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## The effect of moving balance exercises in some electrical indicators of the two straight thighs and the performance of the front hands jump skill on the rug of ground movements

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### Abstract

This study aims to prepare moving balance exercises to improve the performance of the skill of the front hands on the rug of the ground movements at the research One with two tribal and post tests, on a sample chosen in the intentional way in a comprehensive method of Comprehensiveness (100%) to represent the research sample of (12) players from the young players who continue their training in the talent care center Sports for Al-Ghumnastec in Baghdad for the Sports Decree (2021-2022). It was experimented at the beginning of the main section of the training unit at an average of (3) training units per week, and with a total of (24) training units for these exercises, and several means of weights were used, and after At the end of the experiment, it was done Treating the results (SPSS) so that the extracts and applications are that the application of moving balance exercises improves the summit of electrical signal activity (EMG) and reduces its area in both the straight and right Straight thighs and helps improve the performance of the front hands jump skill on the motion of the movements The ground for young players at the Sports Care Center for Gymnast, and young players in the Sports Welfare Care Center for Gymnast need to take into account the training of the training in the moving balance training that improves the skill performance, and to take into account the duration of each exercise in a style and not pressure with excessive training with them to achieve the required goals At the expense of organizing the electrical signal (EMG) for their muscular cells, it is necessary to set goals that can be investigated realistically in this The type of training and the exercises allocated to them must be at the beginning of the main section in the training unit and not to exaggerate the load of young players in the sports care center for gymnasium training loads.

**Keywords:** Moving balance, electrical indicators, land movements.

### Introduction

Balance is generally defined as “the ability to maintain the stability of the body when performing various movements and kinetic and static positions, whether the movements are bilateral or triple” (Maghjoub et al., 2002) [20]. Hisham and Hala believe 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. and Hala, 2013) [11] and as it is known that any movement in the human body is controlled by the nervous system through its control over the muscles that make that movement happen and with the availability of the required energy, and thus the balance depends on the property of muscle tone and the tension or synergy between the muscles to resist the imbalance in the position of the body or Maintaining strength, and thus the muscular excitation comes from the nerves responsible for it to achieve that required balance. That is, “when the muscle fibers that receive orders from the brain are excited, one muscle fiber is subject to the principle (all or none) and the cell movement effort does not arise except when The nerve impulse is able to change the permeability of the motor end plate so that the end plate voltage is less than the excitation threshold level, which means that if any stimulus occurs on a single muscle fiber, it will either be affected entirely or not. R e divorce. (Hassan, 2005) [10].

