

The effect of interval training (moderate, moderate) on the development of maximum aerobic speed in senior football players.

(A field study on the national military basketball team)

أثر التدريب المتقطع (متوسط متوسط) في تطوير السرعة الهوائية القصوى للاعبين كرة السلة أكابر.

(دراسة ميدانية على المنتخب الوطني العسكري لكرة السلة)

Seraiaia Jamel ^{*1}

Institute of Sciences and Techniques of Physical Activities and Sports / University of Souk
Ahras, d.seraiaia@univ-soukahras.dz

Received: 2024-09-26

Accepted: 2024-11-09

Published: 2025-02-22

Abstract:

The main research axes aims to reveal the effect of interval training (moderate/medium) on maximum aerobic speed and maximum speed among senior basketball players. We also aim to highlight the importance of aerobic capacity and anaerobic capacity in this age group. And knowing the duration in which we can acquire the anaerobic lactate aspect and the aerobic aspect through interval training (moderate/moderate). with a total sample size of 16 players. The sample was selected intentionally due to the available resources at the Military Sports Teams Gathering and Preparation Center in Ben Aknoun, Algiers. The researcher used a set of tools to achieve the objectives of his study, which consisted of Arabic and foreign sources and references to gather the scientific material. The researcher also used physical tests in the field. We obtained the following results: interval training (moderate/moderate) positively affects maximum aerobic speed and also impacts the maximum speed.

Keywords: Basketball; training program; interval training (medium/medium); maximum aerobic speed; maximum speed.

1. Introduction and presentation of the problem:

The rapid development in achieving high sports levels across various sports, whether in team or individual games, is in line with the technology of sports training sciences. This advancement did not come from nowhere; rather, science has always been the foundation. Consequently, efforts are ongoing towards a deeper understanding of the principles and rules of sports training science to enhance training conditions and reach high levels. This requires shedding light on everything new and innovative in the field of sports training and its applications. (Basati, 1998, p. 5.)

Cometti emphasized the need to reconsider the curricula and training methods and to adapt them to the actual physical requirements resulting, which has imposed itself in the present time due to its ability to develop the player in terms of explosiveness and both aerobic and anaerobic capacities, which distinguishes the modern basketball player. It has become one of the most widely used methods at all levels, simulating the style of play during matches, which includes periods of high intensity interspersed with rest periods that may last for minutes (Cometti, 1999, p.144).

As confirmed by Mufti Ibrahim Hamad, "Additionally, training on skill or performance in general at the same speed as in competitions and matches is very important." (Mufti, 2001, p. 265). Accordingly, we attempted to highlight this approach by designing maximum aerobic speed in senior basketball players. Accordingly, the general issue has been posed as follows: Does the proposed training program using moderate interval training contribute to the development of maximum aerobic speed in senior basketball players?

2. Study objectives:

2.1. The scientific aspect:

- Identifying the extent to which the proposed intermittent training program (moderate intensity) contributes to the development of maximum aerobic speed and maximum speed in senior basketball players.

2.2. The practical side:

- Presenting intermittent training (medium level) by outlining its characteristics and significance in the training process.
- Providing a training program in interval training (moderate intensity) to develop maximum aerobic speed.

3. Study hypotheses:

3.1. The general hypothesis:

The proposed training program using interval training (moderate intensity) contributes to the development of maximum aerobic speed for senior basketball players.

3.2. Partial hypotheses:

- Interval training (moderate intensity) within the training program positively affects the development of maximum aerobic speed in senior basketball players.
- Interval training (moderate intensity) within the training program positively affects the development of maximum speed in senior basketball players.

4. Reasons for choosing the topic:

4.1. Subjective reasons:

- Striving for a precise understanding of the various types of interval training, including moderate-intensity interval training.
- The desire to establish a purposeful training program using interval training (moderate/moderate) for senior basketball players.

4.2. Objective reasons:

- Expressing the importance of interval training (moderate intensity) in developing maximum aerobic speed.
- Expressing the importance of interval training (moderate intensity) in developing maximum speed.

