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The effectiveness of training with small-sided games on developing cardiorespiratory fitness for football players under 15 years old.

فعالية التدريب بالألعاب المصغرة على تطوير اللياقة القلبية التنفسية لدى لاعبي كرة القدم أقل من 15 سنة

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Abstract:

The present research paper aims to investigate the effectiveness of a proposed training program with small-sided games in the development of cardiorespiratory fitness. Furthermore, the study sample consists of 40 footballers under 15. The latter were randomly chosen, represented by 20 footballers from the 'Chaouia Union' (as an experimental group) and 20 players from the 'Ain Mlila Association' (as a control group). The experimental method was used for its suitability to the nature of the study. We conducted physical tests, and trained for a period of (8) weeks, with three training sessions per week, and then conducted post-tests, after which we performed the necessary statistical treatment and analysed the results of the study and found that the proposed training program had a positive impact on the development of cardiorespiratory fitness for football players less than 15 years old and the superiority of the experimental group players in developing cardiorespiratory fitness.

Keywords: small-sided games; cardiorespiratory fitness; category under 15 years old.

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Introduction:

In comparison to other African teams, Algerian football has considerably declined over the past ten years, and the country's teams have fallen into a difficult-to-exit spiral. In recent years, the development of these components, which serve as the cornerstones and guiding principles of contemporary football, has lagged behind the absence of local players from the national team and their perceived inadequacy in every physical, technical, tactical, and psychological aspect.

Although many studies and research in the field of football training in general and training of small groups, in particular, have focused on the process of Programming or scientific principles of sports training, the game of football has evolved in recent years and the character of playing has changed due to the variety of modern ways of playing, where the physical level has increased and the level of technical, physical, tactical, and psychological performance has increased. However, these studies did not address qualitative exercises in terms of performance and muscle work and their relationship to the requirements of playing football. Also, in the recent period, interest in the form and quality of motor activity of players in the field of football during matches has begun, which shows the importance of the need for a special type of training in line with the nature of physical, technical, tactical and psychological performance and changing playing situations.

The development of physical, technical, tactical, psychological, and mental skills as well as the creation of similar situations, such as competition, are necessary for achieving athletic success; “a football player who has knowledge and experience in the arts of the game and uses his tactical field intelligence to play and fight for Achieving the goal with great effectiveness can excel with his team and get good results in matches, and this superiority and success requires the presence of the basic factors for developing attack and defence tactics, which are physical capabilities and capabilities, high level of skill performance, stability and development of psychological and moral qualities, and players’ ability to think tactically and correct behaviour in different playing situations. (Muwaffaq Asaad Mahmoud, 2009, p. 95).

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1. Statement of the problem:

The most recent training and educational techniques and programs have been made available to us in the modern-day by experts and specialists. These methods and programs are based on a number of contemporary sciences that interact with the biological, biochemical, and other fields. The goal of these contemporary training regimens is to perform at the greatest level and produce football. then hold onto it for as long as you can. Everyone is aware that training programs, especially for smaller groups of players, play a significant and delicate role in player development. As it is the means by which players can acquire physical and technical capabilities and various playing plans that contribute to raising their level to the maximum degree, and this is only done through preparing codified training plans and programmes, and this is confirmed by Weineck, which he says: Sports practice clearly showed that A high level cannot be achieved unless it builds a solid base during childhood and adolescence, and this is what necessitates long-term planning in the field of training. In this context, attention must be drawn to the many problems that Algerian football suffers from, especially the youth groups, which are very important age groups for the optimal construction of the simultaneous sports specialization for the adolescence stage for the 15-year-old stage, where it suffers from a lack of hourly volume, weekly and annual training, and the use of traditional methods in training.