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As "the matter begins with the muscular contraction of the motor neurons, after which the systolic processes begin, and when the nerve signal reaches the end of the motor nerve, the end of the nerve secretes the neurotransmitter called acetylcholine." (Acetylcholine), which spreads through the neuromuscular cleft to bind with its own receptors located above the terminal plate area, which leads to an increase in the permeability of the sarcomere to sodium ions, and as a result, it loses its polarization, and this in turn leads to the beginning of muscle contraction processes. 2003) As it "was Believes that fibres muscle structure humanity blindfolded From Before branch cell nervousness one only, but this branch may be is being One From Between (10-1000) branches similar, has the hub same, so it is for every Axis nervous axon) connection From During its branches terminal By a number From fibres muscle And this Unit functional called lonliness engine (unit kinetics), and that size units movement (from fibres muscular and cells nervous) varies inside muscles, as well number." (Ronald, 2009) [18] To elaborate on knowing this, "after the arrival of the signal and the secretion of acetylcholine, sodium ions are depleted and a potential difference occurs, which runs along the membrane of the muscle fiber in the same way that the action potentials apply to the membranes of neurons, and at this moment the stimulation of the calcium ion begins to release, which was stored." In the network, starting to the muscle fibrils, and calcium ions work by generating attractive forces between actin and myosin filaments. This 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 axon and lose the polarization state represented by an amount of (-90 millivolts) with A rapid rise of the voltage towards the positive direction is called depolarization. In fact, the membrane action potential in large nerve fibers exceeds zero and becomes slightly positive, but in some small fibers and in many neurons of the central nervous system, the voltage reaches zero only and does not exceed the positive voltage. All this happens within a part of a thousandth of a second, and after the membrane becomes highly permeable to sodium ions, which last for a part of a thousandth of a second, the sodium channels begin to close and potassium channels open more than their normal state, and then the rapid redeployment of potassium ions to the outside is called repolarization of the membrane (Depolarization stage), as calcium ions are pumped back into the sarcoplasmic reticulum to begin a state of relaxation." (Gyton & Hall, 2020) [8] External stimuli occur complex chemical reactions and simple electrical charges, which are transmitted quickly in nerve fibers (axons), then another nerve message is followed by another stimulus, and so on, millions and after millions of these electrical nerve impulses, emitted every second during The conscious and unconscious life of man, is directed from And to the brain, muscles and glands." (Wilmore and Costill, 2007) [21] "The level of control is transmitted from the spinal cord to the motor cortex, so the degree of movement complexity increases from just controlling simple reactions to complex movements, and creates Motor response to more complex movement patterns in the motor cortex. (Hamed, 2014) [9] " Training to strengthen the muscles of the body in different positions increases balance through repetition of these positions and equalizing the moving moments." (Isabel, 2014) 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. " (Petersen & Other, 2002) [17] "As for the balance tools used in the exercises, they are defined as unstable bases and stirrups aimed at stimulating the vestibular system's information to sense imbalance in order to prompt the body to change its positions with muscle contractions that tighten its stature to avoid falling. " (Collins & Other, 2007) [6] "As it is required in our use of balance tools in exercises that we be careful not to exaggerate the violation of the base of balance to the extent that requires movements that exceed the individual's ability, the level of his muscle strength, and his ability to react neuro-motor to control the confusion of the figure, which is in this case Whoever uses it will do more harm than good." (Cawley & Other, 2003) [5] Balance tools also differ between them in terms of the type of their material or in terms of their effect on body 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, large Chinese rubber balls filled with air, and solid plastic and wooden tools with a narrow base and a wide surface." (Frizzell & Dunn, 2015) [7] The jump of the front hands on the carpet of ground movements requires its players to move balance, and through what the researcher went on in the aforementioned, this balance requires muscular synergy in the various muscles responsible for motor performance, especially those related to the transitional speed in the preparatory section of this skill and in the section The rectus femoris muscle is one of the major muscles that require provisions to control it to reduce the level of disruption that accompanies rapid movements in skillful performance, to preserve the aesthetics and consistency of the movements, and through the work of the academic researcher in the physiology of sports training and her discussion with the trainers of the Specialized Center for Talented Care Sports in gymnastics, I noticed that the young players in this center need an increase in the control of the moving balance to show the performance on the mat of floor movements as required, which prompted me to study balance exercises and verify the effects of these exercises through accurate objective measurement in the physiology of sports training represented by measuring the electrical activity of the muscles As well as the desired impact it will achieve on the level of performance.

### Research Objectives

1. Preparing mobile equilibrium exercises to improve the performance of the skill of the front hands jump on the floor movements mat for the research sample.
2. Recognize the effect Mobile balance exercises in some electrical indicators of the straight thigh muscles and the performance of the skill of the front hands jumping on the carpet of ground movements in the research sample.

### Research Hypotheses

1. There are statistically significant differences between the results of the pre and post tests of the experimental and control research groups for each of the electrical indicators of the rectus femoris muscles and the performance of the skill of the front hands jump on the mat of floor movements.
2. There are statistically significant differences between the results of the posttests of the experimental and control groups for each of the electrical indicators of the rectus

femoris muscles and the performance of the skill of the front hands jump on the ground movement mat.

**Research Limits**

Human Limits: Young players at the Sports Talent Care Center for Gymnastics in Baghdad for the sports season (2021-2022).