5. Keywords in the study:

5.1. Basketball:

- **Terminological definition:** This game relies on the principle of handling the ball using only the hands, which includes dribbling, throwing, and passing the ball from one player to another. It is worth mentioning that the origins of basketball date back to America, where it was invented by James Naismith on December 1st. Donald, Robert G. Logan, William George Mokray, 2019, p. 154)

- **Procedural definition:** Basketball is known as a team sport in which two teams compete against each other. Each basketball team consists of five players, and the objective for each team.

5.2. The training program:

- Linguistic definition: The term "program" in Arabic is the plural of "برامج" (baramij), and it refers to a structured plan or outline designed for a specific purpose.)Mukhtar, 2008, p. It is said that someone's path is paved with something, and they are trained in something, meaning they are accustomed to it and have been practiced in it. Alawi, Training Language 1994, p. 35)

- **Terminological definition:** It is one of the elements of the plan, and without it, planning is incomplete. The program consists of the executable steps in the form of detailed activities that must be carried out to achieve the goal.)Al-Bayek and others, 2003, p. It seems like your message is incomplete. Could you please provide more context or clarify what you would like to translate?

- **Operational definition:** It is a programmed plan that includes a series of training sessions utilizing interval training to develop certain physical attributes for male basketball players in the senior category.

5.3. Interval training (moderate intensity):

- **Technical definition:** Tarnier Gilles defines it as alternating between short, medium, and long work periods, taking the form of (running, jumping, strength, etc.). And active rest periods. (Tarnier, 2007, p.67). According to (Dellal, Javier, 2017), it is training that involves physical effort combining a work period followed by a rest period that can be either active or inactive, and the training is set within a specific time unit. Intermittent efforts consist of alternating between training time and recovery time (active or inactive during specific training, for example, the intermittent activity 30/30 consists of 30 seconds of alternating effort). With 30 seconds of active or inactive recovery during exercise or a set of exercises. This training method has been relatively used in recent years because it allows for the repetition of efforts made during the match, especially in terms of cardiovascular activity and

muscle stimulation. However, the effort and recovery occur randomly during the match, so it is essential to mix different forms of interval training, with the most commonly used being: 30-20/30-15/20-10/15-10/10-05/20-25. (p.04,2017, Dellal et Javier)

- **Terminological definition:** It is characterized by performing alternating exercises of medium duration at a speed greater than 5 km/h with a rest period of "30, 02".

5.4. Maximum airspeed:

- **Technical definition:** Maximum Aerobic Speed or VMA, abbreviated from the French phrase Vitesse Maximale Aérobie, and in English represented.

Consume oxygen during progressive training, which clearly reflects an individual's fitness level.

Edward Fox defines VO₂max, or maximum oxygen uptake, as the most important factor for athletic success in all endurance events and competitions. It is the body's maximum ability to transport and utilize the greatest possible amount of oxygen within the muscles involved in that activity.

As defined by Krosser, Starishka, and Tsmerman, it is the maximum capacity to absorb and consume oxygen, which is linked to an individual's maximum ability to perform prolonged aerobic physical exertion in the best possible manner.

- **Operational definition:** This important physiological capacity is measured using laboratory devices that collect information about the ratios of oxygen and carbon dioxide in arterial and venous blood during maximal steady-state physical exertion. This is done through gas analysis devices and techniques from the respiratory system. This method is considered the most accurate and reliable compared to various other measurement methods, and it is the direct method for measurement and evaluation.

5.5. Maximum speed:

- **Linguistic definition:** Maximum speed: It is the speed that a body moving in a medium with resistance strives to reach under the influence of a constant force. As fast as possible.

- **Technical definition:** It is the maximum speed of movement that an individual can achieve while performing the required actions in the shortest possible time (Atheer, 2010).

- **Operational definition:** Maximum speed is the highest speed you can achieve - it is the utmost speed you can ever reach. If you try to run at 100% speed and reach the maximum speed you can achieve, you will reach your top speed. The ability to sustain speed is the duration during which you can maintain maximum speed before slowing down.

