is one of those mass games which attract spectators throughout the world in the different international competitions and championships, and that is why it could get as much interest of science and research in order to arrive to suggestions and recommendations that lead to better achievements, and this requires specific criteria either at the morphological level or the functional and physical one which are related to the skill side and which is not

enough for excelling or achieving the highest levels, (Samir Chiban, 2010) confirms that there is a difference in the morphological structure between the elite athlete and the championship's one due to the interest in skills as well as the physical aspects while neglecting puberty and its influence on the selection process. Morphological requirements are also considered to be the requirements of modern football, as the distinction within one team is dictated by the quality of the playing lines and centres which are: the goalkeeper, the centre of defense, the midfield and the attack. (Houar Abdelatif, 2015) showed that there were statistically significant differences between play lines and body measurements such as body weight, height, body mass index, and maximum oxygen consumption. This is an indication that the indicators for body building and formation and all that is related to measurements of dimensions and characteristics of body shape in general, has a direct relationship and positively affects the sport results through outstanding performance. Besides, the functional and physiological capabilities have an important role, as they took an important part of scientific research due to the strong relationship between high performance and readiness of the physiological functions and their efficiency, as there are individual differences between players in this aspect on one hand and the requirements of play centres of physical effort on the other. (Akbobi Habib, 2017) says that experience is not always enough for the coach, as he is in dire need of precise parameters or indicators of physical activity, tactic, physical condition and even biological aspect of the players for the play centres. It is also possible to predict on the basis of the capabilities and functional capabilities of the player such as the efficiency of the periodic and respiratory capabilities of the retrieval capabilities in the selection process at the high level, and this accelerates the achievement of success with economy in time, effort and money and this is consistent with the study that we are conducting, since the selection process by observation is not enough scientifically, and this fact led us to search other determinants which are more precise and objective to be used in the selection process in the under 18 years old category of footballers, as the study is considered to be an important and scientific dimension that is meant to support the observation-based selection process at the higher level in the national championship through the use of the database as a scientific reference.

2. Problematic

Modern football has known a number of changes in the methods of training and preparation, as it has become dependent on the results of scientific research and the application of supervisors of the training process considering those scientific methods

as a guiding platform in their training programs. Modern football is characterized by speed, strength and endurance at the higher levels, It is impossible to focus on some aspects and neglect others, as achievement is interdependent and integrated from the stages of selection and direction to the elite and high level stage.

After the elimination of the national team from the first round in the African Cup, which was held in Gabon in 2017, and which was such a shock to the followers of the team and its supporters, the National Technical Directorate decided to reconsider its policy, which was dependent on the foreign product instead of the local as this was an obstacle in the African participation of the team because of the difference in environment and climate compared to Europe, thus, going back to reliance on local talent, as the case used to be in the eighties became the most prominent interest through the right scientific training in clubs and schools in terms of framing and how selection ways in accordance with the scientific methods studied in the medium and long terms as the best means, with the formation of national teams of the Federation similar to the international teams, and this to prepare them more to the high level and to build the national team as a harmonious team having gone across all stages of the smaller categories of the team. (www.radioalgerie.dz, 2017)

The problem lies not in the lack of talent, but in the lack of methods of discovery and selection of talents, relying on random and self-selection ways, away from the use of modern scientific and codified methods, which is nowadays adopted in selection processes at the high level, away from subjectivity in order to avoid wasting time, effort and money while giving opportunities for all.

The players are almost equally skilled at all levels, thus, players can only be chosen by subjecting them to other parameters and criteria imposed by the game's requirements, and these are the roles and duties required by each of the three playing lines (defense, midfield and attack) and according the playing centers of each line .

Among these determinants are the individual differences in the form and structure of the body, ie physical measurements and physical aspects required in the game according to lines and playing centers. (Samir Chiban, 2010), citing Carter (1985), says that with some physical measurements the talented player can be identified, as the morphological structure is an important and influential factor in the performance of the player in playing line according to the requirements of the positions and roles of the playing centers, the defender's body measurements are different from those of midfielders and attackers, and each center has the physical and functional requirements that make them distinguished from each other in the roles and their peers at the high level and this is what Wahid Halilozitch pointed out reporting from (Alexander Dellal, 2008) that each center has its own physiological needs. The problem of research is that