Time limits: for the period extending from (3/6/2022) to (31/7/2022).

**Spatial boundaries:** Baghdad / Al-Rusafa / Hall of the Sports Talent Nurturing Center for Gymnastics.

**Research Methodology:** The experimental research approach was adopted, which is defined as "the approach in which we treat and control an independent variable to see its effect on a dependent variable, while observing the resulting changes and interpreting them, whether the experiment includes an independent variable and a dependent variable or more than one independent variable or more than one dependent variable." (Magdy, 2019) In accordance with the hypothesis of the current study and its independent variable, and according to the logic of the sequence of methodological procedures, the researcher chose the experimental design with one experimental group, which was controlled by the pre and posttests.

**The research community and its sample:** The boundaries of the research community were represented by young players continuing their training In the Sports Talent Care Center for gymnastics in Baghdad for the sports season (2021-2022), the number of (12) players were chosen by the deliberate method in a comprehensive enumeration method to represent the research sample at a rate of (100%). They were dealt with as one experimental group according to the limitations of the experimental design. For this research, they were homogenized in some extraneous variables that affect the internal integrity of the experimental design, and the values of the torsion coefficients ranged between (+1).

**Measurement, tests and procedures:** The researcher adopted an EMG device (Myo trace 400) (Annex 1), which is an American-made device with a (Bluetooth) transmitter. Using two clips for each rectus femoris muscle, right and left, the results of the (EMG) signal are obtained and analyzed with the program (Myo Research XP 1.06.67) stored on a

laptop computer, as after synchronization between a digital camera type (SONY) no more quickly (75 images.sec) In this measurement, the apex and the area of the EMG signal for each of the two muscles are read at the beginning of the main part of the skill of the front hand jump on the ground movement mat, and this imaging was adopted for the special skillful performance B Performing the skill of the front hands jumping on the ground movement mat according to the evaluation form of (10) degrees.

Before starting the experiment with moving balance exercises, the researcher proceeded to verify the internal safety of the experimental design statistically for each of the height, weight (mass), chronological age, and training age, and made sure that they are within the required limits (+1).

The exercises were prepared according to methodological steps based on the foundations and principles of modern sports training, topped by the specificity of gymnastics and the type of the sample, and the individual ability of each of them, and by adopting tests for the length of time for the required intensity, meaning the greater the balance time, the greater the intensity of the exercise, and according to the determinants of the interval training method. High intensity, and fluctuating in its difficulty between one exercise and another within one training unit, and between one training unit and another that is applied on Sundays, Tuesdays, and Thursdays, and between one training week and another, and by adopting the principle of exchange and diversification in the exercises of these exercises, and according to the determinants of the phosphogenic anaerobic system, the pregnancy was planned training to suit the improvement of skillful performance at the beginning of the main section of the training unit, and the repetitions ranged from (5-10) repetitions ranging opposite 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 of balance were used, represented by half a medicine ball, and pieces of sponge in the form of rectangles measuring (10 x 30) cm distributed On the running floor to perform the skill, pieces of wood and trays, Chinese air balls.

The experiment began by applying the pre-tests on Thursday corresponding to (3/6/2022), according to the requirements of the experimental design, and to verify the homogeneity of the variance as shown in Table (1):

**Table 1:** Shows the results of the pre-tests for the research sample

Indication	(Sig.)	(live)	Standard deviation	Arithmetic mean	Sample number	Dependent search variables tests and units of measurement for each		
Non-signal	0.112	1,441	31,026	653.58	12	The top	Right Straight thighs	EMG
Non-signal	0.225	1,502	0.032	0.445	12	Space		
Non-signal	0.122	1,137	32,408	591.92	12	The top	Left Straight thighs	
Non-signal	0.191	1,415	0.027	0.353	12	Space		
Change D	0.112	1,947	0.835	5.83	12	Performing the front hands jump skill on the ground movement mat		

Not significant if (Sig) < (0.05) at the significance level (0.05).

