

The effect of the integrated training method with an intermittent method on speed endurance and anaerobic capacities of football players under 19 years

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Abstract

The study aims to determine the impact of the intermittent integrated training method on speed endurance and anaerobic capacities. For this purpose, we used an experimental approach on a sample consisting of 13 football players under 19 years old, deliberately selected. To collect data, we used the Student's t-test for a single sample. After collecting and statistically processing the results, significant differences were found at a 0.5 level in favor of the experimental group, recommending the use of similar exercises to competitive conditions during different preparation stages.

Keywords: integrated training method, intermittent style speed endurance, anaerobic capacities football players.

1-Introduction:

Physical preparation for football players has become the main concern for coaches in the preparation and planning of the training season through structured programs designed on scientific principles to bring players to the highest possible level of football fitness. Endurance, strength, speed, and agility are considered the most important components and characteristics for achieving physical fitness. It requires players to have high general fitness and specific speed endurance. As training progresses, there is a decrease in energy production and this trait is evident in the improvement of coordination and energy distribution during competition (**Abdel Khalek, 1992, p. 114**). There are many exercises that aim to develop more than one capability by conducting coordination exercises to blend multiple physical abilities, whether two or more (**Sayed, 2008, p. 33**)

Speed endurance exercises lead to high demand on pathways for both creatine kinase and glycogen; therefore, the intensity of the exercises must be high to reach the maximum limit in order to achieve the basic adaptations for the enzymes associated with anaerobic metabolism. Consequently, these exercises should involve movements that the player uses during high-intensity matches or ball exercises. Speed endurance exercises are of high intensity both physically and psychologically; thus, it is recommended to use this type of training with high-level players (**Fattah, 2003, pp. 230-233**) The exercise intensity and rest periods depend on the heart rate, with a focus on the necessity of reaching a heart rate of 180 beats per minute and not less than 140 beats per minute, and players should not reach complete rest (**Bassat, 1995, pp. 160-161**)

The most commonly used and overlapping elements for athletic achievement are strength and speed endurance, linked to three other dimensions: energy systems; aerobic, anaerobic lactic, and non-lactic. We also find a significant relationship between muscular and oxygen capacities, as well as the oxygen capacity of the heart and lungs. There is also harmony between muscle contraction, elongation, and joint flexibility. In addition, the importance of balancing sports exercises within training programs to cover these basic elements of physical fitness, whether for the purpose of developing athletic abilities or maintaining general health (Kilani, 2005, p. 255)

Integrated training is considered an important method in modern football training, as it breaks the rule and pattern of daily training consisting of several activities such as warm-up, technical exercises, and small-sided games. It is very suitable for players who train for more than five weekly units, as in schools and football academies, and is considered one of the main elements that attract players and relieve them from the routine of exercises.

The impact of integrated training method with an exchange approach on speed endurance and anaerobic capacities of football players under 19 years old

The compound exercises used by the researcher had a positive impact on the development of football speed endurance. The largest significant value appeared in the research sample in the tests, in the speed endurance capacities. According to (Jawad, 2011), the proposed training program following the game style for 12 weeks with an average of 3 training units per week has a positive effect on the development of physical variables, speed endurance, and physiological variables. (Shraheh, 2013, p. 75)

Based on this, researchers believe that building a training program that relies on regulating the training load and creating suitable conditions similar to competitive conditions. Prolonged speed development is achieved in the preparation phase through integrated training in an interactive manner, hence the following question is raised:

Does integrated training with an interactive approach have a positive impact on speed endurance and anaerobic capacities of football players under 19 years old?

The aim of the study is to propose a training program using integrated training with an interactive approach to develop speed endurance and anaerobic capacities in football players under 19 years old based on theoretical and scientific foundations.

Researchers assumed the presence of statistically significant differences between the pre-test and post-test of the experimental sample in favor of the latter in the results of speed endurance and anaerobic capacities. The importance of the research lies in understanding the role of integrated training with an interactive approach in developing speed endurance, studying the importance of some physiological aspects in preparing players for competitions, and incorporating integrated training with an interactive approach in training stages in terms of compatibility between load components (volume, intensity, rest, density), based on training principles. And contributing to the development of these competitions at the national level, creating a broad base for them, and reaching a high level through modest effort.

2-Field Research Procedures:

2.1- Research Method:

Researchers relied on the experimental method in order to conduct their research in the best possible way. The experimental method is one of the closest research methods to solving problems scientifically, and the experiment can be conducted in a laboratory, a hall, or any other field.