6. Previous and related studies concerning the topic of the research:

The study of Abdullah Bafah. Abdul Rahman Zimam. Entitled "The Impact of Using Plyometric Exercises in Interval Training on Vertical Jump and Recovery Ability in U17 Basketball Players," published in the Journal of Sports Creativity, Volume 13, Issue 1, pages 86-110, dated June 1, 2022. This study aimed to identify the effect of plyometric exercises using interval training on improving the vertical jump and recovery ability of basketball players. The researcher employed an experimental method, with a sample consisting of 8 players representing the "CSK" team from Khemis Miliana. The training program was implemented over a period of 6 weeks, with 2 sessions per week. The researcher used the Sargent test to measure vertical jump and the Roffey-Dixon test to measure recovery ability. After collecting and statistically analyzing the data, the researcher concluded that plyometric

The effect of interval training (moderate, moderate) on the development of maximum aerobic speed in senior football players

exercises using interval training positively impact the development of vertical jump and recovery ability in basketball players.

7. Procedures and methodology of the scientific research followed:

7.1. The exploratory study.

We conducted a preliminary visit, during which we took a look and selected the appropriate club, represented by the (Center for Gathering and Preparing Military Sports Teams in Ben Aknoun), to carry out the exploratory experiment, as well as to assess the availability of resources and facilities that align with our research topic, which focuses on the impact of interval training (moderate/medium) on developing the maximum aerobic speed of senior basketball players.

7.2. The exploratory experiment.

The pilot experiment was conducted on a sample of (08) basketball players, during the period from 15/02/2015 to 05/03/2015. They were later excluded from the original research sample. The testing and retesting were conducted simultaneously, which is the same timing as the tests in this research, in order to identify any confounding variables. the tests and their clarity for the sample, by calculating the scientific coefficients (validity - reliability).

7.3. The adopted approach:

which they depend on to interpret phenomena.

7.4. Study variables:

The independent variable: program using interval training (moderate intensity).

The dependent variable: VMA.

7.5. Community and sample of the study:

The research community consists of senior basketball players from the national military basketball team at the gathering and preparation center for military sports teams in Ben Aknoun, Algiers. And the number of players is 22, according to the following table number 01:

Table No. 01: Distribution of Research Community Members

Study population	
The National Military basketball Team at the Military Sports Teams Assembly and Preparation Center in Ben Aknoun, Algiers	
Number of players	16 players
Percentage (%)	100%

Source: Prepared by the researcher, 2024.

Research Sample: A total of 16 players from the national military basketball team were selected from the gathering and preparation center for military sports teams in Ben Aknoun, Algiers, representing 100% of the original population. They were chosen purposefully and an experimental group also consisting of 06 players. Players who participated in the exploratory trial, totaling 04 players, were excluded, as illustrated in the following Table 02:

Table No. 02: Distribution of Research Community Members

Study sample	
The National Military basketball Team at the Military Sports Teams Assembly and Preparation Center in Ben Aknoun, Algiers	
Group	number of players
Experimental group	06 players
The control group consisted of	06 players
Survey group	04 players
Total	100%

Source: Prepared by the researcher, 2024.

7.6. Homogeneity and equivalence of the study sample.

Homogeneity: Before starting the experiment, follows:

Table No. 03: Shows the homogeneity of the research sample.

Variables	unit of measurement	arithmetic mean	deviation	Normative convolution
Length	meter	196	6.33	0.7161
Weight	kg	98	6.16	0.6631
Year	age	25	6.21	0.6531

Source: Prepared by the researcher, 2024.

Normal distribution is moderate.

Equivalence:

Table No. 04: Shows the equivalence of the research sample individuals.

Tests	Experimental group		Control group		Calculated T value	Value SIG	Statistical significance
	Arithmetic average	deviation Standard	Arithmetic average	deviation Standard			
Maximum air speed VMA	16.85	1.08	16.45	1.12	0.952	0.818	Not a sign
Explosive strength of the lower extremities	50.50	3.25	47.50	3.08			
Significance level: 0.05			Degree of freedom: 10				

Source: Prepared by the researcher, 2024.

7.7. The scientific foundations:

Test reliability: the first test for maximum aerobic speed on 25/02/2015 and repeated it on 15/03/2015. This was later excluded (another sample).