Then, the application of balance exercises began for the period extending from Sunday corresponding to (5/6/2022) on Thursday corresponding to (29/7/2022), and the experiment ended with post-tests on Sunday corresponding to (31/7/2022).

Statistical methods: The results of the research were

processed using the social statistical bag system (SPSS) (V 26), to calculate each of the percentage values, the arithmetic mean, and the standard deviation, and the t -test for correlated samples.

**The results and their discussion**

**Table 2:** It shows the results of the pre and post tests of the research sample

The test		Pretest		Post-test		Average variances	Deviation of variances	Value (v)	(Sig.)	Indication
		Arithmetic mean	standard deviation	Arithmetic mean	Standard deviation					
Right straight thighs	The top	653.58	31,026	712.33	3,257	58.75	30,713	6,626	0.000	D
	Space	0.445	0.032	0.373	0.005	0.072	0.034	7,353	0.000	D
Left straight thighs	The top	591.92	32,408	648.33	19,223	56,417	30,261	6,458	0.000	D
	Space	0.353	0.027	0.322	0.015	0.031	0.026	4,134	0.002	D
Performing the front hands jump skill on the ground movement mat		5.83	0.835	8.67	0.492	2,833	0.937	10.47	0.000	

Degree of freedom (n)- (1) level of significance (0.05), significant difference (Sig)  $\geq$  (0.05).

It can be seen from the results of table (2) That the young players in the Sports Talent Care Center for Gymnastics improved in their neuromuscular control mechanisms in organizing the electrical signal appropriate for the skillful performance of the skill of the front hands jump on the ground movement mat, which appeared clearly in Increased peak activity of the electrical signal (EMG) And it reduces its area in each of the right and left anterior rectus femoris muscles in the posttests compared to what it was in the pretests, and the emergence of a clear improvement in the skillful performance of this skill in the posttests compared to what it was in the pretests as well, and the visual acuity attributes the emergence of these results To the positive effect of moving balance exercises that helped to develop the work of the stabilizing muscles auxiliary and opposite to the work of the rectus femoris muscle, and the result of the appropriate repetitions and training intensity in controlling the balance time of the research sample was to increase the efficiency of electrical signals by knowing the systolic position of the muscles to enable players to make their movements in performing This skill is consistent, and this is what the principle of gradualness in the training load helped in this mastery of neuromuscular control, by strengthening the relationship between instructions and sensations, and according to the brain’s directives for this motor program of skillful performance, in addition to that the mobile balance exercises had a clear positive role in Inducing physiological changes in the neuromuscular action, so that these results appear supportive in the development of muscular action And improving the effectiveness of the electrical signal has a positive reflection in improving the performance of the skill of jumping the front hands on the mat of floor movements for young players in the Sports Talent Care Center for Gymnastics, and it is suitable for them, their age and gender, according to the results of this research. As "the nerve signal in the muscle is strengthened by the effect of physical exercises on the efficiency of the locomotor system, and the movement centers in the cerebral cortex are stimulated and the impulse centers are inhibited." (Siddiq et al., 2012) [19] Likewise, "the exercises must take into account the rules of balance, whether in performance or stability, and support the improvement of balance by relying on increasing the activation of the work of the widespread muscle sensors, because the vestibular system does not develop with training because it is like a helm that informs the brain about the body's positions without issuing orders, and this confirms 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 rather than