2.2- Research Population and Sample:

After the survey study and identifying the original population of the study, represented by football players under 19 years old, the researchers selected a deliberate sample from the team of "Tergui Mostaganem

The total number of male players with the same age and training experience (more than 3 years of training) was 35. The sample was divided into three groups, one of which consisted of 7 players who underwent the survey experiment and were excluded from the main study. Two goalkeepers were also excluded, leaving 26 players who were intentionally divided. The experimental group consisted of 13 main players with a high participation rate in competition, on whom the training program was applied.

Research Areas:

2.3- Human Field: The sample of the participants targeted in the research in the sport of football under 19 years old consisted of 13 players.

2.3.1- Spatial Field: The research was conducted at the Suleiman Stadium and a stadium annexed to the civil Raed Faraj for the state of Mostaganem.

2.3.2- Temporal Scope: The period of the pilot work extended from 30/07/2018 to 23/03/2019, with 4-5 training sessions per week.

2.4- Research Tools: Researchers used the following tools to complete their research on the best approach and to achieve their desired goals:

- Medical balance - a wooden stand with centimeter markings along a 2-meter length - a 50m measuring tape
- Two good quality electronic counters "Digital stop Watch"
- Markers - plastic tape - whistle - medical balls - footballs.

2.5- Procedural Control of Variables:

- **Independent variable:** Integrated training method with an exchange approach
- **Dependent variables:** Speed endurance and anaerobic capacity.

2.7-The training program:

2.7.1- Program implementation:

-**First:** Medical examinations, tests, and measurements will be addressed by researchers later.

Second: The training program is built on two stages: the preparation stage and the competition stage. The preparation stage consists of a major cycle composed of three medium cycles and ten weekly cycles for the preparation stage.

2.7.2- Training methods and techniques:

Interactive method, integrated skill exercises, integrated tactical exercises.

2.7.3- Regulating the training load for physical attributes under study:

- Intensity at 70-90% below maximum. Heart rate (physiological index) at 180-200 bpm from the maximum. Time 20s-120s. Incomplete rest at 120 bpm-140 bpm. Active rest. Repetitions 10-20 times. Sets 2-5 times. (Al-Mawla, 2000, pp. 158-159)

2.9 - anaerobic capacity tests:

2.9.1- anaerobic alactic energy system:

A- Running test at 40m speed (from an approximate run):

Objective: anaerobic alactic energy system capacity.

Necessary equipment: chronometer - 400m track - speedometer device (Speedo meter)

Test procedures: Measure the time taken to cover a distance of 40m.

B- Running test 100m from an approximate run:

Objective: To : anaerobic alactic energy efficiency system.

Test procedures: The runner runs at maximum speed for a distance of 100m in the shortest time possible.

Calculation method: To evaluate the efficiency of the anaerobic alactic energy efficiency, we **perform the following procedures:**

Calculate the speed value over 40m. Calculate the speed value over 100m. Extract the quotient of the two speeds

Result: The closer the result is to one, the more advanced the device efficiency is (the device is prolonged).

2.9.2. anaerobic Lactic energy system

A- 300m running test:

Purpose: Assessing the anaerobic lactic capacity system.

Tools: chronometer, square open space or track and field.

Age: Suitable for boys and girls from 6 years old to college stage.

Procedure: Record the time taken by each subject from the start signal until the finish in seconds to the nearest (1 to 10) seconds.

B- 800m running test:

Goal: Evaluating the efficiency of the anaerobic lactic system.

Necessary gear: 400m track, timing watch.

Test procedure: The runner covers a distance of 800m in the shortest time possible.

2.9.3- Speed endurance test: 20m sprint * 12 with 40s rest

Purpose: Measuring specific speed endurance.

Required tools: chronometer, measuring tape, cones or corner flags.

Procedure: Football field.

Place 5 cones at a distance of 4.30 meters between the first and second cone, 3.20 meters between the second and third cone, 5 meters between the third and fourth cone, 3.20 meters between the fourth and fifth cone, and 4.30 meters between the fifth and sixth cone.

Performance specifications: The player runs a distance of 20 meters, then repeats the same distance 12 times with a rest between each repetition of 40 seconds. See the figure.

Recording: Calculate the total time taken during 12*(20m 40 rest) (Cazorla, 2006)

2.10-Statistical methods: The researchers used the statistical program SPSS 21.