Football has changed in every aspect: technical, tactical, psychological, and physical—and these changes have improved athletic performance. However, this shift in the sorts of intensity used in competition necessitates a change in training techniques and equipment. Scientific studies have also shown that the basis of modern training includes integrated training with work-oriented small-sided games, a mixture of physical, technical, tactical and psychological qualities**.** (Dellal Allexander, 2008, p. xll)

Small-sided games are considered among the modern uses in the field of football training because of their similar conditions in football competitions performance-wise. Here is the opinion of some training columns in football about small games: “Small games are a very important part of training and they are loved before by the players and are their favourite part of the training session because it is more competitive” (Jurgen Klopp). “Training in tight spaces is very useful because you do not give the players time to think... it helps to make the right decision in the right moments” (Pep Guardiola). “should be similar to the situations of the match” (Dr Dehbazi Muhammad)

Returning to the modern soccer requirements, we find that endurance is a basic characteristic for player excellence, and that the modern soccer player’s performance at a high level has been improved. In 1952, the player had passing a distance of 3361m where nowadays these values range between 10425 and 11780 according to playing positions (Dellal Allexander and others, 2011) which is related to heart rate averaging 80% to 90% of the high heart’ rate (Stolen and others, 2005). This distance’s development passed by soccer players can be clarified with playing arrangements, defensive and offensive activation that have been changed. The new soccer’s requires each participant to do defensive work centered according to colleagues’ locations and competitor as well as the ball for goal protection. The performance capacity improvement for endurance leads to physical capacity improvement, the

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perfect development of retrieval capacity, and a decrease in the injury risk. (Dellal Allexander, 2008)

Small-sided games are considered from the modern uses in the soccer practice field for its circumstances similar to the performance in soccer competition, so it gains the researchers' interest now (Dellal Allexander, 2008) who has accomplished that the small sided games' effect is similar to the Intermittent gaming one in both cardiac excitation and high oxygen consumption peak, lactic threshold level increasement, and running economy. Based on these data that represent the high levels and those physical, technical and tactical difficulties that indicate the phenomena contrary to modern football, the lack of quotas, the size of the training courier and the methods used in training for the category of less than 15 years, which is witnessed in our reality in Algeria, and as we are specialists, and a desire from us In raising the physical performance, especially the quality of cardiorespiratory fitness in Algerian football and a profit of time, which made us combine all of this in

1.1 The central question:

Is training with small-sided games (the proposed training program) effective in developing the cardiorespiratory fitness of football players less than 15 years old?

1.2 Sub-questions:

- Is training with small-sided games (the proposed training program) effective in developing the maximum amount of oxygen of football players less than 15 years old?
- Are there statistically significant differences between the results of the post-test of the control and experimental sample in terms of maximum amount of oxygen in favour of the experimental sample?

2. Research hypotheses:

2.1 The general hypothesis:

- training with small-sided games (the proposed training program) is effective in developing the cardiorespiratory fitness of football players less than 15 years old.

2.2 Sub Hypotheses:

- Training with small-sided games (the proposed training program) is effective in developing the maximum amount of oxygen of football players less than 15 years old.
- There are statistically significant differences between the results of the post-test of the control and experimental sample in terms of maximum amount of oxygen in favour of the experimental sample.

3.Research objectives:

- Highlighting the position of cardiorespiratory fitness (maximum amount of oxygen) in determining the sporting achievement of football players less than 15 years old.
- Determining the role and impact of the proposed training program with small-sided games in developing cardiorespiratory fitness (maximum amount of oxygen) for football players less than 15 years old.
- Determining the extent of readiness of football players under 15 years of age in accepting training with small-sided games and evaluating their response to the proposed program.

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- Identify the most effective ways and methods to raise the level of cardiorespiratory fitness (maximum amount of oxygen) in football.
- Identifying the statistical differences between the post-test of the control and experimental sample.

