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The effect of a proposed training program with a compound training method on some physical, functional and biochemical variables for futsal football players

Alaa Jassim Mohammed[1], Saif Rasheed Ghanim[2], AL-Yakthan Ali Salih3, Ayat Ali Salih[3], Maysa Khaled Ahmed[2]

[1]College of Physical Education and Sports Sciences, Tikrit University, Iraq.

[2]College of Physical Education and Sports Sciences Samarra University, Iraq.

[3]College of Education for pure sciences, Tikrit University, Iraq.

* Corresponding author: alaa.jasim@tu.edu.iq

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To identify the effect of complex training on some physical, functional and biochemical variables for hall football players. Participants: The study was conducted on the (20) players of the Tikrit University football team in halls for the season 2020-2021. The researchers used the experimental method using the experimental design for one group. By measurement (before-after) due to its suitability to the nature and objective of the research. The researchers conducted a number of physical tests and selected functional and biochemical measurements that are commensurate with the age and gender of the research sample before the start of the training program. Before and after, it was concluded that the proposed training program in the compound training method has an effective effect in developing the physical, functional and biochemical abilities of football players in the halls.

Keywords: Training program, Complex method, Physical variables, Functional, Biochemical, Futsal

1.Introduction:

Football players compete to show their physical and skill abilities in an effort to achieve the highest levels of technical and tactical performance in this game, which is characterized by competition and excitement because it relies on many physical and skill qualities that are only reached through scientific and renewable training methods to ensure keeping pace with the continuous development of the teams' performance levels. Competing in regional and international forums, and it is known that football as a team game includes in its physical and skill requirements many physical qualities that are mixed with game skills such as explosive power as in rising to the top and shooting, as well as the strength characterized by speed when repeated jumps or sharp defensive moves as well as speed as We see him launching a quick attack (Laith Ibrahim, 2010). Despite the player's endurance for this high effort, he must maintain his physical efficiency throughout the time of the match and here the importance of endurance appears for the accumulation of lactic acid and changes in biochemical variables that are directly related to the level of physical performance such as (LDH, CPK) as one of the most important factors affecting the level of performance The players during the two halves of the

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match, the player with low endurance and below the level will face the greater oxygen debt as a result of the increase in heart rate, pressure and respiratory rate, which leads to slow recovery and early fatigue and the consequent decrease in the level of performance, and accordingly it was necessary for the coaches to adopt modern and renewable training methods and methods To keep pace with the continuous improvement of the performance levels of the competing teams. (Abbas Fadel, Naseer Abbas, 1999).

Accordingly, international and even regional teams have used modern training methods that have contributed greatly to a distinct raising of physical and skill capabilities, which are positively reflected on the functional and biochemical aspect of the football game. European trainers and sports scientists developed complex training with the aim of obtaining advanced results by integrating resistance training (weights) of high intensity with plyometric training, and it became widely used in Western Europe in the mid-nineties, and complex training is a qualitative method through which to achieve maximum benefit. Possible plyometric exercise after performing similar weight training in the same muscle groups (Ebben WP, 2002).

And the sports training literature indicates that the use of two training methods in the same training unit can be referred to as a compound training method, that is, when muscle work is carried out according to two different training regimes, the training is complex, and the training using weights and plyometric training in the same training unit is called Compound training. (Ali Shabout Ibrahim, 2004). The adaptations in this method are made by mixing the effects of heavy weight training with shock exercises or what is called plyometrics, as we mentioned earlier, such as weight exercises followed by vertical jumping exercises. (Ebben WP, 2002).

Hence, it can be said that compound training is a qualitative method through which to achieve the maximum possible benefit from plyometric exercise after performing similar weight training in the same muscle groups. Or it is high intensity weight training followed by plyometric exercises in the same training group, provided that the mechanics of the kinetic paths of the exercises are similar. Some athletes perform weight training with plyometric exercises in the same training unit, through which the athletes can get the best results from their training. (Abdulaziz al-Nimr, Nariman al-Khatib, 1996).

