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The effect of axial stability exercises by mobile contraction of the rectus muscles of the thighs on the explosive ability of the legs and the handling accuracy of young football players

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Abstract
The research aimed to prepare exercises axial stability mobile contraction of the rectus muscles of the thighs for young players in football, and to identify the impact of these exercises on the explosive ability of the legs and the accuracy of handling for young players in football, and the researcher assumed that there are statistically significant differences between the results of the pre- and post-tests of the experimental and control research groups for both the explosive ability of the two legs and the accuracy of handling in football, and there are statistically significant differences between the results of the tests of the experimental research groups and the dimensional control of each of the ability The experimental approach was adopted by designing the experimental and control groups on a sample deliberately selected from Al-Zawraa Sports Club, who are continuing their training in the period of special preparation for the sports season (2022-2023), numbering (18) by (75%) from their community of origin**,** After choosing the appropriate measurement tools for the research sample and its specificity, the exercises were prepared to be at the beginning of the main section of the training unit, and the repetitions ranged from (5-10) repetitions in contrast to the training intensity (85-95%), and each training unit (3-4) exercises interspersed with a rest period of (2-5) minutes, and at a rate of (3) training units per week, and a total of (24) training units for these exercises, and after the end of the research experiment by conducting post-tests, the data was processed with the (SPSS) system, to be the conclusions and applications that the application of pivot stability exercises The mobile contraction of the rectus muscles of the thighs helps in the development of the explosive ability of the legs, and in improving the handling accuracy of young football players, and they outperform the development of players who train without it, young players need football, To take into account the duration of each exercise not to press excessive training with them to reach the required goals at the expense of organizing axial stability by moving contraction of the rectus muscles of the thighs, and it is necessary to set realistic achievable goals in this type of exercise and the time allocated to it must be at the beginning of the main section in the training unit and not to exaggerate the high training loads of contractions on the means of balance used in axial stability exercises.

Keywords: Axial stability, leg explosive power, football handling precision

Introduction

Research problem and its importance

Just as the explosive force depends on the number of resistances and the speed at which the muscular contractions of the muscles that produce this ability are produced in the mobile contraction, the static contraction is of great importance in targeting the muscular strength component, which is one of the most important physical capabilities that are related to its training with the rest of the components, and to avoid exaggerations in resistance training that It causes stress to football players, and at the same time they are more susceptible to muscle tears in the training units, which prevents them from participating in matches, as it was found that (30%) of the players suffer from the training they receive with violent stress in order to develop their level, which means that it is possible to adopt Training methods that enable the players to perform the movement of muscle contractions without external resistance so that the resistance is internal, represented by the contractions of maintaining the body with axial stability by achieving the theory of balance on both sides of the body, in front of it and behind it, and then obtaining the amount of strength required for the explosive ability of the two legs, which is the requirement of every player in soccer.

As "the most important characteristic of sports training is its connection with the theories and foundations of other sciences on which it depends mainly in the formation of its various knowledge and information, and thus, sports training is the outcome of that interconnected mixture of different sciences, and perhaps the reason is due to the fact that this science aims to improve the development of human physical performance to achieve the highest levels of sport. (Abu Al-Roumi, 2018, pg. 5) [1].

Considering that "the organization of work on the central nervous system depends on the function and the system and that the composition and complexity of the system and the function are compatible through this important system."

Also, "excitement has a role in stimulating the nerves, and as a result, the strength and speed of the mechanical action of the muscles affected or resulting from this stimulation requires vital energy for its continuation, and then the cessation of stimulation leads to the cessation of the chemical processes related to the liberation of the energy of these muscles." (Guyton, 2010, p:232) [21].

Considering that "the load given to the player causes excitement and change in the vital organs and systems of the body from a functional and chemical point of view. on this pregnancy. (Abu Zaid, 2007, p. 126) [2].

And that the ability of balance in general is of two types: static balance, which means the ability that allows the body to maintain stability without falling or shaking when taking certain positions, and kinetic balance, which means the ability that allows balance during a specific movement performance. (Sawy and Al-Jourani, 2013, p. 35) [11].