the researcher is interested in the field of sports training in general and soccer in particular in the absence of real scientific indicators derived from the terrain in the process of selection of the players and even the studies and research that dealt with this subject found physical, morphological and functional determinants of selection but did not take into account the specificities and requirements of the playing lines and centers, as these determinants were collective and inclusive of different age groups, except the study of (Houar Abdelatif, 2015) Which led to the proposal of a computer program that directs the players according to the play centers based on physical, skill and morphological determinants. Based on these scientific data, it was necessary to think about setting some determinants on which the selection process in football can be based on and from real data taken from the real terrain of Algerian football. The chosen determinants for the selection are the morphological and functional ones because they have a direct impact on the effectiveness of the player's performance, especially in accordance with the requirements of defensive and offensive duties, and the bilateral and aerial conflicts in the midfield, and the length of the match and the intensity of competitions, as for the choice of the category of under 18 years it was based on the fact that this category is the one that separates between the youngsters and adults categories, and this makes the selection more accurate and important because of its sensitive aspect in the selection of players who are able to represent the team among adults and provide a group of players superior to their peers skillfully, physically, morphology And functionally according to the requirements of the playing lines as a homogenous and integrated team; and to help solve the research problematic we ask the following question: *"Do the morpho-functional variables contribute to the variation between football players under 18 years according to the lines of play?"*

2.1 Research Goals

Determination of morpho-functional indicators for under 18 years category according to the playing lines.

2.2 Search Hypothesis

- Yes, some morphological variables contribute to the difference between football players according to the lines of play under 18 years.
- Yes, some functional variables contribute to the variation between football players according to the lines of play under 18 years.

3. Methodology

3.1 Research Methodology

The researcher used the descriptive method in the survey method to suit the nature of the research.

3.2 Sample of the study

The study was conducted on a sample of 10 teams from the west of Algeria under 18 years (180 players), which is more than 32% of the registered ones for the sports season 2016/2017.

3.3 Research fields

A. Spatial field

Measurements and tests were carried out at the teams' stadiums, as we took the morphological measurements in the cloakroom rooms and functional tests in the field.

B. Time domain

This study was conducted between 05/10/2016 and 25/03/2017.

C. The human field

The study was conducted on the players of the Algerian West teams for the under-18 category. We chose 18 players with 6 players in each line of defense (defense, midfield and attack).

3.4 Measurements and tests applied in the research

3.4.1 Morphological measurements

- Height
- Weight
 - fat-weight
 - bone weight
 - muscle weight

3.4.2 Functional tests

- Luc Legér test to measure the maximum consumption ratio of oxygen VO₂max;
- Ruffier Dickson test for measuring **retrieval** capacity;
- Measurement of the vital capacity.

4. Presentation and discussion of the results

Table 1: Descriptive statistics for indicators of morphological football players as playing line

		Sum of squares	df	Mean squares	F	Sig
Height	Between groups	.033	2	.017	4.388	.015
	Within groups	.328	87	.004		
	Total	.361	89			
Weight	Between groups	119.868	2	59.934	.600	.551
	Within groups	8696.445	87	99.959		
	Total	8816.313	89			
Fat-Weight	Between groups	82.464	2	41.232	.643	.528
	Within groups	5580.824	87	64.147		
	Total	5663.288	89			
Bone Weight	Inter-groups	.434	2	.217	.602	.550
	Within groups	31.342	87	.360		
	Total	31.776	89			
Muscle Weight	Between groups	.562	2	.281	.082	.921
	Within groups	296.971	87	3.413		
	Total	297.533	89			

Table 2: Comparison between football players as playing lines in morphological indicators using variance analysis

		Sum of squares	df	Mean squares	F	Sig
Height	Between groups	.033	2	.017	4.388	.015
	Within groups	.328	87	.004		
	Total	.361	89			
Weight	Between groups	119.868	2	59.934	.600	.551
	Within groups	8696.445	87	99.959		
	Total	8816.313	89			
Fat-Weight	Between groups	82.464	2	41.232	.643	.528
	Within groups	5580.824	87	64.147		
	Total	5663.288	89			
Bone Weight	Inter-groups	.434	2	.217	.602	.550
	Within groups	31.342	87	.360		
	Total	31.776	89			
Muscle Weight	Between groups	.562	2	.281	.082	.921
	Within groups	296.971	87	3.413		
	Total	297.533	89			

By analyzing the results of Table No. 2, we find that in the height index, the value of significance is 0.015, which is below the significance level of 0.05. Therefore we accept the alternative hypothesis and we reject the null hypotheses i.e. $X_1 \neq X_2 \neq X_3$ and

conclude that there are statistically significant differences between the averages of the players according to their lines in the height index. For the weight index the mean value is 0.551, which is greater than the significance of 0.05, and therefore we reject the alternative hypothesis and accept the null hypothesis i.e. $X_1 = X_2 = X_3$ and conclude that there are no significant differences between the averages of the players in weight according to the lines of play in the weight index. For the fat mass index, the value of significance was 0.528, which is greater than the level of significance which is 0.05, and therefore we reject the alternative hypothesis and accept the null hypothesis i.e. $X_1 = X_2 = X_3$, and we conclude that there are no statistically significant differences between the averages of the players according to their lines in the fat mass index. In the bone mass index, the value of significance is 0.550, which is higher than 0.05, therefore we reject the alternative hypothesis and accept the null hypothesis i.e. $X_1 = X_2 = X_3$ and conclude that there are no statistically significant differences between the averages of the players according to their lines in the bone mass index. For the index of muscle mass, the value of significance was 0.921 which is higher than the level of significance 0.05, therefore, we reject the alternative hypothesis and accept the null hypothesis i.e. $X_1 = X_2 = X_3$, and conclude that there is no statistically significant differences between the averages of the players according to their lines in the muscle mass index. The results shown in Table (04) show the extent of the difference between players according to their lines in the functional indicators.