From the above, we see that the complex training consists of two exercises in two different methods, which sheds a training burden that exceeds the training burden of the two methods individually. Together, and in this context, (Talha and others) indicate that “Hakinenen” mentions that weight training leads to an increase in strength, but the speed in performing the contraction remains constant and does not change. As for plyometric training, it leads to a noticeable increase in speed, but the change in muscular strength is slight, Therefore, complex training is used to increase strength through weight training, and supplement it with plyometric exercises to increase the acceleration of the same muscle group and in the same training unit, in order to develop the explosive ability, which is the maximum muscle contraction and the least time. (Talha et al., 1997). Under this concept, regular training using weights for a period of six weeks leads to an increase in the height of the vertical jump from stability by (3.3 cm), and that the plyometric training leads to an increase of (3.8 cm), while the combined training of both types for the same period leads to An increase of 10.7 cm. (Docherty, D. And onother, 2004)

The studies that dealt with complex training are of great importance, especially those that dealt with it in an integrated manner, as a study proved. (Omaim Salman Mahdi Al-Obaidi, 2010). The compound training was more effective than weight training and plyometric training in developing

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explosive power and speed characteristic. As for the study (the study of Magdy Abdel-Nabi Muhammad, 2009). She explained that training on actual playing situations through compound exercises and positional exercises improves the level of physical and skill performance of handball players. The most important results of the compound training in the study (Santos and Janira, 2008). The compound training method is more effective than the traditional method in raising the physical and functional efficiency of the players. As for a study (Jamie Nelson and Donna J. Terbizan, 2006). The results showed that the advantage of compound training at the expense of the traditional method in the development of muscle strength.

The multiplicity of previous studies indicates the importance of this type of training, and from here the researchers see that the importance of their research stems from the statement of the effect of complex training on some physical, functional and biochemical variables for football players in gymnasiums, as identifying the capabilities and capabilities of functional and biochemical athletes is one of the important necessities in the field. The athlete, which aims to reach the best possible level, through the application of scientific theories of physiology and sports training, which are based mainly on the effects and positive changes in the functional organs, which play a pivotal role in the level of performance of the players during the match, and from here comes the coaches' interest in training special physical qualities In the game, which reflects positively on the physiological side, and that many coaches do not have full knowledge of the physiological effects of physical effort related to the specificity of effectiveness, which is the football halls and the nature of the work of functional devices as well as the enzymatic work and their role in producing the necessary energy in the anaerobic system (lactic), The second matter is reflected in the importance of identifying those effects and the nature of the work of vital organs and the consequent awareness and knowledge of the trainers in preparing and designing training curricula and knowing the effect of training units on the functional devices of the players. Energy in the body on the one hand, and on the other hand, there is a weakness in the knowledge of some trainers of the relationship of enzymes (the subject of the study) to the process of releasing energy in the body, which the player needs to continue in sports performance, as well as not rationing training loads in terms of (intensity, size and comfort) in light of changes Occurring in the effectiveness of enzymes and according to the energy system most used in the game of football halls, and to verify this, the goal was to identify the effect of complex training on some physical, functional and biochemical variables of football players halls.

2.Procedures and Measurements:

2.1. Participants:

The study was conducted on Tikrit University football team players, which numbered (20) players for the season 2020-2021.

2.2. Measures:

The researchers used the experimental method by using the experimental design for one group and by measurement (pre-post) for its suitability to the nature and objective of the research. The researchers conducted a number of physical tests and selected functional and biochemical measurements that are commensurate with the age and gender of the research sample before the start of the training program, which are as follows:

- **physical tests**

- The explosive power of the legs (Sargent's vertical jump test). (**Mohammed Hassan Allawi & Mohamed Nasr El-Din Radwan, 2002**)
- Strength test characteristic of speed for the legs. Partridge test, the maximum distance within 10 seconds. (**Robert Morford, 2008**).
- Strength endurance test for the legs Test jump from the squat in the same place for a period of (45 seconds). (**Haider Faeq Ali Al-Shammaa, 1998**).

- **Functional tests**

- Heart rate
- Respiration rate

- **biochemical measurements**

- Lactate Dehydrogenase LDH.
- CPK Creatine Phosphokinase**.**

2.3.The proposed training program in the complex method:

In achieving the objectives of the research, the researchers relied on building a proposed training curriculum using the complex training method, and that the sources mentioned multiple forms of complex training.

Suggested forms of compound training

2.4.The general form of complex training: which is performed by the athlete performing all the exercises intended for weight training in all its groups, and then given a sufficient rest period before performing the plyometric exercises in all its groups.

2.5.The qualitative form of complex training: This form is carried out by the athlete performing the exercises in a manner commensurate with the kinetic paths of the game of football halls, where the athlete performs all the groups prepared for one weights exercise for a specific muscle group and then immediately followed by all the groups prepared for one plyometric exercise for the same muscle group with a sufficient rest period between the two groups (Weights and plyometrics).

2.6. Competitive form of complex training: This form is somewhat similar to the qualitative form in the method of application, as the athlete performs one exercise for a specific muscle group, immediately followed by one plyometric exercise for the same muscle group, with the abolition of the rest period completely between weights exercise and the plyometric exercise that follows it directly and increasing the rest period between the chains training.