Likewise, "axial stability exercises must take into account the rules of balance, whether in performance or in stability, and support the improvement of balance by relying on increasing the activation of the work of the diffuse muscle sensors, because the vestibular system does not develop through training because it is like a helm that tells the brain about the body's positions without issuing orders, and this This confirms that the vestibular system's role is informative and not controlling, as is the prevailing idea, and it is possible to improve the effectiveness of its neurophysiological work and not to develop its structures."

He also "was believed that the human skeletal muscle fibers are innervated by only one nerve cell branch, but this branch may be one among (10-1000) similar branches, possessing the same axon, so each axon has a connection through its branches." peripheral with a number of muscle fibers and this functional unit is called a motor unit (motor unit), and that the size of the motor units (muscle fibers and nerve cells) varies within the muscle, as well as their number."

And to delve into the details of this axial stability, "after the arrival of the signal and the secretion of acetylcholine, sodium ions are depleted and a potential difference occurs, which runs along the muscular fiber membrane in the same way that the action potentials apply to the membranes of neurons, and at this moment the calcium ion stimulation begins to release, which was It is stored in the reticulum and goes to the muscle fibrils, and calcium ions work by generating attractive forces between the actin and myosin filaments, which leads to the formation of transverse bridges and then sliding over each other, and we note that the membrane at this stage becomes very permeable to sodium ions, allowing large numbers of them to flow into the axis Axon) and lose the state of polarization represented by an amount (-90 millivolts) with a rapid rise of the voltage towards the positive direction and it is called depolarization The central nervous system reaches the voltage to zero only and does not exceed the positive voltage. All of this happens within a part of a thousandth of a second, and after the membrane becomes highly permeable to sodium ions, which lasts for a part of a thousandth of a second, the sodium channels begin to close and the potassium channels open more than their condition. And then the rapid redeployment of potassium ions outwards is called the depolarization stage, as calcium ions are pumped back into the sarcoplasmic reticulum to begin the state of relaxation. (Gyton & Hall, 2020, p:91) [22].

Since we are unable to coordinate the movements of our body without the sensors, which provide us with information about our muscles and the locations of our movements and joints, and the receptors for the nerve endings in the muscles, tendons, and joints and the information received from them give us the basis and the sensation to make the movements coordinated, and cooperate with the vestibular sense (the sense of steering or balancing the body)".

As for the balance tools used in axial stability exercises, they are defined as unstable bases and supports that aim to stimulate the vestibular system's information to feel unbalanced, to prompt the body to change its positions with muscle contractions that tighten its stature to avoid falling. (Collins & Other, 2007, p: 399) [19]

The balancing tools also differ between them in terms of the type of their material or in terms of their effect on the body's balance, and they are of the following types: sponge tools, such as a thick, highly malleable rug, which makes the individual feel the softness of its flat surface, and rubber tools, which are in the form of figures on which players walk, and balls Large Chinese inflatables filled with air, hard plastic and wood ware have a narrow base and a wide surface. Frizzell & Dunn, 2015, P:404-405 [20].

To preserve the axial stability in balance, directing the orders of the directions of nerve impulses from the cerebral cortex is towards the muscles that increase the body's control of stability in abnormal conditions of balance. We focused on it or increased this tension according to what is required to ensure a sense of balance, and repetition with different positions using means of improving balance helps us to quickly take the balance position if we encounter unstable conditions for the body." (Bronner & Ojofeitimi, 2013, P:370) [17]

Through the work of the academic researcher in sports training and being a football coach, he noticed that the exercises used to develop the explosive ability of the two men need to be rationed to ensure the safety of the players on the one hand and achieve the desired goals of this development on the other hand. Young players from the advanced level in the local clubs with football in the open arenas, which calls for an attempt to experiment so that the importance envisaged by this research is that it may theoretically benefit the coaches by increasing their knowledge about explosive power exercises and the accuracy of long handling, and in practice it may benefit the soccer players themselves in Developing their capabilities at the level of the explosive ability of the two men and the accuracy of handling, and overcoming the low level or skill weakness observed in this problem.

Research aims

1. Preparation of axial stability exercises by mobile contraction of the rectus femoris muscles of the thighs for young soccer players.
2. To identify the effect of the axial stability exercises by the mobile contraction of the rectus muscles of the thighs on the explosive ability of the two legs of the youth soccer players.
3. To identify the effect of the axial stability exercises by the mobile contraction of the rectus muscles of the thighs on the handling accuracy of the youth soccer players.

