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The Impact of Weightlifting Exercises During the the In-season phase on Certain Aspects of Muscular Strength in U19 football players

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Abstract:

This study sought to investigate the impact of weightlifting exercises administered during the in-season phase on certain aspects of muscular strength in U19 football players; this was achieved by introducing a multi-set system of exercises utilizing simple equipment—such as barbells, weight plates, and a multi-station fitness machine—during regular sessions integrated into the standard training program of the experimental group, while the control group followed their customary training regimen, a methodology informed by reviewing prior recommendations and suggestions pertinent to the research focus on strength facets.

The study employed an experimental method with an equivalent groups design, applied to a purposively selected sample of (30) players, who were divided into two groups: an experimental group of (15) players and a control group of (15) players, where the study findings revealed statistically significant differences between the pre-test and post-test measurements in the strength attributes—specifically maximal strength, speed-strength, and explosive strength—for the experimental research group; whereas no statistically significant differences were observed between the pre-test and post-test measurements for the studied attributes among the members of the control group.

Keywords: Weightlifting Exercises, Maximal Strength, Explosive Strength, Speed-Strength, In-Season Phase.

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1. INTRODUCTION

The sheer spectacle witnessed on the green pitch in our world today, with the delight of viewers and the amazement of followers at individual and collective achievements, is but a result of the ample share of attention and passion that the world of the round ball has garnered, driven by the continuous investigation and research by professionals in the field aiming to guide both the individual player and the team towards higher levels and the attainment of titles, relying on all the sciences constituting sports science in general—from sports biology and physiology to social psychology, and other sciences directly and indirectly related to the field.

Physical preparation constitutes one of the essential training duties, being the cornerstone of all subsequent preparation and training processes; this is what has enabled coaches and trainers to achieve the utmost degrees of readiness for competitions and the realization of championships and records, and among the requirements of modern play is establishing the player from the age of awakening on scientific foundations and rules that qualify him in the future to attain peak athletic excellence, foundations which themselves respect all the characteristics of training periodization and phasing, since all scientific theories and axioms confirm the inability of an athlete to maintain peak performance throughout the entire season—this necessitates that coaches divide the season's periods and define the preparation, load, and methods for each phase.

Considering the in-season phase of the training cycle a particularly challenging period for all parties involved, where the coach must consider the player's fatigue and exhaustion while the player himself seeks the components of high performance—especially since a U19 player is in a transition phase towards the elite level, which requires him to be at the peak of fitness, particularly in aspects of muscular strength. (Morabit Mas'oud et al., 2025, p. 2013)

The scholar Weineck (1997), in many of his researches, concluded that there is a consistency between the fitness exerted during competitions and the effects of external load, meaning the totality of adaptations occurring in the individual, and that there are factors which create an imbalance between the demands and the individual's ability to maintain performance on one hand, and his capacity for energy recovery on the other (Weineck Jurgen, 1997, P.55). Similarly, the scholar Bangsbo affirmed that modifying and preparing training content and its organization must take into account all modern requirements and the

characteristics related to a football player's activity during official and unofficial competitions.

Upon examining the nature of training and its content, along with some of the principles and concepts relying on physical preparation with its basic elements of endurance, strength, and speed as a phase for the start of a new season, it is noted that once competitions begin, it is often abandoned, as observing the Algerian league matches, particularly youth matches, reveals a decline in player performance, especially during the in-season phase of the competition, and the emergence of signs of an inability to perform various physical and skill-related duties—which require a degree of muscular strength—due to the depletion of capacities and the failure to program sessions for development and compensation based on weightlifting during the in-season phase. Most coaches content themselves with muscular strength training on the pitch using simple loads that do not induce substantial changes nor meet the player's needs and requirements for strength (Bangsbo J., 2008, P.10).

2. Study Problematic

From this standpoint, the researcher sought to address the problem by formulating the main research question as follows:

- What is the impact of weightlifting exercises during the in-season phase on some aspects of muscular strength in U19 football players?