4. Defining concepts and terms :

4.1 Effectiveness :

It is the impressive results' realization with minimum effort. (saoudi ayoub and others, 2019, p. 167)

4.2 small-sided games

José Mourinho talking about small-sided games states that "I advocate the holistic of training, without separating the physical, technical, tactical and psychological components". "The traditional concepts that we can look at in books are general training methods and far from what I think is good. There is no insight into strength, resistance and speed without contextualizing football and primarily according to the style of play. (Dellal Allexander, 2017, p. pvll)

4.3 Procedurally:

It is one of the training methods similar and identical to the actual performance situations during matches, as it is held between Small numbers of players 2v2 or 3v3..etc, and they are within small areas of the field and at a specific time. (mamaer lobad and others, 2022, p. 316)

4.4 Cardio Respiratory Fitness:

The essential Physical fitness element related to health is called Aerobic Fitness or Aerobic ability, it expresses the individual capacity of using oxygen inside body cells for the necessary chemical energy production for muscle contraction, as it is symbolized by the maximum consumption of oxygen used (VO2 max). (naif mofdhi el-djobour, sobhi ahmed qablen, 2012, p. 239)

4.5 The category of less than 15 years:

The researchers define it as a link between the primary education stage and the secondary education stage. This stage lasts according to the structure of the education system in Algeria for four years, during which the student enters the adolescence stage and undergoes many changes both sexual and physical in nature. (Bakhtawi Abu Bakr and others, 2022, p. 612)

5. Previous and similar studies :

5.1 "M. Tchokonte" study in 2011 :

The aim of this study was to determine the effects of the method of the small-sided game on the physical, technical, tactical and psychological aspects of football players.

5.2 Abdul Haq Abbad's study in 2019 :

The study aimed to show the importance of the blended training method, by comparing it with analytical or separate training.

5.3. Aqli Hussein's study in 2018 :

The study aimed to suggest a method of small-sided games to develop some of the physical and skill traits of football players less than 23 years old.

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6. The practical aspect and the methodological procedures of the study

6.1 Survey study:

The researcher conducted the exploratory study on a sample of the same age group consisting of 8 players from Al-Talaghmeh Club.

6.2 Study Variables:

6.2.1 The independent variable*:*

"small-sided games"

6.2.2 Dependent variable:

" cardiorespiratory fitness ".

6.3 Research sample:

In our experience, the sample will consist of 40 players. The sample represents 18 .18% of the original population and is sufficient to study.

6.4 Research areas:

The human field: the Chaouia Union , Ain Mlila Association, Talaghmeh club. Time-domain: 2022, Spatial domain: Municipal stadiums for teams.

6.5 Research Methods:

6.5.1 Objective of shuttle test :

To measure the efficiency of the cardiorespiratory system (cardiorespiratory fitness). This test was created by dr luc leger. It consists of following a set running speed by means of beeps.

Run as long as possible, making as many round trips as possible between two strips 20 metres apart (or around an athletics track). By respecting an imposed speed which will increase progressively to reach the speed limit of the athlete's capacity.

At each beep, the athlete must be at one of the two lines spaced 20m apart. Explain to the athletes that they must have one foot behind the line when they hear a beep. They can't get ahead of themselves. The aim is to understand and integrate the imposed pace in order to have a regular race, so as not to have to stop at each marker: by smoothing out your race, you optimise it.

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Shuttle test

6.5.2 Setting up the Shuttle test :

• Draw two parallel strips 20 metres apart for a group test (or place 2 studs metres apart for an individual test). For information, the standard width of an indoor handball court is 20 metres

• Bring a soundtrack (or simply take your Sportbeeper).

• Set up several referees to supervise the test and mark the results (remember to prepare the list of players in advance).

• Explain the test

The document below is essential to individualise the work of your players according to the level. The two columns to be used are the one on the left (level) in relation to the column on the right (extrapolation with the VMA on the track).

Example: If a player stops at level 11, this means that he has a VMA of 17km/h. Thus, during a "30/30" exercise at 100% of the VMA (for example) this will allow you to individualise the distance. The player will therefore have to run 142m to achieve his goal.

6.5.3 Conduct of the test :

Goal :

Evaluate your MAS by going to the extreme limit of your physical possibilities. This test also has an important psychological aspect.

The reliability of MAS tests depends on the athlete's investment.