The researchers combined weight training with plyometric exercises under the framework of the three aforementioned forms of complex training, since weight training develops and stimulates muscle fibers and combines it with plyometric exercises, and such a type of exercise leads to achieving the maximum benefit by its direct and effective impact on the development of muscle strength as well as its effects on the system In addition to its effects on the elasticity of the muscle, which is positively reflected on the physiological side, and this is what suits the football player in the halls.

The proposed training program went through several stages of its construction, as follows:

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First: Defining the theoretical vocabulary of the program, as the researchers relied on scientific sources that dealt with complex training, which were agreed that it is weight training with a high intensity, followed by plyometric training for the same muscle groups.

Second: The two researchers built the general features of the proposed training program in accordance with the approved training frameworks and controls and according to the concept of complex training, and then presented these features to a group of experts in the field of sports training, which includes the following features:

- Program-specific variable: Complex training
- Game Jurisdiction: Football Futsal
- Sample level: Tikrit University football team players in halls.
- The objective of the program: To develop some physical, functional and biochemical abilities.
- Course duration: ten weeks.
- Number of training units: 30 training units, 3 training units per week.
- Training program time: 45 minutes, which represents a total time of 1350 minutes for the proposed training curriculum.
- The training method used: repetitive, periodic, continuous.
- Types of compound training used: general compound training, qualitative compound training, competitive compound training.
- Dividing the classes of the types of complex training: three weeks for the general complex, four weeks for the specific, three weeks for the competitive.
- Training intensity used: 75-85%
- Work-to-rest ratio: 2:1, 2:2, 1:2.
- The mechanism of rationing the training load: weight of weight, performance time, repetition.
- Adoption of the principle of ripples in the stresses of training units in the events of training adaptations.
- Inter-rest periods: vary according to the training goal, and are rationed by heart rate and time.

3.Results

After the researchers unpacked the results of the data for the pre and post tests of the research group and processed them statistically, the results were as shown in Table (1):

Table (1) It shows the arithmetic means, standard deviation, calculated (t) values and (sig) values in the pre and posttests.

Search variables		**The pretest**		**Post test**		**t**	**Sig. (2-tailed)**
		Mean	**Std. Deviation**	**Mean**	**Std. Deviation**		
physical variables	Explosive power of the legs	**36.1500**	**1.18210**	**48.5000**	**1.70139**	**-24.251-**	**.000**

	The speed characteristic of the legs	**74.8000**	**2.14231**	**88.5000**	**.51299**	**-26.417-**	**.000**
	Bearing the strength of the legs	**22.2000**	**3.94168**	**33.0000**	**1.94666**	**-10.672-**	**.000**
functional variables	Heart rate	**167.1000**	**1.55259**	**141.6500**	**1.72520**	**45.110**	**.000**
	Respiration rate	**32.2000**	**1.36111**	**23.5000**	**1.14708**	**20.536**	**.000**
biochemical variables	Lactate Dehydrogenase LDH	**388.7**	**14.268**	**595.8**	**7.776**	**45.573**	**.000**
	Creatine CPK Phosphokinase	**161**	**11.089**	**451**	**12.872**	**47.698**	**.000**

From Table (1) shows the arithmetic mean of the differences, standard deviation, level of error (sig) and the significance of the differences between the pre and post tests. Significance between the pre and post tests and in favor of the post test.

4. Discussion

Through the achieved results, the significant differences between the pre-test and the post-test were shown, as the results showed significant differences in relation to the physical variables. Training units codified in a modern training style to suit the game of football halls and its physical requirements, as the training load that the experimental group underwent contained a mixture of weight training and plyometrics, making it the ideal training vocabulary for developing explosive power, resulting in clear adaptations in the explosive power due to its contents of High training stress and this is what Muhammad Reda emphasized that the method of raising or increasing the intensity during the training unit or the training phase is one of the important methods that coaches must focus on when used in training because it increases the ability of the athlete. (Mohammed Reda Ibrahim, 2009). This is consistent with the findings of "Docherty and Robbins" that the use of compound training is sufficient to increase the explosive power in the upper and lower extremities and can be used in training to improve performance. (Docherty, D. And onother, 2004).

The results also showed significant differences in speed-distinguished strength, which were recorded through the positive differences of the post-tests of force-distinguished speed at the expense of tribal tests. (Hamid Al-Rubaie, 2009). They concluded that the development in strength characterized by speed is due to the use of weights, which is a basic means for the development of muscular strength of all kinds, and that training with weights can direct certain muscle groups to bring about development in them, as the exercises that used the increase in intensity, weight led to this development. (Abdul Moneim Hussein Sabr, 2009).