3- Presentation and analysis of the pre-test and post-test results of the research sample and the program progress percentage:

Statistical measures Tests			Experimental Sample						Tabular t	Statistical Significance
			Preliminary Results		Post-Results		T calculated	Progress Ratio		
			x	σ .	x	σ .				
Alactic anaerobic apparatus	Efficiency	Running 40m (s) of movement	5.39	0.39	5.05	0.23	2.27	6.73	2.17	Significant
	capacity	Run 100m/Run 40m	0.93	0.03	0.98	0.01	3.13	5.10		Significant
Lactic anaerobic system	Efficiency	Running 300m (s)	44.83	2.11	37.09	37.09	3.15	86		Significant
	capacity	Running 800m (s)	135	7.89	122	4.35	3.22	11.36		Significant
Speed tolerance	Run 20m *12 Rest 40s		4.78	0.15	4.09	0.16	3.44	16.81		Significant

Table (03) illustrates the significance of the differences between the pre-test and post-test means of the research sample.

Degrees of freedom (n-1) = 12 at a significance level of 0.05.

3.1- Presentation and analysis of the results of a 40m sprint test:

Based on the results recorded in the above table (03), it was found that the mean pre-test value for the experimental sample, which applied the integrated training method with the exchange method, was 5.39 with a standard deviation of 0.39. As for the post-test, it was 5.05 with a standard deviation of 0.23. After using the Student's t-test, it was found that the calculated t-value for the experimental sample was 2.27, which is greater than the tabulated t-value of 2.17 at 12 degrees of freedom and a significance level of 0.05, indicating statistical significance, meaning there is a significant difference between the means. The program progress percentage for anaerobic non-lactic power was 6.83%, as shown in Table 03.

3.2- Presentation and analysis of test results run 100m/run 40m: It is noted from the results table (03) that the arithmetic mean value in the pre-test for the experimental sample, which was subjected to the integrated training method using the exchange method, was 0.93 ± 0.03 . In the post-test, the arithmetic mean value was

0.98 ± 0.01 . After using the statistical significance test "Student's t-test," it was found that the calculated t-value for the experimental sample was 3.13, which is greater than the tabulated t-value of 2.17 at 12 degrees of freedom and significance level of 0.05, indicating statistical significance, meaning there is a significant difference between the pre-test and post-test arithmetic means. The efficiency improvement rate of the non-structural air conditioning program reached 5.10%, as shown in table (03).

3.3- Presentation of the results of the 300m sprint test: It is noted from the results recorded in the table above (03) that the pre-test mean value in the experimental sample was 44.83 ± 2.11 . As for the post-test, the mean value was 37.09 ± 2.08 . After using the statistical significance test "Student's t-test," it was found that the calculated t-value for the experimental sample was 3.15, which is greater than the tabulated t-value of 2.17 at degrees of freedom $n-1=12$ and significance level of 0.05, indicating statistical significance, meaning there is a significant difference between the pre-test and post-test means. The improvement rate of the anaerobic lactate capacity program was 20.86%.

3.4-Presentation and analysis of the 800m running test results: It is noticed from Table (03) that the pre-test arithmetic mean value in the experimental sample was 135.96 with a standard deviation of 7.89, while in the post-test, the arithmetic mean value was 122 with a standard deviation of 4.35. After using the statistical significance scale "Student's t," it was found that the calculated t-value for the experimental sample was 3.22, which is greater than the tabulated t-value of 2.17 at degrees of freedom $n-1=12$ and significance level 0.05, indicating statistical significance, meaning a significant difference between the pre-test and post-test arithmetic means. The improvement rate of the aerobic efficiency program reached 11.36%.

3.5-Displaying the results of the speed endurance test running 20m * 12 rest 40 sec: It was revealed through the results recorded in the above table (03) that the value of the pre-test arithmetic mean in the experimental sample reached a value of 4.78 sec 0.15, while in the post-test the arithmetic mean value was 4.09 sec 0.16. After using the statistical significance measure t-Student, it was found that the calculated value for the experimental sample, which was subjected to the integrated training method with an exchangeable approach, was 3.44, which is higher than the tabular value of 2.17 at 12 degrees of freedom and a significance level of 0.05, indicating that there is statistical significance, meaning there is a significant difference between the arithmetic mean of the pre-test and post-test for the experimental sample. The progress rate of the speed endurance program was 16.87% as shown in table 03.

- Discussion of the hypothesis:

The presence of statistically significant differences between the pre-test and post-test in favor of the latter in the results of some physiological abilities related to speed endurance, following the statistical analysis of the raw data obtained using the "t-test" to make objective judgments about the significance of the differences between the means of the experimental sample on the latter applied to it the integrated training method with the exchange method. It is evident from the statistical results extracted from table number (03) that all the differences between the means of the test results for the experimental sample have statistical significance in favor of the post-test, as most of the calculated "t" values are greater than the critical "t" value of 2.17 at 12 degrees of freedom and a significance level of 0.05.