Start of the test :

- The Shuttle test starts at 8.5km/h. The test is progressive so there is no need to warm up (it's very very slow 8,5km/h…)
- then the speed increases by 0.5km/h every minute: this corresponds to crossing a plateau.
- Be careful: once the test starts, you can't stop it (so make sure you understand the test, the laces, the appropriate clothing, and hydration beforehand).

6.5.4 Conduct of the test :

Each athlete must have one foot behind the line when the beep sounds. The distance to be covered remains the same: 20 metres, but the speed is increased by 0.5 km/h every minute.

6.5.5 End of the test :

The athlete will stop (or be stopped by the "judges"), as soon as he/she is 2 meters behind the 20 meter line. This is a personal test, so each athlete will "give up" when he/she is at the end of his/her capacity.

To complete your results, you can equip your athletes with tools to measure their heart rate.

MAS = Speed of the last stage reached fully. (cepsi sport, 2022)

6.6 Scientific conditions for the instrument :

6.6.1 Test reliability:

Muqaddam Abdel Hafeez defines that it will give the same results if this test is repeated on the same individuals and under the same conditions. The researcher applied the test to a sample of 08 players from the Talaghmeh club, and after a week of applying the test, they were re-applied to the same sample.

Calculate the normal distribution for the Shapiro-Wilk test:

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The test probability was as follows: 0.926 ، 0.417 for pre and post test cardiorespiratory fitness, which is greater than the 5% error rate and therefore the test are distributed normally, and after obtaining the results, the researcher calculated the correlation coefficient. The simple known Pearson correlation to ensure that the of test has a high degree of stability as shown in the table:

Table 1

Tests	Mean	Std. Deviation	mean of retest	Std. Deviation	stability coefficient
Shuttle	43.61	5.619	45.00	5.335	0.853

Source: spss,2022

6.6.2 Validity of the test:

It is measured by calculating the square root of the test reliability coefficient (Moqaddam Abdel Hafeez, 1993, p. 152). It was found that the test has a high degree of self-veracity as shown in the table.

Table 2

Tests	sample size	Test stability coefficient	Test validity coefficient
Shuttle	8	0.853	0.923

Source: spss,2022

A table showing the reliability and validity coefficients of the physical test approved in the research. Thus, the exploratory study achieved its objectives

6.6.3 The objectivity of the test:

It is expressed by the correlation coefficient. Accordingly, the tests taken enjoy high objectivity.

6.7 Content of the approved training program:

The design of 24 training units in the manner of training with small sided games and distributed over 8 weeks with 3 training sessions as shown in the plan and the weekly program

We relied on rationing the external load, working time, rest and intensity, on the tables of experts in the list of references:

(Chiha fouad, 2022, p. 57), (Aguiar Marco, 2012), (Longer Julien, 2015, p. 9)

The duration of the exercise varies according to the number of players, the area, and according to the experts and their legalizationThe working volume is 90 minutes, the heating stage is 20 minutes, the main stage is 60 minutes, and the final stage is cooling down 10 minutes

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Rely on the heart rate monitor polar device to control the severity of pregnancy during pregnancy

The average load is from 50 to 75% of the maximum estimation of the individual, which is equivalent to 165 p/min

The less than maximum load reaches 90% of the individual's maximum capacity, i.e. from 180 to 190 p/min.

The maximum load is 100% where the pulse reaches more than 190 p/min

The plan of the training stage: two stages, each stage in a month.

program of the week:

Monday: Technical majority small-sided games

Tuesday: rest.

Wednesday: the majority of the game principles of play small-sided games

Thursday: Mixed session, Tactical organization

Friday: rest

Saturday: matches

Sunday: rest.

We relied on the RPE method, heart rate monitor polar to fill the load in every training session, week and month.