2.1 Sub-Questions:

- Are there statistically significant differences between the pre-test and post-test measurements for the experimental group members due to the effect of weightlifting exercises on developing (maximal strength, explosive strength, speed-strength) during the in-season phase among U19 football players?
- Are there statistically significant differences between the pre-test and post-test measurements for the control group members due to the effect of regular training on developing (maximal strength, explosive strength, speed-strength) during the in-season phase among U19 football players?

3. Research Hypothesis:

Weightlifting exercises during the in-season phase have an impact on some aspects of muscular strength in U19 football players.

3.1- Sub-Hypotheses:

- There are statistically significant differences between the pre-test and post-test measurements for the experimental group members due to the effect of



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weightlifting exercises on developing (maximal strength, explosive strength, speed-strength) during the in-season phase among U19 football players.

- There are no statistically significant differences between the pre-test and post-test measurements for the control group members due to the effect of regular training on developing (maximal strength, explosive strength, speed-strength) during the in-season phase among U19 football players.

4. Research Objectives:

- Identifying the impact of weightlifting exercises during the in-season phase on certain aspects of strength among U19 football players.
- Examining the status of certain physical elements—specifically facets of strength—in players under the pressure of competition intensity, following the first half of the season and throughout the prolonged in-season phase.
- Understanding the effect of improving certain strength elements through the method of weightlifting on strength components, as measured by specific tests directly related to strength attributes, particularly for the lower limbs.
- Ascertain the importance of training the strength element throughout the entire season and its correlation with the indicator of performance stability.

5. Research Significance:

The significance of the current research can be outlined in two aspects:

5.1 Theoretical Significance:

- Opening avenues for scientific research to investigate theoretical and field-based scientific facts for coaches and physical trainers regarding the training obstacles that prevent some players from assimilating training tasks as effectively as their peers during the in-season phase.
- Highlighting the importance of implementing training using the weightlifting method to develop muscular strength throughout the entire season, rather than limiting such training to the doses provided during the physical preparation phase alone.

5.2 Practical Significance:

- The current research aims to uncover the reality of programming muscular strength training during the in-season phase of the training cycle and the resulting positive indicators for the football player.
- The significance of the research also lies in providing a practical model for field professionals regarding muscular strength training via the method of weightlifting

in its various forms, aiming to elevate the level of athletic excellence for both the individual and the team.

-Utilizing the research findings to develop training modules within the training content for football players using the weightlifting method, which contributes, to some extent, to improving fundamental skills directly related to strength indicators, thereby preparing an athletic generation capable of keeping pace with the modern developments of the game.

6. Previous and Similar Studies:

6.1 Study by Jafar Mahmoud (2016), entitled "The Effect of Using Special Strength Exercises on Some Physical and Skill Abilities of Youth Football Players": The objective of this research was to prepare special strength exercises and investigate their impact on some physical and skill abilities of youth football players, as the researcher hypothesized that there were statistically significant differences between the experimental and control groups in the physical and skill abilities, in favor of the experimental group, where the study employed the experimental method on a research population and sample consisting of (25) players from the Al-Sina'a Sports Club, aged (16) years, with a final research sample of (20) players divided into two groups of (10) players each; the experimental intervention lasted for (8) weeks. The researcher concluded that the special physical and skill strength exercises within the training program led to development in all the physical and skill abilities under investigation, confirming that the program prepared by the coach developed the physical and skill abilities addressed by the researcher.

6.2 Study by Ismail Abdul-Jabbar Al-Zubaidi (2012), entitled "The Effect of Using Different Depths in Depth Jumping on Some Aspects of Muscular Strength for U17 Handball Players": This research aimed to identify the effect of training using depth jump exercises from different heights on explosive strength and speed-strength for U17 handball players, where the results showed differences between the three groups in favor of the post-test. The researcher hypothesized significant differences between pre-test and post-test measurements for explosive strength and speed-strength in favor of the post-test, and also between the three research groups in the post-test for these strength aspects. Relying on the experimental method, the research sample consisted of (24) players from Nineveh Governorate, as the program was implemented over (8) weeks, with (3) training units per week. The researcher found that the depth jump training program was effective in increasing both the explosive strength and



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speed-strength of the leg muscles for youth handball players, unlike the other two experimental groups, which used heights of (30-50) cm, where the researcher recommended the necessity of using depth jump training to develop explosive strength and speed-strength.

