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The impact of plyometric exercises on the strength speed and skillful performance of soccer players U19

أثر تمرينات خاصة بالأسلوب البليومتري على القوة المميزة بالسرعة والأداء المهاري للاعبي كرة القدم

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Abstract : The study aimed to know the impact of the plyometric training on the strength of speed and some skills on football players juniors through a special plyometric exercise program, the research sample consisted of control and experimental groups each group contain 14 players, who were chosen in a simple random manner using the experimental method and as tools for the study was used a set of physical and skill tests, the data were statistically processed by spss and Exel program the results yielded indicated the effect of the proposed plyometric exercises on the strength of speed and the skills

Keywords: special exercises - plyometric training - strength of speed –skills –football

الملخص : هدفت الدراسة إلى معرفة أثر التدريب البليومتري على القوة المميزة بالسرعة وبعض المهارات في للاعبي كرة القدم الأواسط من خلال برنامج تمرينات بليومترية خاصة، وتكونت عينة البحث من مجموعتين ضابطة وتجريبية في كل مجموعة 14 لاعب، تم اختيارهم بطريقة عشوائية بسيطة باستخدام المنهج التجريبي وكأدوات للدراسة تم الاعتماد على مجموعة من الاختبارات البدنية والمهارية، وتم معالجة البيانات إحصائيا باستعمال البرنامج الاحصائي spss وبرنامج Exel،لتفسر النتائج عن وجود فروق ذات دلالة إحصائية وتأثير للتمرينات البليومترية المقترحة على القوة المميزة بالسرعة والمتغير المهاري

الكلمات المفتاحية: التمرينات الخاصة -التدريب البليومتري-القوة المميزة بالسرعة-المهارات-كرة القدم

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1- **Introduction and problematic of the study:** Physiologists have their perception of the training process, as "Ray" mentioned that it is conscious planning and codified organization of physical operations to increase the functional capacity to reach the goal of health and efficiency in addition to educational processes and the development of many physical and skill characteristics, And from it, sports training is an educational process organized to achieve a balance between the requirements of the sporting activity practiced and the capabilities of the player to bring him to the highest levels in sports activity, and To improve the athletic performance level of the player and achieve championships and achievements in all sports, scientific development has had an important role in sports training with all its components, so sports training has become a process that has a role in contemporary societies, As it has become a wide area for competition between all sectors of society and a field for competition between different countries and peoples, sports training, according to Hara, is a special process organized for comprehensive physical education that is subject to scientific and special educational principles that aim to reach high levels in the activity practiced, (EL Bachtaoui, EL Khoudja, 2010, p 25)

Sports training was concerned with various activities, including football activity, and as Majadi Fateh and others indicated that football is a group game that requires reliance on theoretical and practical aspects, taking into account the scientific and objective foundations to reach the goals set for that it is important to give importance to various aspects during The training process to raise the level of players,(Madjadi and al, 2019,p 405), The search for effective training methods has become an imperative necessity to reach the player to the highest training status, to improve the level of the player's efficiency to perform basic skills and employ them effectively during the application of offensive or defensive play strategies, the player's training status is related to the

improvement of its components where the higher the level of growth as the level of athletic performance improves, this takes into account coordination between the degree of development of these components according to the requirements of competition so that the highest possible level in all aspects can be reached,(EL bisati, 1998, p 18-19) There have been numerous training methods that all aim to develop the level of physical and skill performance, to achieve advanced positions in various activities .(Mofti, 1994,p 66).

Among these methods, we find the plyometric training that uses the movements that are characterized by little and explosive time, where the activity of the muscular nervous units is higher than that which occurs in the normal contractility(Medah, Saci, 2019, p 179), And Ghallab Hakim notes that the muscular ability of the muscles of legs is one of the most important physical capabilities that must be available in activities where performance requires vertical jumping, such as the rise to hit the ball head in football(Ghalab, Boukratem, 2019, p 341), the muscle strength considered as one of the important physical characteristics to reach good skill performance, as the level of athletic skills, depends on what the player has of those characteristics related to skill, and that every basic skill in football needs a specific of attributes to be able to perform correctly, provided that the player performs the basic skills in soccer with appropriate strength and speed. (Recham, 2019, p 158) The combination of muscle strength and speed is one of the most important requirements for athletic performance at high levels and this physical ability is one of the most important characteristics of outstanding athletes as they have a great deal of strength, speed, and skill in linking them to create a strong rapid movement, This was confirmed by many previous studies on the importance of linking of skill and physical In football with the need to choose the appropriate training method for

that according to the goal, As a researcher interested in sports training, physical preparation and a football coach the following question was asked:

-Do the proposed special exercises in the plyometric training affect the development of force distinguished by speed and the improvement of some skills among juniors' football u19?