7. Presentation of the analysis of the results of the study:

7.1 Presentation and analysis of the results of the tribal tests for the control and experimental sample:

Table 3

Statistical study / Tests		Levin's test		t-test for equality of means					Statistical significance
		Fisher	Sig	T test	Df	Sig	Mean Difference	Std. Deviation. D	
Length	e. v .a	1.10	0.30	0.11	38	0.908	0.003	0.299	There is homogeneity
Weight	e. v .a	0.53	0.47	0.65	38	0.519	1.765	2.711	There is homogeneity
Age	e. v .a	1.87	0.17	0.94	38	0.350	0.150	0.158	There is homogeneity

Source: spss,2022

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Through the table it becomes clear to us that: The two groups are homogeneous in (height, weight and age). The probability value of t was

respectively (0.908, 0.519, 0.350), which is greater than the significance level of 0.05 at the degree of freedom of 38, and this indicates the homogeneity of a sample.

Table 4

Statistical study Test		Levin's test		t-test for equality of means					Statistical significance
		F	Sig	T test	Df	Sig	Mean. D	Std. Deviation. D	
Shuttle	e. v. a	0.03	0.850	0.167	38	0.868	0.280	1.678	SS

Source: spss,2022

From the table, it becomes clear to us that: The two groups are homogeneous in the cardiorespiratory fitness test (maximum amount of oxygen). The probability t is (0.868), which is greater than the 5% error rate, and the degree Freedom 38, there are no statistical differences, and this indicates the homogeneity and equivalence of the research sample in these test before conducting the program.

7.2 Presentation and analysis of the results of the pre and post-test for the control sample:

Table 5

stats Test	Pre-test of the control group		Post-test of the control group	
	Mean	Std .Deviation	Mean	Std .Deviation
Shuttle	43.55	5.38	49.65	5.02

Test. Statistical analysis	sample differences					T	Df	sig	Statistical significance
	Mean	Std .D	Std. error mean	95%confidence interval of the difference					
				Lower	Upper				
Shuttle	6.09	1.45	0.32	5.41	6.77	18.7	19	0.00	Ss

Source: spss,2022

A table showing the results of the pre and post-test for the control sample at the significance level of 0.05 and the degree of freedom of 19.

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It is clear from the table when comparing the results of the pre and post-test of

the control sample that the probability t value of the cardiorespiratory fitness test (maximum amount of oxygen). has reached (0.000), which is smaller than the error rate. 5% and the degree of freedom is 19. Therefore, there are statistically significant differences between the pre and post-measurements of the control sample in favour of the post-test.

7.3 Presenting and solving the results of the pre and post-test of the experimental sample:

Table 6

STAT / Test	Pre-test for the experimental sample		Post-test of the experimental sample	
	mean	Std .Deviation	mean	Std .Deviation
Shuttle	43.27	5.23	54.23	5.93

Statistical analysis / Test	sample differences					T	Df	Sig	Statistical significance
	mean	Std .D	Std. error mean	95%confidence interval of the difference					
				Lower	Upper				
Shuttle	10,96	3.18	0.71	9.47	12.44	15,4	19	0.0	Ss

Source: spss,2022

It is clear from the table when comparing the results of the pre and post-test of the experimental sample that the probability T value of the cardiorespiratory fitness test (maximum amount of oxygen) amounted to (0.000), which is less than the error rate 5 %, and the degree of freedom is 19.

Thus, there are statistically significant differences between the pre and post-test of the experimental sample in favour of the post-test.

7.4 Presentation and analysis of the results of the post-test of the control and experimental sample:

Table 7

Statistics	Post-test of the control sample		Post-test of the experimental sample	
Test	Mean	Std .Deviation	Mean	Std .Deviation
Shuttle	49.65	5.02	54.23	5.93

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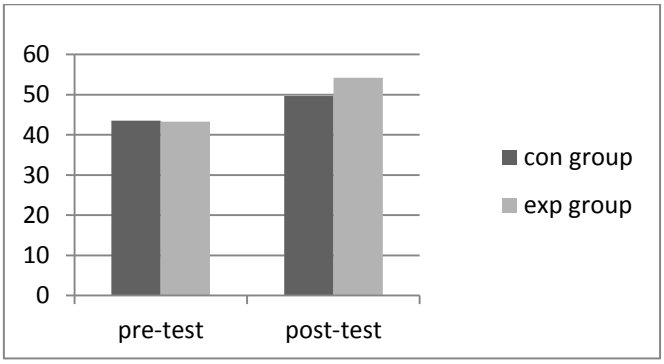
Statistical study / Tests		Levin's test		t-test for equality of means					Statistical significance
		F	Sig	T test	Df	Sig	Mean. D	Std. Deviation. D	
Shuttle	e.v.a	0.36	0.55	2.63	38	0.012	4.58	1.73	SS