6.3 Study by Sid Mohammed Ketchouk (2012), entitled "The Effect of a Weight Training Program on Muscular Strength and Some Physiological Variables and Skill Performance of Youth Football Players": This study aimed to design a training program using modern weight training methods for football and to identify its impact, as the approach followed in the research was the experimental method, applied to a sample of (36) youth players divided into an experimental group and a control group, while the tools for the proposed program included physical and skill tests, and a questionnaire. Among the most important findings was a recommendation to generalize the use of weight training during the preparation period to develop some strength characteristics in football.

6.4 Commentary on Previous Studies:

Upon analyzing the content of the previous studies, it became evident that they are directly relevant to our research topic; our research angles converged with the selected studies in many aspects. In terms of the study objective, it was clear that most studies relied on the experimental method with one of the known experimental designs, which aligns with our study's adoption of the experimental method with an equivalent groups design. Regarding the sample, all studies utilized research samples that met the conditions allowing the researcher to generalize the findings.

Most importantly, we carefully selected our study variables, addressing a problem related to one of our study variables while investigating some facts related to both of the current study variables; furthermore, our reliance on physical tests as a research tool in all previous studies is highly consistent with the current study, finally, all of the reviewed studies concluded that there were statistically significant differences between the study variables, which lends great credibility to our approach to addressing the problem.

7- Study Terminology :

7.1 Weightlifting Exercises:

Defined as "a method of preparing and conditioning the athlete using graduated resistances to enhance the capacity for force production or application"

(Mohamed Sobhi Hassanein, 1992, p. 25), this approach forms the core of the experimental intervention.

7.2 Maximal Strength:

Conceptualized as "the highest level of force a muscle or muscle group can generate through a maximum voluntary contraction" (Sari Ahmed, 2001, p. 15), it represents one fundamental aspect of the strength qualities under investigation.

7.3 Explosive Strength:

Defined as "the ability to exert a sub-maximal force in the minimal possible time" (Talha Houssam Eddine et al., 2003, p. 67), thereby reflecting the high-velocity component of muscular performance.

7.4 Speed-Strength:

Understood as "the capacity to overcome external resistances with a high output of rapid force within a brief time frame and with minimal repetitions" (Amer Rashed, 2014, p. 32), this variable bridges the qualities of pure strength and movement speed.

7.5 In-Season Phase:

Referring to the second competitive period of the sports season which follows the first half, this phase typically incorporates a break for player recuperation and tactical reassessment by coaches, and it constitutes the specific temporal context for applying the training program.

8- Field Research Procedures

8.1 Pilot Study:

As characterized by (Issa Sobhi, 2007, p. 74) as a preliminary experimental investigation conducted on a limited sample prior to the main study, its purpose is to finalize research methodologies and instruments; accordingly, and in alignment with the research problem and objectives, the researcher undertook several steps to ensure the reliability of the selected tests, which included: reconnoitering the field site to meet logistical requirements, trialing the necessary tools and equipment—specifically those pertaining to weightlifting, and evaluating the appropriateness of the testing protocols for the specific sample.

8.2 Study Methodology:

Given that inquiry within the domain of sports training often necessitates empirical investigation, the researcher adopted the experimental method to achieve the stated objectives and address the research questions; this was implemented using a design featuring both an experimental and a control group,



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wherein the independent variable—the weightlifting exercise program—was applied solely to the experimental group's regimen.

8.3 Study Population and Sample:

The research population and the primary study sample are foundational to the research process; for this study, the population comprised all athletes from teams competing in the Regional Second Division - East, totaling 112 individuals, from which a representative sample of 30 players was intentionally selected for the core research.