Table 3: descriptive statistics for functional indicators for football players as playing lines functional

		N	mean	std deviation	Std. error	95% confidence interval for mean		Minimum	Maximum
						Lower bound	Upper bound		
Vital capacité	Defense	30	4.1560	.60419	.11031	3.9304	4.3816	3.25	6.10
	Midfield	30	4.0550	.81160	.14818	3.7519	4.3581	2.88	6.77
	Attack	30	4.4367	1.02575	.18727	4.0536	4.8197	2.71	7.87
	Total	90	4.2159	.83832	.08837	4.0403	4.3915	2.71	7.87
VO2max	Defense	30	56.6100	3.98656	.72784	55.1214	58.0986	50.60	62.60
	Midfield	30	55.6533	2.81532	.51400	54.6021	56.7046	50.60	60.40
	Attack	30	54.6067	4.30733	.78641	52.9983	56.2150	50.60	62.60
	Total	90	55.6233	3.80570	.40116	54.8262	56.4204	50.60	62.60
Ruffier Dickson	Defense	30	5.8400	3.08652	.56352	4.6875	6.9925	1.20	12.40
	Midfield	30	6.9467	2.94029	.53682	5.8487	8.0446	3.60	14.00
	Attack	30	8.1500	2.66623	.48679	7.1544	9.1456	4.40	13.20
	Total	90	6.9789	3.02282	.31863	6.3458	7.6120	1.20	14.00

Table 4: comparison between football players by playing functional indicators lines using single contrast analysis

Anova						
		Sum of squares	df	Mean squares	F	Sig
Vital capacity	Between groups	2.346	2	1.173	1.695	.190
	Within groups	60.201	87	.692		
	Total	62.547	89			
VO2max	Between groups	60.241	2	30.120	2.133	.125
	Within groups	1228.780	87	14.124		
	Total	1289.021	89			
Ruffier Dickson	Between groups	80.088	2	40.044	4.752	.011
	Within groups	733.142	87	8.427		
	Total	813.230	89			

In the biomass index, the value of significance is 0.190, which is higher than the significance level of 0.05; therefore, we reject the alternative hypothesis and accept the null hypothesis i.e. $X_1 = X_2 = X_3$, therefore, we conclude that there are no statistically significant differences between the averages of the players according to their lines in the biomass indicator. The maximum consumption index of oxygen (VO2max) was 125, which is higher than 0.05. Therefore, we reject the alternative hypothesis and accept the null hypothesis i.e. $X_1 = X_2 = X_3$, and conclude that there are no statistically significant differences between the averages of the players according to their lines in the maximum oxygen consumption index (VO2max). For the retrieval capacity index through Ruffier test, the value of significance was 0.011, which is higher than the significance level of 0.05. Therefore, we accept the alternative hypothesis and reject the null hypothesis i.e. $X_1 \neq X_2 \neq X_3$; and conclude that there are statistically significant differences between the averages of the players according to their lines in the index of the retrieval capacity.

5. Conclusions

1. There was a difference in the height indicator between the players according to the three lines of play (defense, midfield and attack) which was in favor of the attackers and then defenders and then midfielders.
2. There is no difference in level in the fat mass index between the players according to the three lines of play.
3. There is no difference in level in the bone mass index between players according to the three lines of play.
4. There is no difference in level in the muscle mass index between the players according to the three lines of play.

5. There is a difference in the retrieval capacity index between the players according to the three lines of play.
6. There is no difference in the level of the maximum consumption of oxygen among the players according to the three lines of play.
7. There is no difference in level in the vital capacity indicator between players by the three playing lines.

6. Discussion of hypotheses

6.1 Discussion of the first hypothesis

We conclude from our analysis of Table (02) that there is a difference between football players according to the three lines of play (defense, midfield and attack) in the height index where the value of the test indication level is 0.015 which is less than the null hypothesis significance level 0.05, therefore we accept the null hypothesis and reject the alternative hypothesis and conclude that there are statistically significant differences between the averages of the players according to their lines in the height indicator. This indicates that there are differences between players in height according to the requirements of the three lines and play centers, as the attackers over performed in height and then the defenders and then midfielders due to the requirements of the offensive roles and the imposition of winning air conflicts with the defenders, and the same imposed by the defensive roles with the attackers, as (Houar Abdelatif, 2015, p. 157) states that defenders and attackers are distinguished from their peers in height, because of the nature and role of the central defender and the attacker in winning the air balls, as confirmed by (Samir Chiban, 2010, p. 10) and (Duffour AB.RA, 1987) who argue that there is a difference in the morphological structure between the elite players and amateur players and that is part of the requirements of modern football and that every play center has its own Morphological profile.