Discussion of the results of a 40m sprint test: Through table number (03), researchers conclude that the training method using the exchange method had a positive effect on developing the capacity of the non-aerobic non-lactic system. The researchers believe that this development is random despite relying on scientific principles in developing the capacity of this system (anaerobic alactic), because speed tends to lean towards the genetic side, meaning genes acquired from ancestors and passed on to offspring. Abu Al-A'la Ahmed Abdul Fattah and Ahmed Nasr El-Din Sayed mention that "speed is physiologically influenced by the genetic factor that controls the formation of the fast and slow muscle fibers ratio and the subsequent formation of motor units." Kollath et Quade (2001), Cometti et al. Brewer et Davis (1992) agree that anaerobic alactic capacity is important for football players, as it is not possible to exceed a distance of 40m in order to evaluate non-aerobic non-lactic capacity. (Alexandre, 2008)

Discussion of test results: 100m/40m: Researchers conclude from Table 03 that the training method using the exchange method had a positive impact on developing the efficiency of the non-oxidative non-lactic acid system.

Researchers see from the results recorded in the table that these differences are random despite the fact that the exercises used were based on correct scientific principles in terms of intensity, volume, and density. In this context, the researchers took sufficient recovery into account to quickly restore the energy compounds (phosphagens) in this system between repetitions and sets, as phosphagens are recovered. As phosphagens recover by 70% within 30 seconds, completion occurs within several minutes as mentioned (Ammar, 1998, on FOKS). "Phosphate compounds are recovered by about 75% within 60 seconds and about 98% within 180 seconds" (Al-Bustat, 1998 , p. 75). In conclusion, to achieve a significant improvement in the efficiency of this device, continuous and regulated work is required even if it is not sufficient because genetic factors have a significant impact. The speed is physiologically affected by the genetic factor that controls the formation of the ratio of fast and slow muscle fibers, followed by the formation of the number of motor units (al-Din, 1993, p. 180) making it easier for the coach to bring the player to the highest levels.

Discussion of the results of the 300m sprint test: Through Table (03), the researchers concluded that the training method using the exchange style had a positive effect on developing the capacity of the anaerobic lactic system. This is attributed to the program used by the researchers leading to the development of the anaerobic lactic system through the use of specific and coordinated exercises in terms of load level and training method, by using the training method in training. This was achieved through the physiological adaptation of the players. It is mentioned by Ahmed Al-Bustati that the coach should consider that the exercises should be appropriate in terms of timing, intensity, number of repetitions, rest intervals, and nature, in line with physiological principles (Al-Bustat, 1998 , p. 72) This study agrees with the study of Mohammed Kazem Khalf Al-Rubaie (Al-Rubaie, 2004), who assumed that there are significant meaningful differences between the pre and post tests of an experimental sample on the effect of recovery periods in developing energy systems, in favor of the post test. It concluded that the development of each of the three energy devices, the most commonly used and overlapping elements for athletic achievement are strength and speed endurance, linked to three other dimensions, which are energy systems; aerobic and anaerobic, lactate and non-lactate (. (Kilan, 2005, p. 255)

Discussion of the results of the 800m running test: Researchers concluded from the table number (03) shown above that the training method using the alternating style had a positive effect on developing the efficiency of the anaerobic lactic system. Therefore, the researchers believe that the development in the efficiency of the anaerobic lactic system is a result of the independent variable that was prepared based on scientific principles and subject to regulation, where this type of training involves speed endurance and strength endurance, working without oxygen and without full rest, leading to the presence of lactic acid and utilizing it in energy production to increase the effectiveness of training and adapt Functional sports devices for working with oxygen deficiency. As for the control sample, researchers attribute the lack of development to the use of exercises with an inappropriate intensity, volume, and density compared to the energy systems used in developing these capabilities, so the enzymes responsible for ATP re-synthesis are not increased, leading to lactic acid accumulation. The results of this study agreed with the findings of a study by Habib Rouih Habib (Habib, 2006, pp. 111-122) regarding the 800m achievement test, where his results with his research sample were somewhat similar to the results of this study in terms of athletic achievement test.