The effect of interval training (moderate, moderate) on the development of maximum aerobic speed in senior football players

Table No. 05: Shows the stability of the tests used.

Tests	Experimental group		Control group		Stability coefficient	Value SIG
	Arithmeti c average	Standard deviation	Arithmeti c average	Standard deviation		
Maximum air speed VMA	16.85	.580	16.16	.510	.7180	0.05
Explosive strength of the lower extremities	50.50	1.75	44.16	1.72	.9500	
Degree of freedom	03					

Source: Prepared by the researcher, 2024.

Table (05) shows us that these tests are characterized by a high degree of reliability, degrees of freedom for each test, which demonstrates.

Validity of the Test: the true scores, which have been purified:

Table No. 06: Shows the validity of the tests used.

Tests	Experimental group		Control group		Stability coefficient	Value SIG
	Arithmeti average	Standard deviation	Arithmeti average	Standard deviation		
Maximum air speed VMA	16.85	0.59	16.16	0.52	.7180	0.847
Explosive strength of the lower extremities	50.50	1.75	44.16	1.72	.9500	0.974
Degree of freedom	05					

Source: Prepared by the researcher, 2024.

Table (05) shows us that these tests are characterized by a high degree of reliability, as degrees of freedom for each test, which demonstrates their reliability.

7.8. Data collection tools:

Data collection tools are considered the cornerstone upon which the research is based, and their utilization aims to reach the facts upon which the study is built. This study relied on the following:

7.9. Physical tests

7.9.1. Maximum aerobic speed test Vameval (Cazorla)

Purpose: Calculate maximum aerobic speed (VMA) and maximum oxygen consumption (VO2max)

Testing tools: a radio, a test recording tape (vameval), a field of at least 200 metres, markers placed at a distance of every 20 metres, a whistle, and a results table representing the replicates obtained .

Performance specifications: Running while respecting the rhythm (running speed is controlled by the tape recording (Vameval) that emits sound at regular intervals, increasing speed by 0.5 km/hour every minute starting from 8 km/hour. At each whistle, the player must be at one of the posted signs. In the field (the test can be accepted with an accuracy of 2 m at most).

- **Speed increase:** 0.5 km/h
- **Repeated:** 1 minute
- **Distance between two lines:** 20 metres
- (Place adhesive tape 2 meters away from each line to determine the space that must be reached at each signal)

Location: 200m square. (Aurélien Broussal Derval, 2016, p. 99)



Figure No. (01) shows the Vameval (Cazorla) maximum aerodynamic speed test.

7.9.2. Test name: 30m Speed Test (Munther Hashim and Ali Al-Khayat, 2000, p. 72)

- **The purpose of the test:** measuring the transition speed.
- **Necessary tools:** An athletics track or an area of space at least 50 meters long and at least 5 meters wide, a stopwatch. (2).
- **Procedures:** The testing area is defined by three lines: the first starting line, a second starting line 10 meters away from the first line, and a finish line 30 meters from the second line and 40 meters from the first.
- You are planning two areas in the region for conducting the test.
- **Performance description:**
 - The test begins with each participant taking a readiness position behind the starting line.
 - A supervisor is assigned to each participant, who takes their position at the second starting line. The supervisor stands with one arm raised, and when the participant crosses the second starting line, the supervisor quickly lowers their arm. At that moment, the timer starts the clock with this signal.

The effect of interval training (moderate, moderate) on the development of maximum aerobic speed in senior football players

- Test management:

- **The ear to start:** It gives the signal to begin.

- Two officials for the second starting line: Each official's task is to signal with their arm when the competitor crosses the second starting line, at which point the timer will start the clock with this signal.