8.4 Operational Control of Variables

8.4.1 Independent Variable:

This is the primary factor or intervention manipulated by the researcher to observe its effect on other outcomes, as its presence and variation are hypothesized to directly influence the state of the dependent variable(s); in the context of this study, the independent variable was explicitly defined as: "Weightlifting Exercises".

8.4.2 Dependent Variable:

These are the outcomes measured to assess the effect of the independent variable; for this research, the dependent variables are concretely identified as: "Maximal Strength, Speed-Strength, and Explosive Strength".

9. Research Scopes

9.1 Geographical Scope:

The practical aspects of the current field study were conducted with the NRBHT team.

9.2 Human Scope:

The study relied on the NRBHT club's U19 team as its participants.

9.3 Temporal Scope:

The work was carried out over the period extending from December 20, 2024, to February 20, 2025.

9.4 Introduction of the Experimental Factor:

This involved implementing muscular strength training exercises using the weightlifting method for the experimental group members, while meticulously adhering to all the rules, foundations, and principles of sports training—including load, timing, intensity, and rest periods—without disrupting the objectives of the sessions scheduled by the responsible coach; this stood in contrast to the control group, whose training program remained unchanged throughout this period.

10- Study Test Terminology

10.1 Sargent Vertical Jump Test:

a. Purpose: Designed to measure the explosive strength of the legs through a vertical jump upwards.

b. Instructions:

- The player is given a piece of chalk no less than 3 cm long, then stands facing the board, fully extends both arms upwards as high as possible, and marks the board with the chalk while ensuring both feet remain flat on the ground;
- subsequently, the subject extends the knees and pushes off with both feet simultaneously to jump vertically, vigorously swinging the arms forward to reach the maximum possible height.
- The best attempt is recorded in centimeters (Aurélien Broussal-Derval & Olivier Bolliet, 2012, P.38).

10.2 3 Meter Hop Test on One Foot:

a. Purpose of the Test: To measure the speed-strength of the lower body (leg muscles).

b. Testing Method: The subject stands with the hopping foot on the starting line and the free leg (swinging) behind; the player then hops as quickly as possible until crossing the 30-meter line, with subjects starting in pairs of equal ability and each player is given one attempt (Al-Hayani Mohamed Khader Asmar, 1999, p. 135).

10.3 Bench Press Test:

a. Purpose of the Test: This test measures the maximal strength of the muscles of the chest, shoulders, biceps, and triceps.

b. Performance Specifications: The subject assumes a supine position on a Swedish bench; two assistants hold the barbell at each end, allowing the subject to grip it with both hands in front of the chest with arms fully flexed at chest width; the subject then fully extends the arms and subsequently lowers the barbell to the chest.

c. Recording Method: The subject is given two attempts, and the best attempt is recorded in kilograms (Mowaffak Saeed Al-Dabbagh, 2002, p. 172).



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11. Psychometric Properties of the Instrument

11.1 Test Reliability:

As noted by (Mohamed Sobhi Hassanein, 1992, p. 25), a one-week interval between applications in physical education is considered an appropriate procedure for obtaining the reliability coefficient; consequently, using the simple "Pearson" correlation coefficient and after determining the tabulated value for the simple correlation coefficient at a significance level of 0.05, the reliability results for the tests under study were derived as follows:

- The Sargent Vertical Jump Test reliability coefficient equals 0.71.
- The Bench Press Test reliability coefficient equals 0.95.
- The 30-Meter Hop on One Foot Test reliability coefficient equals 0.73.

These results indicate that the tests under study possessed the attributes of reliability and stability during the application and re-application phase.

11.2 Test Validity:

It can be stated that validity is among the most important conditions for a good test, meaning that a test is valid if it is capable of measuring the trait or phenomenon for which it was designed; accordingly.

12. Statistical Processing

To address the study's questions, the Microsoft Excel program was used for the following statistical processing:

- Arithmetic Means.
- Standard Deviations.
- Student's T-Test.
- Simple Correlation Coefficient.