Following this, the sub-questions were:

-does the proposed plyometric exercise affect the development of the force distinguished by speed for juniors football players?

- does the proposed plyometric exercise affect the development of some football skills for juniors football players?

- Research hypotheses:

- the proposed special plyometric exercises affect the development of force distinguished by speed and the improvement of some skills among juniors' football u19.

-sub hypotheses:

- the proposed plyometric exercise affects the development of the force distinguished by speed for juniors football players.

- the proposed plyometric exercise affects the development of performance skills for juniors football players.

-the importance of the research:

- Highlighting the importance of the speed force as an important and necessary physical quality for football players.

- Knowing the extent of the coaches 'awareness and awareness of the effect of the distinctive force on speed on improving some skills in the game, and in designing special exercises to develop physical characteristics.

- Show the relationship between physical and skill characteristics and the effect between them.

-Preparing a training program with special plyometric exercises in order to develop the distinguished strength with speed and improving some skills in football, while highlighting the importance of plyometric training.

2- **The significant terminology of the research:**

Plyometric training: It is a method of training based on the exploitation of muscle contraction by prolongation in the production of explosive motion and is used to develop distinctive force by speed with a focus on jump-down exercises or the sudden method and often exercises are performed in the form of jumps and leaps. (EL kouli and al, 2005, p 585)

-the distinctive force by speed: It is the player's ability to use the maximum strength in the shortest possible time(Al Rabadhi, 2004, p40)

- Motor skills: It is the player's ability to use the maximum strength in the shortest possible time (Hamad, 2002, p 13)

- Special exercises: Leila Zahran defines it Physical exercises with a special goal are exercises aimed at preparing and developing special motor skills for various types of sports activities, and it is an auxiliary factor that aims to prepare the player and develop his level in the type of sports activity specializing in it. (Zahran,1997, p 40)

-football: A group game in which the greatest number of goals are recorded at the opponent's goal, the net is kept clean of goals and football plays between two teams, each one with 11 players, 90 minutes of each game, 45 minutes of each run and 15 minutes of rest time. The match is played between two teams wearing different suits.(Salem, 1988, p 12).

3- The art condition and similar studies:

3-1- study of Zemam Abderrahman: Under the title of the effect of plyometric exercise in the repetitive way in the development of vertical jump and the performance of the skill of hitting the ball to the head, an article published in the

journal Sports Creativity in 2019 University of Misla, Where the research was conducted on the football players category Cubs for the MC Team Elkhemise U17, The goal of this study was to identify the effect of plyometric exercises in the development of vertical jump and the performance of the skill of hitting the ball by the head, The research sample consisted of 18 players divided into two equal groups, 9 players as a control group and 9 players as an experimental group, pre and post physical exams were applied with the 9-week training program, at a rate of two sessions per week, The data was analyzed and statistically processed using the spss program, For the researcher to find that the proposed program had a positive effect in developing vertical leap and the skill of hitting the ball with the head in favor of the experimental sample, as there were statistically significant differences between pre and post-tests for the benefit of post-test of the experimental sample.

3-2-study of Medah Rachid: Under the title the impact of plyometric training on the power, marked by speed and some basic skills of U15 handball players. A field study at the level of Chlef state, an article published in the Journal of Sports creativity in 2019, Al-Messila University, Where this study aimed to highlight the role and impact of plyometric exercises on the development of some basic skills in handball as well as the development of the distinct strength of speed for the U15 class players, The experimental approach was adopted, while the research community consisted of handball players from Chlef Province, and the sample was chosen in a systematic, random way, represented by 20 players from the Bougadir team less than 15 years old, It was divided into two groups, the first was trained in plyometric training, and the second group in its normal way, the analysis was based on the results on the spss program, and the results showed that there were statistically significant differences in favor of the post-test of the

experimental sample, and that the control sample achieved a significant development, but with an average arithmetic less than the experimental sample.

