

Analysis of intermittent training and small-sided games training methods and their impact on explosive power of the lower limbs in U19 soccer players.

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Abstract

The study aims to identify the effectiveness of a proposed training program using two methods: Intermittent training and small-sided games training on developing explosive power in soccer players under 19 years old. For this purpose, we used the experimental method on a sample consisting of 10 players as an experimental sample and 10 players as a control sample, who we deliberately selected to collect data we used the Sargent high jump test. After collecting the results and processing them statistically using the SPSS statistical package, it was found that there were statistically significant differences in favor of the experimental group, and thus the effectiveness of the applied training program. On this basis, the study recommended combining the methods of intermittent training and small-sided games training to develop explosive power of the lower limbs.

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1. Introduction

Football as a sport receives a great deal of attention due to its being played in all countries of the world, due to this great interest, football is always witnessing development, and it also varies from one country to another, each school has a feature that it considers to be the basic component on the path to victory and triumph. Some schools focus on the physical aspect (England), others on the technical aspect (Brazil), and a third on the tactical aspect (Italy) (**Bangsbo, 1994**). In football, all aspects of preparation are important to get players to their peak performance. and the physical aspect in football receives a great deal of attention due to the development of training methods and physical preparation, explosive power is one of the most important physical qualities in football. definition of explosive power according to Cazorla “it is the ability to produce the greatest acceleration applied to the body or to the machine, and it is considered the most important physical characteristic that must be developed in most sports disciplines” (**Cazorla, 2013, P327**). This trait is particularly evident in short sprints over distances of 3 to 10m, in jumping and dueling. Through an analysis of the 2007/2008 English Professional Championship, he recorded an average of 13 sprints, 15 aerial duels, and 21 ground duels (**Dellal, 2008, P16**). And there are many training methods that contribute to developing explosive power, and in our study, we wanted to know the extent of the effect of the two methods of intermittent training and small-sided games training to development explosive power.

Intermittent training is one of the modern methods that has been able to impose its results as it is derived from the actual performance of the football player during the match. It is known as a training method that contains a very important form to improve the maximum aerobic capacity in team sports through the stimulation of mixed aerobic and anaerobic energy (**Dellal, 2013, P14**). Intermittent training contributes to the development of many of the physical qualities needed by a football player, as it is compatible with the work and rest requirements that characterize the sport

of football. The small-sided games training method is no less important than other methods of training. It resembles the conditions of the activity, is more fun and exciting for the players, and aims to develop the physiological and physical capabilities of the players with the same efficiency as traditional training (**Hourcad, 2018, P44**). The method of training with small-sided games plays an important role in youth football due to being an enjoyable way that helps avoid boredom. Given our familiarity with Algerian football in general and youth football in particular, in which we have worked in various categories, along with our interest in training players using systematic scientific methods, we wanted to know the extent to which combining intermittent training and small-sided games affects the explosive power of the lower limbs of football players under 19 years old. Through this, we posed the general research question as follows: Does the proposed training program using interval training and small-sided games training have an effect on developing the explosive power of the lower limbs in football players under 19 years old?

1.1. Literature Review

The starting point of our research was based on previous studies that had been conducted before, among them is the study conducted by (**Ahmed Rouini, 2020**), titled: “The effect of using ballistic exercises in plyometric training to development of explosive strength for the lower limbs of football players”. The Object of the study aims to identify the effect of using ballistic exercises for development explosive power of the lower limbs, for this purpose, the researcher used the experimental method, on a sample composed of 24 football players in the U19 category from USMAB (Union Sportive of Ain Beida). For 08 weeks, 2 session per week, and for data collection, the researcher used the Sargent test and test of Long jump from a standstill. After collecting the results and having treated them statistically, the researcher conclude that there exists a significant difference between the experimental group and control group in favor of the experimental group. On this basis, the study recommended to use the method of ballistic