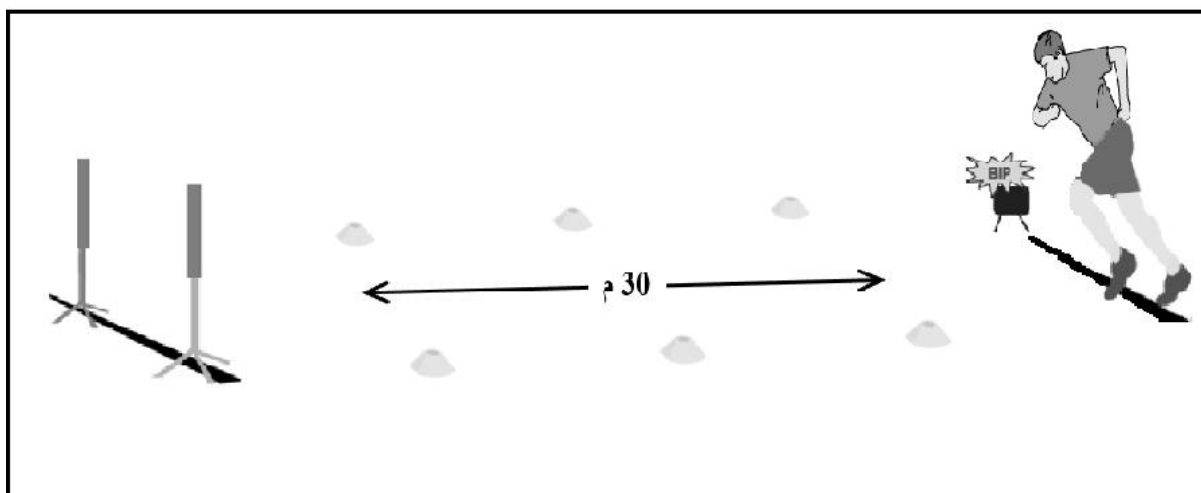


Figure (02) illustrates the maximum speed test of 30 meters.

7.10. The general framework of the training program:

We have taken into consideration the planning and construction of the general framework for the upcoming training program:

7.10.1. How to build the program.

- The use of reinforcement and incentives, along with introducing an element of excitement through simple and small games in this regard, indicates that the speed and ease of learning through small games for any program is because they align closely with an individual's nature and inclinations.
- Using cool-down exercises to relax the body and return to a normal state.
- The program notably included a focus on the physical aspect of the study.
- Pay attention to warming up before starting the training session.
- The duration of a single training session is between 90 to 120 minutes, including warm-up and the concluding part.
- The duration of the training program is 6 weeks, with an average of two sessions per week.
- Taking into account the gradual increase in training load.

7.10.2. Implementation of the proposed:

Table No. 07: The training program.

p. T.	C. T.	T. s.	Int.	R. p.	R. b. g.
Week 1	Interval training (short/short)	(30/30) '7×5	90% of the VMA	20 seconds	4 minutes
Week 2	Interval training (short/short)	(15/15) '7×5 (30/30) '7×4 20/20	100% of the VMA	20 seconds	4 minutes
Week 3	Interval training (short/short)	(15/15) '7×4	80% of VMA	25 seconds	5 minutes
Week 4	Interval training (short/short)	("120/"20) ("100/"6)	85% of VMA	25 seconds	5 minutes
Week 5	Interval training (short/short)	("120/"120) 45×5	105% of the VMA	15 seconds	4 minutes
Week 6	Interval training (short/short)	(100"/4) 60×08	110% of VMA	15 seconds	4 minutes

Source: Prepared by the researcher, 2024.

7.11. Statistical methods : SPSS 26

8. Presentation, analysis, and discussion of the results:

8.1. Presentation of the maximum aerobic speed test.

Table No. 08: the maximum aerobic speed test.

	Sample number	Pre- measurement	Post- measurement	Pre- measurement	Post- measurement	"T" calculated	"T" tabular	Degree of freedom	SIG value	Significance level	Connotation
Experimental group	06	14.06	14.41	1.10	1.09	0.00	0.05	05	0.00	00.1	sign
Control group	06	13.67	14.17	1.17	1.09	0.00	0.05	05	0.00	00.1	sign

Source: Prepared by the researcher, 2024.

- **Experimental group:** measurement was 14.06 with a standard deviation of 1.10, while in the post-test measurement, the mean was 14.41 with a standard.

- **The control group:** measurement was 13.67 with a standard deviation of 1.17, while in the post-test measurement, the mean was 14.17.