3-3- the study of Roabi Seif Eddine under the title of The effect of both high-intensity intermittent training and plyometric training on the mobility of some immunological blood elements of soccer players, an article published in the Journal of Sports creativity in 2020, The study included a comparison between two methods of muscle strength training (high intensity intermittent, and plyometric training) about the effect that these two methods can cause at the level of the individual's immune system, a sample of 12 players was selected. JS Kouse club, season 2018/2019, according to the random method, The team was divided into two experimental groups (6 players with intermittent high-intensity heavyweight training, 6 plyometric training), Where the experimental method was used in that (blood sample analyzes), Where the applied training session in the plyometric and intermittent high-intensity training resulted in statistically significant differences between the pre /post analyzes in most white blood cells.

- **The practical chapter:**

1- **Followed Methodologies**: Given the nature of our research that proposes special exercises that was piloted on a 14-player sample from the CRT THAMER team, the appropriate approach to our study is the experimental approach.

2- **Research community**: The study community is all groups of units from which the sample is actually chosen. (El-Sherbiny et al., 2012, p. 155). In this study, the research community consisted of football players juniors active at the state association level of bouira.

3- The research sample: 28 players were chosen as a study sample divided into two equal and homogeneous groups, in each group 14 players from the Thamer team. The sample was chosen in a simple random manner.

Homogeneity: means that there is no significant difference

Table No. (01): represents the coefficient of difference in the variables of age, length, weight and training age.

Variables	Coefficient of variation
Age	0.29
Length	0.20
Weight	0.22
Training age	0.05

Source: Designed by the researcher

Analysis: Since the coefficient of variation for all variables does not exceed 0.30, this indicates the presence of homogeneity between the two groups in the variables "age, length, weight, and training age".

Valence: It means that the values are not far from their mean in large distances

Table No. (02): represents the arithmetic means, the standard deviations, and T student of the "age, weight, length, training age" variables for the two groups.

Variables	Experimental group		Control group		Calculated T	Tabular T
	$\bar{x}$	S	$\bar{x}$	S		
Age	18.5	0.51	18.37	0.61	0.58	2.04
Length	172.06	3.94	171.12	4.88	0.40	
Weight	68.56	2.03	69	2.75	0.44	
Training Age	2.87	0.5	2.62	0.5	0.10	
Force -speed	37.56	1.54	37.37	1.85	0.75	

Source: Designed by the researcher

Analysis: The results showed that there were no statistically significant differences between the two groups in all variables, Where the value of the $\bar{X}$, respectively, was "18.5, 18.37", "172.06, 171.12", "68.56,69", "2.87, 2.62",

Whereas, the calculated T was less than the tabulated T value, As shown in the table, at the significance level of "0.05", from it, we conclude that there is an equivalence between the members of the two groups.

Research Tools and Data Processing:

Suggested Special Exercises: The researcher applied the proposed special plyometric exercises within the period specified.

Physical and skill tests:

-Sargent long jump test: its designed to measure the force- speed

Description: The player grabs a piece of chalk and then extends the arm high for the maximum range and sets a mark on the wall, then he stands on the line drawn on the floor and the side facing the wall, One of the arms is fixed behind the body and the other is free, holding a chalk, The player bends the knees and wave the free arm and then pushes the jump force after giving the signal and then jumping to reach the highest possible point, The distance between the first and second signs is measured, the number is scored, and the player is given 03 attempts, while calculating the best.

Tools used: chalk, tape measure, wall. Registration card. (kharbit, 1989, p 57)

- Shooting accuracy test: its designed to measure the accuracy of the ball's shot to the goal, which is divided into regions and each region has a certain degree achieved by the player if he succeeded in aiming the ball to it and a line parallel to the goal line is drawn 16 meters away from it and 5 balls are placed on it and the distance between each two balls is 100 cm, The player stands behind ball number 1 and when given the signal he points the ball to the goal, Then repeat the shooting with the ball No, 2 and so on until he finishes all the balls, the score is calculated by the sum of the scores obtained by the player from shooting of balls, so that each shoot gets the specified degree in each region, and the scores are calculated as follows: ½degree in the first central region.