exercises for the development of explosive power. We also find a study (**Bouchama Farid and Kamal Melouk, 2020**) entitled “The impact of training program using the elastic bands on the explosive power of football players under 17 years of age”. The Object of the study aims to identify how the impact of training program using the elastic bands on the explosive power of football players under 17 years of age and to develop a method of controlling the load of elastic bands training for. This purpose, the researcher used the Experimental method On 25-player under 17 years of ETIHAD TISSEMSILT selected Intentionally the study and the training took 10 weeks at a rate of (2) session In the week .After collecting the results and having treated them statistically, the researcher conclude There were statistically significant differences between the control group and experimental group and for the benefit of the experimental group in the pre-test, which indicated the effectiveness of the program training. The study recommended the necessity of work with elastic bands in training programs for developing explosive power. There is also a study by (**Chadi Abdel razak and bachir Houssam, 2019**) titled: “Effect of plyometric training by using the interval circular training method on the development of explosive power of the lower limbs of handball players under 19 years”. This study aimed to prove the influence of plyometric training and his role in the development of the explosive power of the lower limbs to handball players. This study aimed to prove the influence of plyometric training and his role in the development of the explosive power of the lower limbs to handball players. The study sample consisted of handball players. The researchers used the experimental method. These data were processed using Stat Plus v 2007. The study found the following results: Plyometric training and regular training has an effective impact on developing the explosive power of the lower limbs to handball players. However, Plyometric circular training have more effectiveness. There is also a study by (**Rachad Djeddi and others, 2021**) titled: “The effect of High-intensity intermittent training on improving some physical characteristic of (acceleration speed and explosive power and agility) on elite division clubs soccer players”. The study aimed to identify the effect of High-intensity intermittent training on improving

some physical characteristics (acceleration speed and explosive power and agility) on elite division clubs soccer players (a field study on U17 class Tebessa Union Club). Where the researcher used the experimental method, and the sample included 10 players were chosen as a Control group and 10 as an experimental group, and after collecting data and dealing with it in the appropriate statistical method (SPSS IBM V 22). It was concluded that there is an effect of High intensity intermittent training on the characteristics of acceleration speed and explosive power and agility, accordingly the researcher recommends developing these characteristics, and focus more on working with reciprocal training because of a strong and statistically significant relationship.

2. Method and Materials

Due to the nature of our study, we chose the experimental method, where we used an experimental design based on a control group and an experimental group, in addition to conducting a pre-test and a post-test after implementing the training program. The experimental method is defined as objective observation of a particular phenomenon, which occurs in a situation characterized by tight control, and includes one or more variables while proving the other variables (**Boudaoud and AtaAllah, 2009, P137**). Our study included the following research variables: the independent variable included the methods of intermittent training and small-sided games training, while the dependent variable was represented by the explosive strength of the lower limbs. We also took a pilot sample that included 05 players on whom the experimental study was conducted, where we applied the test used in the study. We conducted a pre-test and then, after a week, we conducted a post-test, and we implemented two sessions of the training program.

2.1. Participants

Our research community includes the teams participating in the youth categories of the Constantine Regional Football League. We intentionally selected the research sample, which consisted of the Mila Municipal Youth

Team under 19 years, made up of 28 players. We excluded the three goalkeepers and then divided the research sample into 5 players for the exploratory sample, 10 players for the control sample, and 10 players for the experimental sample.

Table 1. Shows the statistical information for the homogeneity and equivalence of the research samples.

Variables	control sample		experimental sample		Value T calculated	Value Sig	Level Sig	sig statistical
	arithmetic average	Standard deviation	arithmetic average	Standard deviation				
Age (years)	17.5	0.53	17.7	0.48	-0.88	0.39	0.05	Not Sig
Weight (kg)	67.5	5.73	67.2	6.2	0.14	0.89	0.05	Not Sig
Height (cm)	181	5.52	178	4.86	1.16	0.26	0.05	Not Sig
Age of training	6.8	2.57	6.7	2.41	0.09	0.93	0.05	Not Sig

Through table 1, shows the differences between the control sample and the experimental sample in the basic variables of research (age, weight, height, age of training) before applying the training program. Accordingly, we note that there are no statistically significant differences in all the basic variables of research between the two sample, as we find that value signification of T was confined between (0.26 and 0.93) before the experiment, and this is when significance level 0.05, This confirms the homogeneity of the two sample in the basic variables before applying the training program.

2.2. Materials

- **Data collection tools:** sources and references, observation and experimentation, tests and measurements, computer and internet.

- **Pedagogical tools:** the field, footballs, vests, cones, stopwatch, whistle, camera, laptop.
- **The training program:** We formulated a training program based on scientific principles, relying on our expertise in the field. The program included exercises using both intermittent training and small-sided games training. We implemented the program on the experimental sample over a period of two months (9 weeks), with 2 to 3 sessions per week.
- **The Test:** Vertical jump test (Sargent Test), this test aims to measure explosive strength for the lower limbs. It requires the presence of a smooth wall or a board attached to the wall, metric measuring tape and chalk. The person raises their hand to the highest point from a standing position and draws a line on the wall (A), and then he jumps to the highest possible height and draws another line on the wall (B), the distance between points (A) and (B) is recorded.