13. Presentation and Analysis of Test Results

13.1 Presentation and Analysis of Results for the Tests of Maximal Strength, Explosive Strength, and Speed-Strength

Two-sample test results	Statistical operations									
	Experimental Group Pre-test		Control Group Pre-test		Sample Size	Degrees of Freedom	Significance Level	Calculated t-value	Tabulated t-value	Statistical Significance
	Mean	Std. Dev.	Mean	Std. Dev.						
maximal strength test	49,6	179,29	48,13	173,99	15	14	0.05	0,92	2,04	Not Significant
Explosive test	9,53	34,20	9,2	33,25	15	14	0.05	0,70	2,04	Not Significant
Special velocity strength test	5	18,07	4,8	17,35	15	14	0.05	0,26	2,04	Not Significant

Table (01) presents the results of the pre-tests for both the experimental and control research samples:

Table 01 displays the pre-test results for both the experimental and control research samples; regarding the maximal strength test, members of the experimental research sample achieved a pre-test mean of 49.6 with a standard deviation of 179.29, while the control sample recorded a mean of 48.13 with a standard deviation of 173.99. The comparison between the group means yields a calculated t-value of 0.92, which is less than the tabulated t-value of 2.04 at 14 degrees of freedom and a 0.05 confidence level, thereby indicating no statistically significant difference between the two samples at the outset.

Concerning the explosive strength test, the experimental sample members obtained a pre-test mean of 9.53 with a standard deviation of 34.20, whereas the control sample showed a mean of 9.2 with a standard deviation of 33.25; the calculated t-value here is 0.70, which also falls below the critical value of 2.04,

thus confirming the absence of statistical significance between the two groups prior to the intervention.

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Similarly, for the speed-strength test, the experimental sample members recorded a pre-test mean of 5 with a standard deviation of 18.07, compared to the control sample's mean of 4.8 and standard deviation of 17.35. The resulting calculated t-value of 0.26 is substantially lower than the tabulated value of 2.04, which further substantiates the lack of statistical significance between the individuals of the two samples before implementing the experimental protocol.

13.2 Presentation and Analysis of Pre-Test and Post-Test Results for Muscular Strength Aspects in the Experimental Group

Table (02) presents the results of pre-test and post-test measurements for muscular strength aspects (maximal strength, explosive strength, speed-strength) in the experimental research sample:

Two-sample test results	Statistical operations									
	Experimental Group Pre-test		Control Group Pre-test		Sampl e Size	Degr es of Freed om	Signific ance Level	Calcula ted t- value	Tabulat ed t- value	Statistical Significan ce
	Mean	Std. Dev.	Mean	Std. Dev.						
Maximal strength test	49,6	179,29	52,2	188,61	15	14	0.05	4,48	2,14	Significant
Explosive test	9,53	34,20	10,08	36,38	15	14	0.05	3,41	2,14	Significant
Special velocity strength test	5	18,07	8,06	29,16	15	14	0.05	4,85	2,14	Significant

Table 2 presents the results of the pre- and post-tests for the experimental research sample; concerning the maximum strength trait test, the experimental sample subjects achieved the following results: a pre-test arithmetic mean of 49.6 with a data dispersion, indicated by a standard deviation, of 179.29, whereas in the post-test, the central tendency measured by the arithmetic mean was 52.2, with a data dispersion indicated by a standard deviation of 188.61. Upon comparing the means of the two measurements, the calculated t-value was found to be 4.48, which is greater than the critical t-value of 2.04 with 14 degrees of freedom and a

confidence level of 0.05, thereby indicating a statistically significant difference for the sample subjects between the two measurements.