Research hypotheses

1. There are statistically significant differences between the results of the pre and post tests of the experimental and control groups for each of the explosive power of the two men and the accuracy of handling football.
2. There are statistically significant differences between the results of the experimental and control group posttests for each of the explosive power of the two men and the accuracy of football handling.

Research limits

Human Borders: Al-Zawraa Youth Football Club players (Outdoor stadiums) for the sports season (2022-2023).
Time limits: for the period from (9/1/2023) to (12/3/2023).
Spatial borders: Baghdad / Karkh / Al-Zawraa Sports Club football stadium.

Research Methodology

To reach a solution to the existing problem, the researcher adopted the experimental research approach, which is defined as "a pattern of research in which the researcher controls one or more variables to bring about a deliberate and controlled change to the specified conditions and interprets the results of this change." (Muhammad, 2016, p. 48) The experimental design with two groups, the experimental and the equal control, was also approved by the control of the pre and posttests.
The research community and its sample:
The limits of the research community were represented by the young players in Al-Zawraa Football Club, who are (24) players who are continuing their training for the sports season (2022-2023), from whom (2) injured players were excluded. The research sample was chosen from them by the intentional method (18) A percentage of (75%) of their original community, then they were divided
into two groups, experimental and control, according to the requirements of the experimental design, with an equal number of each of them (8) players. For the experimental design, in which the values of the distortion coefficients ranged between (+1), and (4) players were selected from them for the survey sample, with a rate of (16.667%) from their original community.

Measurement and procedures

To measure the explosive power of the two men, the Sargent jump-up test was used (Al-Hakim, 2004, p. 88), and to measure the accuracy of the handling skill, the (Hamza, 2009, p. 14) test was used (Appendix 1). (9/1/2023), the researcher prepared axial stability exercises by adopting the foundations and principles of modern sports training in football, by adopting the principle of privacy and the type of the sample of the applicants, taking into account the individual ability of each of them, and by adopting the tests for the duration of the balance time for the required intensity by standing on a stick With both feet, in the sense that the longer the time of axial stability with balance, the greater the intensity of the exercise, and according to the determinants of the high-intensity interval training method, and fluctuating in its difficulty between one exercise and another within one training unit, and between one training unit and another applied on days (Sunday, Tuesday, and Thursday) From each week of time, and between one training week and another, the principle of ripple was taken into account in determining the training loads, and by adopting the principle of exchange and diversification in these targeted exercises for the rectus femoris muscle, and according to the determinants of the phosphogenic anaerobic system, the training load was planned to suit the improvement of spatial accuracy by controlling muscle contractions for the skill of handling To obtain accuracy with this control, and these exercises are at the beginning of the main section of the training unit, and the repetitions range from (5-10) repetitions in contrast to the training intensity (85-95%), and for each training unit (3-4) exercises interspersed with a rest period (2-5) minutes, at an average of (3) training units per week, with a total of (24) training units for these exercises, and several means were used for axial stability exercises to stand with moving balance on them, represented by half a medicine ball (Appendix 2), and pieces of sponge In the form of rectangles measuring (10 x 30) cm distributed on the playing field, pieces of wood and trays, and Chinese air balls, over which the player walks to perform axial stability according to the time allotted for each training intensity, which as it increases increases the training intensity as mentioned. The application of the exercises was in the training units allocated for the period of special preparation. The duration of the training unit was (90) minutes, and the application of the axial stability exercises began with the mobile contraction of the rectus muscles of the thighs from Sunday corresponding to the date (15/1/2023) until Thursday corresponding to the date (3/9). /2023), in which the players of the experimental group meet balance exercises with the moving contraction of the rectus muscles of the thighs, while the players of the control group are satisfied with the explosive power exercises followed by their coach, and after the end of the research experiment, they conduct the post-tests on Sunday corresponding to (3/12/2023) The data were processed using the SPSS system to extract the values of each of the percentage, the arithmetic mean, the standard deviation, the torsion coefficient, the t-test for correlated samples, and the t-test for uncorrelated samples.