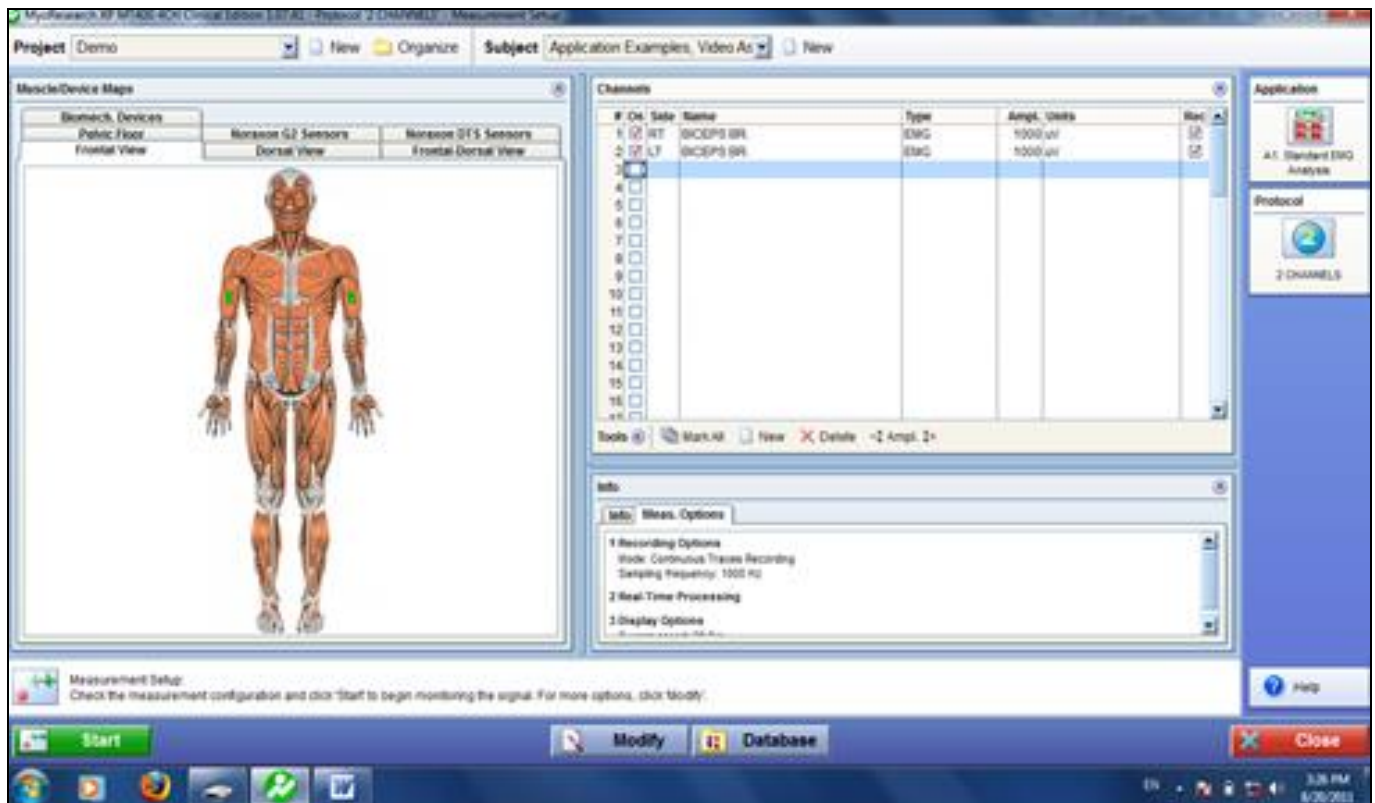
developing its structures. (Arthur, 2001) [4] Since we are unable to coordinate the movements of our body without sensors, which provide us with information about our muscles and the locations of our movements and joints. The receptors for the nerve endings in the muscles, tendons, and joints and the information received from them give us the basis and sensation to make the movements coordinated, and cooperate with the vestibular sense (the sense of steering or balancing the body). (Michael & Ronald, 2001) [16] Also, "The gradual increase in the training load is the basis for any training planning for the player and must be followed by all players who care about their level of achievement." (Jamal, 2018) [13] "In the succession of exercise, the relationship between the brain and muscles is strengthened, and repetition helps to Neglecting external stimuli in the performance of the movement, and serving this succession in subjecting the body to a change in improving with strength and athletic skill in the end. (Lee & Brenda, 2007) [14] "Training leads to physiological changes involving the body's systems, and the level of athletic performance progresses whenever these changes are positive, in order to achieve physiological adaptation of the body's systems and then to physical load and skill performance." (Adnan, 2010) [2].