Furthermore, for the explosive strength trait test, the experimental sample subjects obtained the following results: a pre-test arithmetic mean of 9.53 with a data dispersion, indicated by a standard deviation, of 34.20, while the post-test revealed a central tendency measured by an arithmetic mean of 10.08, with a data dispersion indicated by a standard deviation of 36.38. The comparison between the means of the two groups yielded a calculated t-value of 3.41, which also exceeds the critical t-value of 2.04 with 14 degrees of freedom and a confidence level of 0.05, thus demonstrating a statistically significant difference for the sample subjects between the two measurements.

Moreover, in the test for the strength trait characterized by speed, the experimental sample subjects achieved the following results: a pre-test arithmetic mean of 5 with a data dispersion, indicated by a standard deviation, of 18.07, while the post-test results showed a central tendency measured by an arithmetic mean of 8.06, with a data dispersion indicated by a standard deviation of 29.16. The comparison between the means of the two groups resulted in a calculated t-value of 4.85, which is greater than the critical t-value of 2.04 with 14 degrees of freedom and a confidence level of 0.05, this, in turn, confirms the presence of a statistically significant difference for the sample subjects between the two measurements.

13.3 Presentation and Analysis of Pre- and Post-Test Results for the Aspects of Muscular Strength in the Control Group

Table (3) illustrates the results of the pre- and post-tests for the aspects of muscular strength—namely, maximum strength, explosive strength, and strength characterized by speed—for the control research sample.

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Two-sample test results	Statistical operations									
	Experimental Group Pre-test		Control Group Pre-test		Sample Size	Degrees of Freedom	Significance Level	Calculated t-value	Tabulated t-value	Statistical Significance
	Mean	Std. Dev.	Mean	Std. Dev.						
Maximal strength test	48,13	173,99	48,33	174,71	15	14	0.05	0,68	2,14	Not Significant
Explosive test	9,2	33,25	9,46	34,22	15	14	0.05	0,83	2,14	Not Significant
Special velocity strength test	4,8	17,35	5,13	18,15	15	14	0.05	0,56	2,14	Not Significant

Table 3 presents the results of the pre-test and post-test assessments for the control research sample concerning the aspects of muscular strength; in the maximum strength test, the control sample members achieved a pre-test arithmetic mean of 48.13 with a data dispersion, indicated by a standard deviation, of 173.99, while the post-test results showed a central tendency measured by an arithmetic mean of 48.33, with data dispersion indicated by a standard deviation of 174.71. The comparison between the means of the two measurements reveals a calculated t-value of 0.68, which is less than the critical t-value of 2.04 with 14 degrees of freedom and a confidence level of 0.05, thereby indicating no statistically significant difference for the sample members between the two measurements.

Regarding the explosive strength trait test, the control sample members obtained a pre-test arithmetic mean of 9.2 with a data dispersion, indicated by a standard deviation, of 33.25; conversely, the post-test yielded a central tendency measured by an arithmetic mean of 9.46, with a data dispersion indicated by a standard deviation of 34.22. The comparison between the means of the two groups shows a calculated t-value of 0.83, which is also smaller than the critical t-value of 2.04 under the same degrees of freedom and confidence level, thus demonstrating no statistically significant difference for the sample members between the two measurements.

Moreover, in the test for the strength trait characterized by speed, the control sample subjects obtained the following results: a pre-test arithmetic mean of 4.8 with a data dispersion, indicated by a standard deviation, of 17.35, while the post-test results showed a central tendency measured by an arithmetic mean of

5.13, with a data dispersion indicated by a standard deviation of 18.15; the comparison between the means of the two groups resulted in a calculated t-value of 0.56, which is smaller than the critical t-value of 2.04 with 14 degrees of freedom and a confidence level of 0.05, and this, in turn, confirms the absence of a statistically significant difference for the sample subjects between the two measurements.

14- Discussion and Comparison of Results with the Hypothesis:

- «Weightlifting exercises during the in-season phase have an impact on some aspects of muscular strength in U19 football players».