1 degree in the second zone. 2 degree in the third lateral region.

0 degrees if the ball goes out of goal. (The player is awarded 05 attempts). (Ibrahim, 1994, p 260)

Long Distance Ball Heading Test: it is designed to measure the distance achieved and the ability to head soccer balls in athletes.

Description: The soccer player stands behind the starting point holding the ball with both hands. The soccer player then throws the ball high and jumps to head it forward as far as possible. Attempt to increase the heading distance. The difference in distance between the starting point and the heading point is the score. The best of two attempts is recorded. (Zemam, 2019, p 130)

Scientific conditions of the tool: persistence: In this study, a "test-retest" method was used, on a sample of 10 individuals. After obtaining the results, we used the Pearson correlation coefficient in the statistical analysis to determine the extent of correlation between the results of the pre and post-test.

Validity of the test: It means that it actually measures what was put in place to measure it, and does not measure anything to replace it or add to it (Saber, Khafaga, 2002, p. 167) and it is calculated as follows:

$$\text{Coefficient of honesty} = \sqrt{\text{reliability}}$$

Table No. (03): shows the results of the reliability coefficient of the tests used

Consistency and honesty coefficient results						
Testes	sample	Coefficient honesty	Coefficient of stability	Tabular "R"	Significance level	freedom degree
Sargent long jump test	10	0.81	0.66	0.60	0.05	09
Shooting accuracy test		0.93	0.88			
Long Distance Ball Heading Test		0.87	0.77			

Source: Designed by the researcher

Analysis: It is clear from the table that physical and skill tests have high-reliability transactions, so it is greater than 0.5 and the calculated t value is greater than the tabular t value in all variables, Which made it have the stability and honesty, which makes it suitable for study.

Statistical Processing:

-SPSS 20 - 2007 Microsoft Office Excel was used

- arithmetic mean: The sum of values divided by their number (Eljinabi, Elchawi, 2015, p101)

$$\bar{x} = \frac{\Sigma xi}{n}$$

Coefficient of variation: the ratio between the standard deviation and the mean

$$Cv = \frac{Sd}{\bar{x}}$$

(jilali, 2012, p 100)

-standard deviation: It is calculated to determine the group's approximation or distance from its mean

$$\sigma = \sqrt{\frac{\Sigma (x - \bar{x})^2}{n}}$$

-T Student: They are used to calculate the differences between the arithmetic averages and used to accept or reject Nothingness. (AL jadi, Abu hlo, 2009,p 424)

$$t = \frac{(\bar{X}1 - \bar{X}2)}{\sqrt{\frac{s_1^2 + s_2^2}{n - 1}}}$$

-Pearson's Correlation Coefficient:

$$r = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{[N\Sigma x^2 - (\Sigma x)^2][N\Sigma y^2 - (\Sigma y)^2]}}$$

1- analysis and result exam:

- Results for sergeant jump test

Table No. (04): represents the results Sargent test for the force- speed

Group	Pre-test		Post-test		Calculated T test	Tabular T test	Statistical significance
	$\bar{X}$	S	$\bar{X}$	S			
Groupe A	37.56	1.54	40.37	1.76	3.86	2.04	significant
Group B	37.37	1.85	36.75	2.04	0.37		Non-significant

Source: Designed by the researcher

-Analysis and discussion: we note that the experimental group obtained, in the pre-measurement, an average mean of ($\bar{X}$=37.56) and a standard deviation of (S=1.54), While in the post-measurement, it obtained an average mean of ($\bar{X}$=40.37) and a standard deviation of (S=36.75), While the calculated value of T test was (T=3.86), Whereas, in the pre-measurement, the control group obtained an average mean of ($\bar{X}$=37.37) and a standard deviation of(S= 1.85), Whereas, in

post-measurement, it obtained an average mean of ($\bar{X}$=36.75) and a standard deviation of (S=2.04), While the calculated value of T test was (T=0.37), after looking at the statistical significance table for the T-test, it was found that the calculated test value of the experimental group was greater than the tabular T-test value, while the control group test was smaller than the scheduled test, we conclude from the previous analysis, that there are statistically significant differences between the pre and post measurements, for the long jump test for Sargent "in favor of the post- measurement of the experimental sample, From it, we conclude that the proposed special exercises using the method of plyometric training have influenced the level of development of the force characterized by speed for football players, and this is what a study indicated of Medah and Rouabi, which corresponds to the current study in that the plyometric exercises affected the development of the physical quality understudy