As for the other morphological indicators of fat, bone and muscle mass there is no difference in the level of players according to the lines of play, and this is due to the nature of the modern game, which has become comprehensive and requires the player to play defensive and offensive roles throughout the match, besides, the players execute the same training program, especially in the period of physical preparation, leading to the equality of the players in those indicators of fat and bone with superiority in the index of muscle mass, as indicated by (Mohamed Sobhi Hassanein, 1996) and (Derbal Fathi, 2014), as the players are characterized by a balanced muscle model that fits the game and its requirements.

6.2 Discuss the second hypothesis

We conclude from our analysis of Table (04) that there are statistically significant differences in the Ruffier test between players according to the three lines of defense (defense, midfield and attack). The test value is 0.011, therefore, we accept the null hypothesis and reject the alternative hypothesis, and conclude that there are statistically significant differences between the averages of the players according to their lines in the retrieval capacity index. This indicates that this aspect must be taken into account in the selection process, as attack and defense lines require physical readiness throughout the match time, especially the speed of retrieval in order to maintain the same performance, especially for the midfield players who over performed attackers and defenders in this index, as (Derbal Fathi, 2014) pointed out that the center of the game requires a constant move forward and backward and on both sides, which affects the physical and functional aspect of the player and which is reflected positively on the players' performance. As for the index of maximum consumption of oxygen and the indicator of the dynamic capacity between the players according to their lines, there were no differences, and this shows that the requirements of the modern game has forced the players in the defense, midfield and attack to play defensive and offensive roles throughout the whole match, and the player should have sufficient functional presence in the maximum oxygen consumption ratio and in critical capacity no matter what type of position they occupy, because they are considered the direct source of energy during performance, as (Bishop et Edge, 2006) notes reporting from (Alexander Dellal, 2008) that Vo_{2max} affects the performance of all players directly, especially to stabilize the performance at short speeds, that is why we did not notice any differences in level between players according to the lines of play in these indicators, although the requirements of the role of midfield players require a significant presence in the vital capacity and in Vo_{2max} according to what is indicated by (Cazorla G., 1996) and (Houar Abdelatif, 2015)

7. Recommendations

- Selection of players according to the lines of play by the adoption of the height indicator in the morphological side.
- Selection of players according to the lines of play by the adoption of the retrieval indicator in the functional aspect.
- Use other morpho-functional parameters with another sample when selecting according to play lines.

References

1. AKbobi Habib (2017), *Physiological and morphological indicators when Algerian football players according to the level of their play stations*. Algéria: Abdelhamid ibn Badis University. Mostaganem.
2. Alexnder Dellal (2008), *Le football de l'entraînement à la performance*. France: Amphora. Paris.
3. Ben Goua Ali (2004), *Select standard levels for some basic skills when football players Youth*. Algeria: Scientific journal for the science and techniques of physical and sports activities, page 1 Mostaganem.
4. Cazorla G. (1996), *Evaluation physique et physiologique du footballeurs et orientation de sa preparation physique*. France: France: Paris.
5. Derbal Fathi (2014), *physical configuration and construction standards and its relationship with physical and functional requirements for football players as play centers*. Algéria: Université Abdelhamid ibn Badis. Mostaganem. Algéria.
6. Duffour AB.RA. (1987). *Profil morphologique des hand balleurs francais de haut niveau*. France: Science et motricité. Paris.
7. Houar Abdelatif (2015), *Elaboration d'un programme informatique pour orienter les jeunes footballeur vers des compartiments de jeu à base de profile morphologique et des attributs de l'aptitude physique et technique*. Algeria: Université Abdelhamide ibn badis, Mostaganem.
8. Mohamed Sobhi Hassanein (1996), *Factor analysis of physical abilities in the areas of physical education and sports*. Egypt: the Arab thought House-I 2.
9. Samir Chiban (2010), *Les dimensions corporelles en tant que critère de sélection les jeunes footballeurs algériens de 15-16 ans*. France: France: Université Claude Bernard, Lyon 1.
10. www.radioalgerie.dz, 2017. (s.d.).

Creative Commons licensing terms

Authors will retain the copyright of their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of Physical Education and Sport Science shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflict of interests, copyright violations and inappropriate or inaccurate use of any kind content related or integrated on the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a [Creative Commons attribution 4.0 International License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).