Based on this, researchers conclude that the training method with the exchange style led the independent variable to the development of achieving the 800-meter run, due to the relationship and correlation between the high-speed endurance quality and the 800-meter run, characterized by anaerobic endurance to the high intensity used and its reliance on anaerobic energy to a large extent, as it is one of the most important physical capabilities affecting the achievement of the 800-meter run. Developing it in athletes helps them maintain their speed throughout the event and resist fatigue resulting from the accumulation of lactic acid, which increases in the muscles due to severe oxygen deficiency. This is confirmed by Michelson, stating that runners of the 800-1500 meters should perform endurance training at a high level, with their endurance reaching 80-90% of the maximum heart rate (Mikkelsen, 2018, p. 41)

Through this discussion, researchers concluded that the method of training with integrated repeated speed interchange during the training session is important in developing speed endurance. This indicates the effectiveness of the integrated training method with the interchange style suggested by the researchers,

confirming the hypothesis of significant differences in the results of subsequent tests, which applied the integrated training method with the interchange style to develop some physiological abilities for speed endurance. Speed endurance variable: Through table (03), it is evident that there is a significant difference in the results, as the calculated "t" values are greater than the tabular "t" value at a significance level of 0.05 and 12 degrees of freedom. This confirms the effectiveness of the integrated training method with the proposed reciprocal approach aimed at developing speed endurance in football players under 19 years old. This result can be interpreted as statistically significant differences at the (0.05, 0) level between the pre-test and post-test of the experimental group for the speed endurance variable. This is attributed to the effectiveness of the integrated training method with the reciprocal approach, as similar exercises for movement performance in various distances during the match have helped in developing speed endurance. This is in line with what Hanafi Mahmoud (1994) indicated, "The player's sense of the ball grows with practice and becomes a special type of high observation that enables him to deal with the ball with his experience, leading to the player's perception of the ball's accuracy and characteristics, its shape, weight, and flexibility when running with it." Researchers believe that using the integrated training method with the reciprocal approach should be tailored to the players' positions based (Remy, 2001, 29-33)

Integrated training is a field- or period-dependent training that can be used in multi-dimensional exercises and goals. It can be linked to the analysis of efforts and rest periods during competition (LETI, 2012, pp. 87-89). To control the training load levels through integrated training, a process of reducing playing positions must be carried out according to the type of physical training that allows control over variables, playing spaces, reverse play, and achieving a strong will to challenge one-on-one play. Playing at defensive, offensive, defensive midfield, offensive midfield levels, and adapting to various types of selected play by the coach, each player should bear the loads of efforts specific to playing positions (Francois, 2001, 19-21).

In the context, researchers believe that using exercises similar to those conditions of the match that align with the preparatory stages, as well as organizing training sessions in the form of exercises similar to those situations in the match, where exercises specific to strength distinguished by speed according to the players' positions are used. The results confirm an improvement percentage for the speed endurance variable, reaching an improvement percentage of 16.81%. This means that training players according to the integrated training method with the exchange method has greatly impacted the level of speed endurance variable.

Therefore, players achieve good results and experience improvement because this integrated training method with the exchange style, as known, excites players during training sessions and is distinguished by its ability to stimulate motivation for training, leading to increased participation among players. This hypothesis is supported by the study of Maher Ahmed Hassan Al-Bayati and Fares Sami Youssef in 2004, which found an improvement in the performance level of players in the following physical fitness components (flexibility - transitional speed - agility - specific endurance - speed strength) in football players (Al-Bayati, 2004). There was an improvement in the speed endurance component (Fathi, 2009), as it was found that using physical and skill exercises to develop the attribute of prolonged speed in basketball players had a positive impact (Abdul Qadir, 2009).

As the training method of integrated interval speed during the training session is important in developing speed endurance, this indicates the effectiveness of the integrated interval training method proposed by researchers had the same impact on developing speed endurance and on this basis, researchers concluded that this hypothesis had been achieved.

Conclusion: Reaching a high level of athletic achievement and winning various championships (local, Arab, African, international, and continental, Olympic) did not happen by chance but came through the concerted efforts of a team based on managing various sports, relying on scientific research in various sciences related to the field of sports training. "Training programs should be based on determining the intensity of the workload and thus determining the proportions of energy production systems, as each sport has its own requirements, such as team sports (football, basketball, handball, volleyball, hockey) which require both types of energy (aerobic and anaerobic). A football player who possesses knowledge and experience in the game's arts and uses his tactical field intelligence in play and strives to achieve the goal efficiently can excel with his team and achieve good

results in matches. This excellence and success require the presence of the fundamental factors for developing offensive and defensive tactics, which are physical capabilities, high level of skill performance, stability of psychological and moral traits, and their development.

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