Table No. (05): represents the results Long Distance Ball Heading Test:

Group	Pre-test		Post-test		Calculated T test	Tabular T test	Statistical significance
	$\bar{X}$	S	$\bar{X}$	S			
Groupe A	2.81	0.75	4.06	0.92	5.42	2.04	significant
Group B	2.5	1.15	2.12	0.80	0.27		Non-significant

Source: Designed by the researcher

-Analysis and discussion: Through the results shown in the table, we note that the experimental group obtained, in the pre-measurement, an average mean of ($\bar{X}$=2.81) and a standard deviation of (S=0.75), While in the post-measurement, it obtained an average mean of ($\bar{X}$=4.06) and a standard deviation of (S=0.92), While the calculated value of T test was (T=5.42), whereas, in the pre-

measurement, the control group obtained an average mean of ($\bar{X}$=2.5) and a standard deviation of(S= 1.15), whereas, in post-measurement, it obtained an average mean of ($\bar{X}$=2.12) and a standard deviation of (S=0.80), While the calculated value of T test was (T=0.27), after looking at the statistical significance table for the T-test, it was found that the calculated test value of the experimental group was greater than the tabular T-test value, while the control group test was smaller than the scheduled test, we conclude from the previous analysis, that there are statistically significant differences between the pre and post measurements, for long Distance Ball Heading Test, in favor of the post-measurement of the experimental sample, from it, this indicates that the special plyometric exercises to develop the distinctive force at speed have affected the level of skills selected among the members of the experimental group, where Maddah Rashid indicated that the plyometric exercises take on a nature close to the nature of skill performance, as the plyometric training helps increase the number of muscular units of the muscle, whereas, the members of the control group did not notice any development but rather a low level.

Table No. (06): represents the results of Shooting accuracy test:

Group	Pre-test		Post-test		Calculated T test	Tabular T test	Statistical significance
	$\bar{X}$	S	$\bar{X}$	S			
Groupe A	2.93	0.77	4.75	1.52	2.77	2.04	significant
Group B	2.75	1.29	2.43	0.51	0.35		Non-significant

Source: Designed by the researcher

-Analysis and discussion: Through the results shown in the table, we note that the experimental group obtained, in the pre-measurement, an average mean of ($\bar{X}$=2.93) and a standard deviation of (S=0.77), While in the post-measurement, it obtained an average mean of ($\bar{X}$=2.75) and a standard deviation of (S=1.29),

While the calculated value of T test was (T=2.77), whereas, in the pre-measurement, the control group obtained an average mean of ($\bar{X}$=2.75) and a standard deviation of(S= 1.29), whereas, in post-measurement, it obtained an average mean of ($\bar{X}$=2.43) and a standard deviation of (S=0.51), While the calculated value of T test was (T=0.35), after looking at the statistical significance table for the T-test, it was found that the calculated test value of the experimental group was greater than the tabular T-test value, while the control group test was smaller than the scheduled test, we conclude from the previous analysis, that there are statistically significant differences between the pre and post measurements, for Shooting accuracy test, in favor of the post- measurement of the experimental sample, from it, this indicates that the special plyometric exercises to develop the distinctive force at speed have affected the level of skills selected among the members of the experimental group, and this is what a study indicated of Zemam.

-conclusion: In this study, several conclusions were drawn as follows:

- The two groups, after taking the pre-test, had one level in all study variables.
- After conducting the post-tests, it was found that there are statistically significant differences in the pre and post measurements in favor of the post-measurement of the experimental group that underwent the proposed exercise program in the physical and skill tests.
- The group that underwent the exercises of strength distinctive by speed by the method of plyometric training obtained positive results, unlike the control group trained in their own way.
- Where it was found that the strength distinctive by speed has a role and an effect in improving the performance of skills, therefore we can say that the more

a football player has a good level of strength distinctive by speed, the better his skill performance is at a good level.

- Through the foregoing, the researcher believes that the method of plyometric training has had an impact on developing the strength marked by speed and also the development of that latter has a reflection on improving some of the skills in football, which is what proved all the hypotheses.

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