**Abstracts and applications:**

1. The application of moving balance exercises improves the increase in the peak activity of the electrical signal (EMG). And it reduces its area in each of the two anterior rectus femoris muscles, the right and the left, in the young players in the Center for the Nurturing of Athletic Talent for Gymnastics.
2. Moving balance exercises helps in improving the performance of the skill of the front hand jump on the floor movement’s mat for the young players in the Center for Sporting Talent for Gymnastics.
3. The young players in the Gymnastics Talent Care Center need to take into account the training stresses in the mobile equilibrium exercises that improve skillful performance, and 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 organizing the electrical signal. (EMG) of their muscle cells.
4. It is necessary to set realistic goals that can be achieved in this type of training, and the exercises allocated to them must be at the beginning of the main section in the training unit, and not to exaggerate the load of young players in the Sports Talent Care Center for gymnastics with high training loads.



**Fig 1:** Shows the device system (EMG) Type (Myo trace 400) with the (Bluetooth) transmitter



**Fig 2:** Shows the device system window (EMG) in the calculator for determining the muscles to be measured

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**Appendix (1)** Shows a test for analyzing some variables of the electrical signal of the muscles: (Aad, 2010)

The objective of the test: measuring some of the variables of the electrical signal of the muscles.

#### **Hardware and tools:**

1. Device system (EMG) (Myo trace 400) American made with a (Bluetooth) transmitter With eight antennas, (4) of them were adopted to measure the specific muscles in this research, Figure (1).
2. A portable personal computer.
3. Program (Myo Research XP 1.06.67) device signal processing Figure (2).
4. As a digital camera type (SONY) no Its speed exceeds (100) images per second.
5. Disinfectant solution (methanol).
6. Razor (blade) for hair removal.
7. Medical adhesive plaster.
8. Paper tissues for wiping and cleaning.

**Explanation of the system:** The device is attached to a belt around the waist of the tester, as this device works to receive muscle electricity through wires connecting it to the antennas that are placed over the muscles whose electricity is required to be measured, and this device sends a signal (EMG) in the form of a signal (Bluetooth) to the receiver (Type (PC Interface Model 044 connected to the personal computer

(laptop) which contains the program (Myo Research XP ver. 1.06.67, 2006) For conducting several treatments for these signals, this program also has a map of the front and back muscles of the body, and on it the location of the muscle, with reference to the location of the placement of the electrodes and when the cursor (the surface electrodes) is placed On the muscle and pressing on it, the program records the name of the muscle along with the channel number on which a signal will appear (EMG) A digital camera should also be connected at a speed not exceeding (100 fps). with the laptop computer to synchronize the image and the incoming signal, bearing in mind that each receiver is numbered and has a special place when connected to the device, and the receiver also contains (special gel) It does not work for one time only and is specified by an expiration date. Through analysis, it is possible to obtain the highest peak, which is measured in (microvolts) and the time in (the second and its fractions). And the area in (microvolts. Tha), which counts One of the most important variables in the electrical activity of the muscles as well as other variables, and it is not possible to conclude through measurement with this device In determining the ratio of white fibers to red with numerical values, and measuring it serves the fast and slow movements in various skills in games and events in which synchronization is determined.

#### **Terms and procedures**

1. The device must be firmly attached to the body of the player, not allowing it to fall.
2. Shave the areas to be fixed with a razor blade to remove hair.
3. The clamps must be fixed with a medical plaster that does not allow them to move when performing very fast movements.
4. Camera is connected to the laptop computer with its own wires, and the imaging is confirmed.
5. After making sure that the (Bluetooth) signal reaches the receiver and reads it in the program stored on the laptop computer, the player performs the required skill or movement.
6. A synchronization is made between the movement or skill images and the captured signals and storing them in order to analyze them later.