8.2. Presentation the test VMA.

Corresponding author: Seraiaia Jamel , E-mail: d.seraiaia@univ-soukahras.dz

The effect of interval training (moderate, moderate) on the development of maximum aerobic speed in senior football players

Table No. 09: Presentation the test VMA.

	Sample number	Dimensional measurement		Degree of freedom	"T" tabular	"T" calculated	Connotation	Significance level	SIG value
		Arithmetic average	Standard deviation						
Experimental group	06	15.41	0.74	2.729	1.762	10	0.003	0.01	sign
Control group	06	14.17	1.09						

Source: Prepared by the researcher, 2024.

The control group in test (vma). The mean for the experimental group was estimated at 15.40 with a standard deviation of 0.73, while the control group had a mean of 14.16 with.

8.3. Analysis, discussion of hypothesis.

1-3-1. Analysis of the Maximum Speed test.

Table 10: Maximum Speed Test.

	Sample number	Pre-measurement		Dimensional measurement	"T" calculated	"T" tabular	Degree of freedom	SIG value	Significance level	Connotation
		Arithmetic average	Standard deviation							
Experimental group	06	5.56	0.90	5.44	0.85	4.189	1.834	05	0.002	0.01 sign
Control group	06	4.97	0.80	4.61	0.72	2.445	2.016	05	0.008	

Source: Prepared by the researcher, 2024.

- **Experimental group:** pre-test measurement was 5.55 with a standard deviation of 0.90.

- **The control group:** pre-test measurement was 4.96 with a standard deviation of 0.80.

8.3.2. Analysis of the Post-Test (Maximum Speed Test).

Table 11: Analysis of the Post-Test (M. S. T.).

	Sample number	Dimensional measurement		Degree of freedom	"T" tabular	"T" calculated	Connotation	Significance level	SIG value
		Arithmetic average	Standard deviation						
Experimental group	06	5.44	0.85	2.005	1.762	10	0.001	0.01	sign
Control group	06	4.61	0.72						

Source: Prepared by the researcher, 2024.

estimated at 5.44 with a standard deviation of 0.85, while the control group had a mean of 4.61 with a standard.

9. Comparing the results with the study hypotheses:

9.1. Hypothesis One:

It states that "interval training affects the development of maximum aerobic speed. Based on the results presented in tables (08) and (09), that these differences are real and not due to chance."

The researcher attributes this to the proper direction of training sessions towards the goal. The use of training sessions (moderate/moderate) and intensive sessions led to an improvement in the respiratory system's ability to adapt to high effort, contributing to an increase in maximum aerobic speed. Additionally, the use of varied intensity and duration sessions enhanced endurance and the ability to respond effectively to the demands of maximum aerobic performance. By carefully determining rest periods, this resulted in significant improvements in performance. Furthermore, diversifying the training sessions of the proposed program and directing them towards improving maximum aerobic speed as a fundamental part of the interval training program (short-short) led to continuous and varied stimulation of the respiratory system. It was organized appropriately alongside other elements of the comprehensive training program, such as nutrition and adequate rest. In this regard, Abu Alaa Ahmed Abdul Fattah states that "interval training contributes to improving maximum aerobic speed by stimulating the body's biological adaptation process." When the body is subjected to intense training periods followed by active rest periods, the respiratory and cardiovascular systems adapt better for endurance and aerobic performance. This adaptation can include an increase in heart size and improved efficiency in oxygen utilization (Abu Alaa Ahmed Abdul Fattah, 1998, p. 16). If we refer back to previous and similar studies, we find that our study aligns with. The study of Abdullah Bafah. Abdul Rahman Zimam. Thus, we confirm the validity of the first research hypothesis.

9.2. The second hypothesis:

It affects the development of maximum speed." Through the results obtained in tables (10) and (11), which involved intermittent training (moderate intensity), including moderate and intense exercises targeting the main muscles involved in maximum speed movements. This stimulation enhanced muscle growth and increased strength, contributing to improved acceleration and maximum speed. It also intensely activated the central nervous system, which improved movement coordination and increased muscle movement speed. As a result, this led to improved performance in the required fast movements. The program also included moderate periods of high-energy-consuming exercises followed by rest periods. This type of training improves cardiovascular efficiency, In this regard, (Amr Allah Ahmed Al-Basati) states that interval training (moderate intensity) is an effective and proven strategy for enhancing maximum speed in athletes, while ensuring the exercises are varied and appropriately directed to guarantee maximum benefit and achieve the desired results (Amr Allah Ahmed Al-Basati, 1998, p. 45). Thus, we confirm the validity of the second research hypothesis.