2.3. Design and Procedure

Before starting the research, we reviewed scientific references related to our study topic. We also worked on defining the study population and sample, choosing the Mila Youth team, which plays in the inter-league division (Eastern Group), given that the researcher was a former coach in the team's youth categories and we have a good relationship with the coaches and team management. We initially identified the target group, which is the U19 category (juniors), before the end of the 2023/2024 season, where we received a welcome from the category's coach. At the beginning of the 2024/2025 season, we conducted an exploratory study that included a sample of 05 players (outside the main research sample). We divided the players into experimental and control groups, then conducted a pre-test for explosive power of the lower limbs on both groups and recorded the results. After that, we started implementing the training program on the experimental group for a duration of 9 weeks, with an average of 2 to 3 sessions per week. The training program includes training sessions using the intermittent training method, training sessions using the small-sided games

training method, and other sessions where we combine both training methods. Upon completing the program, we conducted a post-test for both the experimental group and control group and recorded the results obtained.

2.4. Statistical Analysis

We conducted the statistical analyses using program SPSS statistical package. We used the following statistical methods: Pearson correlation coefficient, the arithmetic average, standard deviation, difference test (T-test).

3. Results

- **Presentation and analysis of the pre-test results of explosive power for the control and experimental groups:**

Table N°02: Shows the results of the pre-test of explosive power for the control and experimental groups.

Sample	Arithmetic average	Standard deviation	Degree of Freedom	Level Sig	Value T Calculated	Value Sig	Statistical Sig
Control	47.3	3.59	18	0.05	-0.029	0.977	Not Sig
Experimental	47.25	4.06					

Through Table N° (02), which shows the results of the pre-test for explosive power for the control and experimental samples, we notice that the arithmetic average of the pre-test for the control sample is (47.3) with a standard deviation of (3.59), while the arithmetic average of the pre-test for the experimental sample is (47.25) with a standard deviation of (4.06). The result shown in the table for the T value, which was estimated at (-0.029) with a significance level of (0.977), is greater than the significance level (0.05). Therefore, there are no statistically significant differences between the pre-test results of the control and experimental samples in the explosive power test.

- **Presentation and analysis of the post-test results of explosive power for the control and experimental groups:**

Table N°03: Shows the results of the post-test for explosive power for the control and experimental groups.

Sample	Arithmetic average	Standard deviation	Degree of Freedom	Level Sig	Value T Calculated	Value Sig	Statistical Sig
Control	47.7	3.33	18	0.05	2.154	0.045	Sig
Experimental	51.2	3.91					

Through Table N° (03), which shows the results of the post-test for explosive power for the control and experimental groups, we notice that the arithmetic average of the post-test for the control group is (47.7) with a standard deviation of (3.33), while the arithmetic average of the post-test for the experimental group is (51.2) with a standard deviation of (3.91). The result shown in the table indicates a T value of (2.154) with a significance level of (0.045), which is less than the significance level (0.05). Therefore, there are statistically significant differences between the post-test results of the control and experimental groups, favoring the experimental group in the explosive power test results.

- **Presentation and analysis of the pre-test and post-test results of the explosive power for the experimental sample:**

Table N°04: Shows the results of the pre- and post-test of explosive power for the experimental sample.

Test	Arithmetic average	Standard deviation	Degree of Freedom	Level Sig	Value T Calculated	Value Sig	Statistical Sig
Pre-test	47.25	4.06	09	0.05	-7.949	0.000	Sig
Post-test	51.2	3.91					

Through Table N° (04), which illustrates the results of the pre-test and post-test for explosive power for the experimental sample, we observe that the arithmetic average of the pre-test is (47.25) with a standard deviation of

(4.06), while the arithmetic average of the post-test is (51.2) with a standard deviation of (3.91). The T value shown in the table is (-7.949) with a significance level of (0.000), which is less than the significance level (0.05). Therefore, there are statistically significant differences between the pre-test and post-test for the experimental sample, favoring the post-test in the results of the explosive power test.

4. Discussion

Based on the results in Table N° (02) and after analysis, we found that the results of the control and experimental groups in the pre-test of explosive power were close. We can say that this is due to both groups undergoing the same training before the implementation of the training program. In addition, we should have distributed the samples according to equal capabilities to avoid a significant difference between the two samples, which could later affect the post-results. This aligns with the study by Rachad Djeddi and others (2021), where they stated, "We did not record any difference in the value ratios to the explosive power test and this indicates that the results of the two samples are equal and that they are consistent in terms of training". And looking the results in Table N° (03) And after analysis, we found that the results of the control and experimental groups in the post-test of explosive power were different. We observed, through the arithmetic average of both groups, a noticeable improvement in the experimental group compared to the control group, which showed slight improvement. It can be said that this is due to the application of the training program using the methods of intermittent training and small-sided games training, which were applied to the experimental group but not to the control group. This contributed to the development of the explosive power of lower