Results and Discussion

The researcher attributes the emergence of these results among the players of the experimental group to the positive effect of the axial stability exercises by the mobile contraction of the rectus femoris muscles, which helped to develop the work of the stabilizing muscles, auxiliary and opposite to the work of the rectus femoris muscle. To increase the efficiency of neuromuscular control in controlling the amount of contractions that produce the explosive power of the two legs, and by knowing the systolic position of the muscles at axial stability by standing on balance tools to increase the capabilities of the players to

make their movements in the performance of the handling skill that is characterized by spatial accuracy, and this is what the principle of gradualness in the training load helped In this, I was able to control the neuromuscular, by strengthening the relationship between the instructions and the sensations, and according to the brain's directing of this motor program for the skillful performance of the accuracy of the skill of long handling in football, in addition to that the axial stability exercises with the moving contraction of my rectus muscle of the thighs had a clear positive role in that it It is characterized by the availability of safety and security factors in the exercises and the availability of the elements of excitement and suspense in the training environment and departure from the stereotypes in the players bearing the burden of resistances of various kinds, to show these results are supportive in the development of the muscular work of the rectus muscle in the directions of contractions appropriate to expel the handling by kicking the ball with an explosive ability that the player controls and helps On improving its effectiveness, it had a positive impact on improving the accuracy of performing this skill, and these exercises were suitable for them, their age and gender, which showed their superiority in the results of the post-tests on the development of their peers from the players of the control group, who developed the explosive ability of the two men and improved their level of handling accuracy However, they did not reach what their peers in the experimental group achieved in this development and improvement.

Table 1: Shows the results of the tribal tests between the two research groups

Th test	Group and number		Arithmetic mean	Standard deviation	(Levene)	(sig.)	(t)	(sig.)	The difference
The explosive power of the two men	Experimental	(9)	33.11	2,472	0.215	0.649	1,978	0.065	Non
	Control	(9)	35.33	2,291					
Football handling accuracy	Experimental	(9)	4.78	1,202	0.131	0.722	0.933	0.365	Non
	Control	(9)	5.33	1,323					

Non-significant: (Sig) < (0.05) at the level of significance (0.05) and degree of freedom n-2 = (16)

Table 2: Shows the results of the pre and post tests for the two research groups

Th test	The group	Comparison	Mean	S.d	A.v	D.v	(t)	(sig.)	The difference
The explosive power of the two men	Experimental (9)	Tribal	33.11	2,472	13	2,915	13,377	0.000	D
		after me	46.11	1,167					
	control (9)	Tribal	35.33	2,291	4,444	2,833	4,706	0.002	D
		after me	39.78	3,667					
Football handling accuracy	Experimental (9)	Tribal	4.78	1,202	3,889	1,364	8,552	0.000	D
		after me	8.67	0.5					
	control (9)	Tribal	5.33	1,323	1,111	0.782	4,264	0.003	D
		after me	6.44	0.882					

D: (Sig) > (0.05) at the level of significance (0.05) and degree of freedom (n) - (1) for each group.

Table 3: Shows the results of post-tests between the experimental and control groups

The test and the unit of measure	The group	The number	Arithmetic mean	S.D	(t)	(Sig.)	The meaning of the difference
Explosive capacity of the legs (cm)	Experimental	(9)	46.11	1,167	4,938	0.000	D
	control	(9)	39.78	3,667			
Football Handling Accuracy (degrees)	Experimental	(9)	8.67	0.5	6,576	0.000	D
	Control	(9)	6.44	0.882			

D: (Sig) > (0.05) at the level of significance (0.05) and the degree of freedom (n1 + n2-2) = (16)

As "in the succession of exercise, the relationship between the brain and the muscles is strengthened, and the repetition helps to neglect the external stimuli in performing the movement, and this succession serves in subjecting the body to a change in the improvement of strength and athletic skill in the end." (Lee & Brenda, 2007, P:157) [23].

Also, "the exercises must be closely linked to the movements in the skill, so it is necessary to develop the physical capabilities associated with the basic skills through designing special training programs for each sporting activity, and this means that the training program must focus on the muscles working in the performance itself."

As it is required in our use of balance tools in exercises that we be careful not to exaggerate in disturbing the base of balance to the extent that requires movements that exceed the ability of the individual and the level of his muscle strength and his ability to react neuro-motor to control the confusion of the stature, which in this case would be more harm than good from using them.