9.3. General conclusions:

After shedding light on the various theoretical and practical aspects of the topic, we have reached answers to all the previously raised questions at the end of this study, which allowed us to arrive at the following conclusions:

- Interval training (moderate intensity) affects the development of maximum aerobic speed "VMA" in male basketball players in the senior category.
- The proposed program of intermittent training (moderate intensity) positively affects the improvement of other fundamental aspects of physical performance.

9.4. Suggestions :

- Activating moderate interval training in a balanced manner throughout the week, while ensuring sufficient rest periods between sessions.
- The use of modern tracking devices such as fitness sensors and smartwatches to record performance data and provide accurate feedback to coaches and players.

9.5. Future prospects for study:

- Conduct studies on the integration of intermittent training programs (medium intensity) with mental training and specialized nutrition programs to provide a comprehensive plan for the holistic development of players.
- Applying the principles of moderate interval training in other sports areas in addition to basketball, which expands the range of applications and increases the diversity of available training programs.

8. References used in the research:

The books:

1. Al-Basati, Amir Allah Ahmad.1998) Principles and Foundations of Sports Training and Its Applications. The Knowledge Establishment.
2. Bastoisi Ahmed; Foundations and Theories of Sports Training, (Cairo, Arab Thought House, 1999), p. 116.
3. Bastoisi Ahmed; The Introduction to the Meaning, Concept, and Importance of Plyometric Work, Episode One: (Athletics Bulletin, Cairo, International Amateur Athletics Federation, Regional Development Center, Issue / 18, 1996), p. 17.

4. Qasim Al-Mandalawi and Ahmed Saeed Ahmed; Training Between Theory and Practice: (Baghdad, University of Baghdad Press, 1979), p. 45.
5. Qais Naji Abdul Jabbar and Bastawisi Ahmed; Tests, Measurement, and Principles of Statistics in the Sports Field, (Baghdad, Baghdad Press, 1984), pp. 342-342.
6. Mohammad Hassan Alawi; Science of Sports Training, 12th edition: (Cairo, Dar Al-Ma'arif, 1992), p. 151.

1. Scientific research:

7. The study by Ben Shatiwi Abdel Razak (2017), titled "The Effect of Short/Short Interval Training on Maximum Aerobic Speed and Explosive Strength of Volleyball Players," is characterized by being a published research paper in the Journal of Sports and Artistic Physical Activity Sciences and Practices, Volume 06, Issue 02 (2016), University of Algiers 3.
8. A study by Nasser Bay Karim and Tahari Rabah (2019) titled: The Effect of an Interval Training Program on Developing Speed-Strength and Transitional Speed in Handball Players. The study is published in the Journal of Excellence in Physical Activity and Sports Sciences, Volume 4, Issue 2, pages. 185-202.

2. Doctoral dissertations:

9. The study of Abdullah Bafah. Abdul Rahman Zimam. Title: The Impact of Using Plyometric Exercises in Interval Training on Vertical Jump and Recovery Ability in U17 Basketball Players. Journal of Sports Creativity, Volume 13, Issue 1, Pages 86-110, dated 01-06-2022.

3. Foreign references :

10. Aurélien Broussal Derval : la préparation physique moderne, edition 4 trainer, paris, 2016, P99 .
11. Alexandre Dellal, Une saison de préparation physique en football, édition De boeck, Bruxelles, 2013, p68 .
12. Gilles et Dominique Cometti, (2012), La pliométrie : méthode de restitution d'énergie au service de la performance sportive, Chiron, Vincennes, France.
13. "BASKETBALL ", www.lths.net, Retrieved 22-10-2019. Edited.
14. Larry W. Donald, Robert G. Logan, William George Mokray, "Basketball", www.britannica.com, Retrieved 29-10-2019. Edited.