Concerning the control group, following the progression through the various research stages and the application of appropriate statistical processing, it was revealed that there were no statistically significant differences for the control research sample members between the pre- and post-test measurements in the tests of muscular strength aspects—namely, maximum strength, explosive strength, and strength characterized by speed; the researcher interprets this by noting that this sample, during the return leg phase marking the beginning of the training season's end, did not receive the sufficient training loads for the muscular strength attribute that would induce fundamental changes, as the coach relied on the training foundation built during the physical preparation phase and provided strength training throughout the season that was far less than the requirements for this age group.

In contrast, for the experimental research sample subjected to weightlifting exercises, the results demonstrated statistically significant differences between the pre- and post-test assessments for the aspects of strength under study, with considerable developmental margins and rates; this is attributed, according to our study, to the positive impact elicited by the implemented exercises, reflecting the effects and feedback ascribed to the independent variable which introduces training against external forces using light and moderate weights, as noted by (Husni, 2009): "Weight training for developing muscular strength can be achieved using simple free weights or weight machines, or both methods combined, with simple weights being the least costly means of weight training" (Mohamed Hassan, 2008, p. 349).

Furthermore, when evaluating the daily needs of a football player for exerting efforts and achieving objectives, he requires muscular strength that enables him to perform, resist external forces imposed by the game and opponents, and maintain sustained effort over relatively prolonged periods; a football player carries his own body through various movements on the field—jumps, falls, and pushes—and considering that free weights and weightlifting



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machines are the most commonly used tools and equipment for training motor contractions with resistances.

Regarding training in football, the process requires the coach to possess several competencies, both relational and practical, enabling him to steer the process in an organized, scientific manner with a deliberate strategy, allowing for the development of players' capacities and the stabilization of performance during specific periods; the return leg phase of the training season necessitates recharging the player's battery to complete the season and account for the efforts expended during the first leg, as the adaptations acquired in one phase, upon cessation of those exercises, can lead to partial or complete loss of these adaptations (L'amara Salim, and Ouali Abdel Nour, 2025, p. 97).

Moreover, the results of our research align with the findings of studies by Sid Mohamed Ketchouk 2012, Ismail Abdel Jabbar Al-Zubaidi 2012, and Jaafar Mahmoud 2016, whose outcomes collectively concur with our study's results regarding the effect of the weightlifting variable on enhancing players' capabilities in the domain of strength and effecting fundamental changes with statistical significance.

General findings:

Following the systematic research procedures implemented within a rigorous scientific methodology to address a problem in sports training and physical preparation, it can be affirmatively stated that football coaches and physical preparers possess the capability to program sessions for developing aspects of muscular strength—specifically maximum strength, explosive strength, and strength characterized by speed—utilizing weightlifting exercises throughout the entire sports season, rather than confining such training solely to the preparatory phase; this approach is imperative as players critically require the enhancement of their physical and energetic capacities, particularly these key strength indicators, to fulfil their assigned tasks. In light of the obtained results, the following conclusions are substantiated:

- Statistically significant differences exist between the pre-test and post-test measurements for the experimental group, a finding attributed to the positive impact of the prescribed weightlifting exercises on developing maximum strength, explosive strength, and strength characterized by speed during the return leg phase for U19 football players.
- No statistically significant differences are observed between the pre-test and post-test measurements for the control group, which confirms the limited effect of their regular training regimen on developing the same muscular

strength aspects—maximum strength, explosive strength, and strength characterized by speed—during the same period.

Conclusion :

Attaining high performance levels, achieving seasonal objectives, and developing players capable of meeting the demands of modern football necessitate the integration of all theoretical knowledge underpinning training and physical preparation processes, combined with the practical application and field-testing of solutions for challenges faced by technical staff to elevate the player to a competency level that permits advancement to higher tiers and professionalism.

Accordingly, the findings of this study demonstrate that targeted training for this U19 age group is fundamental, as players at this stage peak in physical potential, and this capacity must be strategically leveraged and developed to facilitate a successful transition to the first team, as employing weightlifting exercises to enhance muscular strength provides the player with a distinct advantage, enabling improvements in functional performance, physique, and power, all of which are essential for optimal practice and competition.

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