Source: spss,2022

A table showing the results of the post-test for the control sample and the experimental sample at the significance level of 0.05 and the degree of freedom of 38.

It is clear from the table when comparing the results of the dimensional test of the control sample and the experimental sample that the probability t value of the amounted (0.012), which is less than the error rate. 5%, and the degree of freedom is 38. Therefore, there are statistically significant differences between the post measurements of the two samples in favor of the experimental sample. A better improvement for the players. The Mean are less than the Mean of the control sample.

Figure.1. Effect of small-sided games training program on cardiorespiratory fitness



Source: spss,2022

8. Presentation and discussion of the research results:

8.1 First Hypothesis:

Where the researcher hypothesized that training with small-sided games (the proposed training program) is effective in developing cardiorespiratory fitness for football players less than 15 years old.

The results of our study are in line with the scientific study carried out by (Balsom, 2009) (Sadoqi Bilal, 2016, p. 82) which found that small-sided games have an effect on the maximum aerobic speed.

(Mahfudi Muhammad, 2018) found the positive effect of training in narrow spaces on the development of maximum aerobic speed. Therefore, it can be said that training with

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small-sided games (the proposed training program) effectively contributed to the development of cardiorespiratory fitness, and therefore the hypothesis The first has been achieved.

8.2 The second hypothesis:

There are statistically significant differences between the results of the post-tests of the control and experimental sample in the development of cardiorespiratory fitness for the benefit of the experimental sample.

This is due to the proposed small-sided games training program for this sample, which is consistent with the idea of (Jones. S, drust.B, 2007, p. 150) that small-sided games allow the development of all the qualities of athletic achievement that they require. Football, which gives preference and equality as a microcosm of the game used throughout the sports season, at all age groups, gender, and level of experience in competition, and thus small-sided games integrate at once physical work and this through events and behaviors short and high intensity, changing the direction of running , binaries, as well as the technical, schematic, mental and physical aspect.

(sylvain alain monkam tchokonte, 2011), where he was interested in the effectiveness of small-sided games es on the adaptation of soccer players, during which he reached to the positive role of Small-sided games in developing the aerobic and anaerobic capacities of soccer players. Therefore, it can be said that training with small-sided games (the proposed training program) effectively contributed to the development of the cardiorespiratory fitness of the players in the experimental sample, better than the traditional training of the control sample, and therefore the second hypothesis has been achieved.

9.Conclusion:

Within the limits of the research procedures, and in light of its objectives and through statistical analysis of the results obtained, the following conclusions were reached:

- Training with small-sided games positively affects the development of cardiorespiratory fitness (maximum amount of oxygen). These exercises are based on the style of competitions, which is one of the best methods of stimulating the activity of young players, which creates a physical burden and real competition.
- Programming training according to scientific foundations and principles with the content of traditional exercises is not enough to bring the player to the highest levels.
- There are statistically significant differences between the post-tests of the two samples, which are for the experimental sample, training with small-sided games at the degree of freedom of 38 and the significance level of 0.05 for the physical tests of cardiorespiratory fitness (maximum amount of oxygen).

Depending on the data we collected through this study and based on the conclusions drawn, and within the framework of the study, the researcher makes the following recommendations:

- The necessity of using small-sided games exercises in training programs for the youngest because of their positive impact on the development of physical attributes.

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- Use exercises that are consistent with the nature and direction of performance as occurs during competitions.
- Analyzing the performance of players in international level competitions in order to extract new playing situations.

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