DOI: 10.33687/jhssr.001.03.00033

With regard to the differences in the pre and post tests of the strength endurance test, the researchers believe that the use of appropriate training methods and methods within the proposed program had a significant impact on developing the endurance of the two men's strength. Muscles have different motor paths, which means prolonging the work period for that muscle or group, which makes this type contribute to raising the muscle's endurance, in addition to building muscle fibers in a more balanced and comprehensive way than the rest of the training types, and this physical fitness and motor skill are among the general requirements for the game of ball The foot halls, which interfere with the requirements of the game, so endurance of strength is among the most important physical elements that enable the player to continue to move efficiently to take the right place offensively or defensively, as well as to jump strongly throughout the match, as the direct meaning of muscle skin or endurance of strength is the continuation of the performance of the effort What is done against resistances of medium intensity, as the greatest burden of work falls on the muscular system. (Mohammed Sobhi Hassanein, Ahmed Kesri, 1998).

As for functional changes (respiratory rate), the researchers see a significant reason for the differences due to the effectiveness of the proposed training program. The opinion of the researchers agrees with (Qasim Hassan Hussein) that regular exercise leads to positive functional changes in the respiratory system (such as the growth of chest muscles and an increase in the size of the chest muscles). lungs and widening of the thoracic cage), which improves and increases the process of gas exchange between the blood and alveoli, and economical breathing movements (respiration rate) due to an increase in vital capacity. (Qasim Hassan Hussein, 1990). This is a reinforcement that emphasizes superiority in statistical estimation, i.e. positive functional changes occur.

As for the decrease in the heart rate variable among the research sample members, it is due to the given regular exercise, as the change in the pulse depends on the level of exercise applied, which would improve the efficiency of the circulatory system so that the heart rate decreases with the increase in the size of the stroke. Heart rate as a good indicator of the individual's physical capacity, especially the circulatory system.

There is a relationship between the stroke size and the number of heart beats. The larger the stroke, the lower the heart rate, and this happens when the respiratory system adapts. (Gloser, Diana, 1991).

The two researchers agree with the results of a study conducted by (SAMUE & ABED), which showed that the regular practice of physical activity leads to a decrease in heart rate and respiratory rate at rest. (SAMUEL, and ABE, 1988). It is noteworthy that the number of heartbeats in individuals who exercise in sports is characterized by a greater heart pumping efficiency and a large cardiac output, offset by a decrease in the heart rate at rest. (Guyton Hall, 1997).

Also, the high level of CPK enzyme in the post test is due to the fact that CPK is stimulated after physical efforts to phosphorylate ADP, that is, it supports anaerobic energy processes during biochemical reactions to produce energy to support muscle requirements for rapid energy for short periods of time, and this is consistent with what was indicated Fuchs reports that CPK catalyzes reactions related to ATP production within the anaerobic energy system. (Keteyian, S, J, Fox, 1998).

The researchers believe that the high level of CPK enzyme after physical exertion is due to the effects resulting from performance at a high level of intensity and impact, which imposes high and great burdens on the muscles as a result of anaerobic metabolism and the resulting rise in the products of

metabolic processes, which makes CPK enzyme high in its concentration level for a longer period After physical exertion in order to support muscle metabolism and get rid of catabolic waste.

Also, the high level of LDH enzyme after exercise is due to the essential and vital role it plays in the biochemical reactions of the anaerobic glucocorticosteroid system, which is the system on which players depend in performing physical efforts, and this is consistent with what Atul and others have stated that continuing to perform a physical load High intensity rated for (60s) seconds leads to a significant increase in blood LDH immediately after performance. (Atweel el.Al, 1991). In addition, LDH catalyzes the reactions related to the conversion of pyrones to lactate, which is consistent with the findings of Robergs and Roberts that LDH catalyzes the reactions of converting pyrones to lactate. (Robergs and Roberts.2000).

5. Conclusions

Complex training has a positive impact on the development of the physical, functional and biochemical abilities of football players in gymnasiums, as the complex training has proven the comprehensive and balanced development of physical abilities, which led to a significant increase in the effectiveness of the enzyme (CPK, LDH) when implementing training loads and according to the anaerobic energy production system - Lactic acid, as well as reducing the heart rate and breathing rate during rest, that the use of the compound training method in physical preparation in the game of football halls proved its effectiveness in developing and improving the variables of the study and thus that this development will be positively reflected on the level of performance during the matches.

In light of the results, the researchers recommend the use of complex training as an effective method for developing physical, functional and biochemical capabilities, with the need to conduct scientific research for modern methods and methods on this training method to increase the benefit that is reflected on the level of football players in halls to keep pace with the development of the game at the Arab and regional levels, as well as Conducting research that highlights the effects of compound training for games other than futsal and the level of other samples.

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