The factors affecting the production of muscle force are determined by the number of excited muscle fibers, the cross-section of the muscle or muscles participating in the performance, the composition of the muscle fibers, the angle of muscle force production, the length and relaxation of the muscle or muscles before contraction, the length of time spent in muscle contraction, and its degree. The compatibility of the muscles involved in the performance, and the emotional state of the player before and during the production of muscle strength, age, gender, and warm-up." (Salman *et al*., 2010, pp. 66-69) [10]

"The exercises to develop muscle strength make the player better able to deal with the requirements of the specialized game."

"As all the physical activities of the player lead to the occurrence of many physical changes, but when these activities occur on the body according to regular scientific

rules, it then leads to an improvement in achievement." (Al-Anbaki, 2010, p. 45) [14]

Also, "the nerve signal in the muscle is strengthened by the effect of exercise on the efficiency of the locomotor system, and it stimulates the movement centers in the cerebral cortex and inhibits the centers of impulses."

And that the performance of any skill is less than the maximum intensity or an intensity commensurate with the skill performance requirements (ideal intensity of performance) in most cases of play. (Al-Hayali, 2007, p. 151) [6]

Likewise, "the rate of activation of motor units and control over the style of excitement is the main factor between good performance and not so good performance." (Saad Al-Din, 2000, p. 30) [9]

As it is "the repetition of any kind of skill that develops the player's sense of feeling with the ball." (Al-Zahawi, 2004, pg. 92) [8]

"The handling skill is one of the most frequent skills in matches, and it is the most important effectiveness in football compared to other skills."

Conclusions and Recommendations

1. The application of axial stability exercises by the mobile contraction of the rectus muscles of the thighs helps in developing the explosive ability of the two legs of the youth football players, and they excel in the development of the players who train without them.
2. The application of the axial stability exercises by the mobile contraction of the rectus muscles of the thighs helps in improving the handling accuracy of the youth soccer players, and they outperform the improvement of the players who train without it.
3. Young soccer players need to take into account the duration of each exercise by not applying excessive pressure with them to achieve the required goals at the expense of regulating axial stability by the mobile contraction of the rectus muscles of the thighs.
4. It is necessary to set realistic goals that can be achieved in this type of exercise, and the time allotted for it must be at the beginning of the main section in the training unit and not to exaggerate the high training loads of the contractions on the means of balance used in the axial stability exercises.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix (1) illustrates the accuracy of football handling skill test

Handling towards a small target at a distance of (20) meters: (Hamza, 2009, p. 14)

- Objective of the test: measuring handling accuracy
- **Tools used:** (5) soccer balls, a small goal (dimensions 110 cm x 63 cm)
- **Test procedures:** The starting line is drawn at a length of (1) m, and at a distance of (20) m from the small target, we place a fixed ball on the starting line as shown in Figure (1).
- **Description of performance:** The player stands behind the starting line facing the small goal, and when the signal is given, he begins to handle the ball towards the goal to enter it. Each player is given 5 consecutive attempts.
- **Registration**: The score is calculated by the total scores obtained by the player from handling the five balls as follows:
- Two points for each correct attempt to enter the small goal.
- 1 point if the ball touches the post or the crossbar and does not enter the goal.
- Zero if the ball goes out of the small goal.
- The maximum score for the test is (10) degrees.

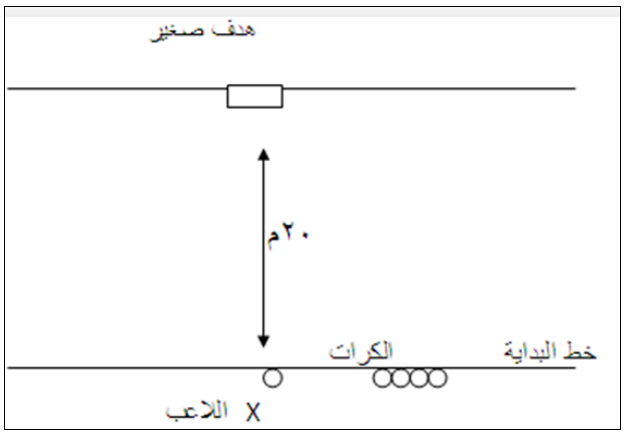

Fig 1: Shows the scheme of the handling test towards a small target 20m away

Appendix (2) shows a picture that represents a model of the means of balance used in the exercises of axial stability by the mobile contraction of the rectus muscles of the thighs