limbs of the experimental group. This aligns with the findings of the study by Bouchama Farid and Kamal Melouk (2020), where “they proved the effective impact of the proposed training program using rubber bands contributed to the development explosive power of the upper and lower limbs of the experimental sample on which the training program was applied. And also, in looking the results in Table No. (04) And after analysing them, we found that the results of the experimental sample in the pre-test and post-test of explosive power were different. We observed, through comparing the arithmetic average of both tests (pre-test and post-test), a noticeable improvement, as the arithmetic average of the sample experimental in the post-test increased compared to the arithmetic average of the pre-test. We can say that this development is attributed to the implementation of the training program using the methods of intermittent training and small-sided games training, which were applied to the experimental sample over a period of 9 weeks. This contributed to the development of the explosive power of lower limbs of the experimental sample. This aligns with the findings of the study by Chadi Abdel razak and bachir Houssam (2019), where they found statistically significant differences between the post-test of the experimental sample and the post-test of the control sample, favoring the experimental sample. This confirms that high-intensity circuit plyometric training helped develop the explosive power of the lower limbs more than regular training. As indicated by the study of Ahmed Rouini (2020), which the post-test results of the experimental group members showed a significant change and improvement in the level of explosive power comparison with the post-test results of the control group, it has been proven that the use of ballistic exercises during

plyometric training provides a significant addition to the development of explosive strength in the lower limbs of football players. Finally, and based on the above we can confirm the answer to the posed research question by saying say the proposed training program using interval training and small-sided games training have an effect on developing the explosive power of the lower limbs of the experimental study sample.

5. Conclusion

At the end of our study, we can say that football require significant attention to the physical aspect. It is essential to work according to scientific methods and to program training in a studied manner, especially for youth categories, which often suffer from a lack of proper coaching. Considering that explosive power of the lower limbs is considered one of the most important physical attributes in football, the results of our study concluded that the proposed training program using intermittent training and small-sided games training has positively contributed to the development of explosive power of the lower limbs in the experimental sample on which the program was applied. This is due to the presence of statistically significant differences between the pre-test and post-test of the experimental sample, as well as the presence of statistically significant differences between the post-test of both the control and experimental groups in favor of the experimental group, while there were no statistically significant differences in their pre-tests. This highlighted the effectiveness and efficiency of the applied training program.

Based on the results we reached in our study, we are honored to present some suggestions that may benefit specialists in the field. We

recommend that coaches focus on working according to well-studied scientific methods and use known training techniques and methods, being familiar with their intricate details, as well as keeping up with the latest modern methods. Additionally, they should work on developing various physical attributes of the players, especially explosive power of the lower limbs. We also advise coaches to consider the specific characteristics of different age groups in the physical preparation process according to the requirements of each group. Team managers should pay more attention to youth teams and support them in all aspects. Furthermore, we encourage researchers to conduct studies that address other physical attributes or training methods, especially modern ones, in football and other activities.

6. References

1. Bangsbo (1994), The physiology of soccer--with special reference to intense intermittent exercise, *Acta Physiologica Scandinavica Supplement*, 619:1-155
2. George Cazorla. (2013) *La bible de la préparation physique*. Amphora. Paris.
3. Alexandre Dellal. (2008). *De l'entraînement à la performance en football*. Edition de boeck. Bruxelles.
4. A, Dellal, (2013), *Une saison de préparation physique en football*, 1 édition, Bruxelles.
5. Jean-Christophe Hourcad, (2018), *Modélisation des jeux réduits, les cours de formation fédérale des préparateurs physiques*.
6. Boudaoud, A., & Ata Allah, A. (2009). *The guide in scientific research for students of physical education and sports*. Algeria. University Press Office.
7. Ahmed Rouini, (2020), The effect of using ballistic exercises in plyometric training to development of explosive strength for the lower limbs of football players, *Journal of Sport Science Technology and Physical Activities*. Vol: 17/ N°: 02, P 138-152.
8. Bouchama Farid and Kamal Melouk, (2020), The impact of training program using the elastic bands on the explosive power of football players under 17 years of age, *Journal of Sport Science Technology and Physical Activities*. Vol: 17/ N°: 02, P 51-65.
9. Chadi Abdel razak and bachir Houssam, (2019), Effect of plyometric training by using the interval circular training method on the development of explosive power of the lower limbs of handball players under 19 years, *Journal of Sport Science Technology and Physical Activities*. Vol: 16/ N°: 02, P 142-156.
10. Rachad Djeddi and others, (2021), The effect of High-intensity intermittent training on improving some physical characteristic of (acceleration speed and explosive power and agility) on elite division clubs soccer players, *Journal of Sport Science Technology and Physical Activities*. Vol: 18/ N°: 01, P 89-102.