Designing a Qualitative Training Program for the Skill of the Pelvic Back Cycle to Stand on the Hands in Terms of the EMG Variables.

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Introduction and research problem

Recent years have witnessed scientific progress in the field of gymnastics, and this development has clearly appeared in the recent world championships and the Olympic Artistic Gymnastics Championships (2016) through outstanding performance, especially on the device of different height crossbars because it is considered one of the most difficult devices in the training process because of its special nature and physical requirements It is global and requires outstanding performance that combines innovation and difficulty in forming a kinetic sentence due to its subjection to research and experiment and the accurate and objective scientific methods used in the training process. With the change of fists, this is achieved by knowing the principles and specifications that serve this performance, which is subject to coordination and linking between the external range in which the player moves, whether in the vacuum or on the equipment, and the internal range in which coordination takes place between the different parts of the body and how they are used for the muscles that result in the movement of the joints. 6)

The skills close to the bar are considered one of the skills included in the development, by introducing flight on the same bar, by moving between the two bars, or by changing the fists by inserting twists (7)

Referring to the international law of artistic gymnastics, it is clear that among the performance requirements on the device of different heights, the athlete must perform a complex sentence that shares many of the technical and technical requirements and specifications stipulated by the law with a movement close to the bar. Skills near the bar (8)
By watching many international tournaments and through the researcher's work as a coach and judge, she noticed the performance of this skill in all the sentences performed, and the players' dependence on it in forming sentences and linking them to his skills with high difficulty by introducing twisting or flying. Teaching and training this skill correctly and reaching the right position until it is calculated. One of the conditions for its performance is for the player to reach the full (vertical) handstand position, so the difficulty will be (c), which can be developed to higher difficulties up to difficulty (E) and if the skill is not completed to reach the position Vertical the player is exposed to the opponent (8)(1)

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Through the researcher's observation of the last Republic Championship for the stage of under 10 years, under 11 years and the extent of the technical mistakes that the player makes while performing the skill by throwing the head back or the shoulder tilt forward in the preliminary stage or near the center of gravity of the rotation axis, the player is exposed to the opponent or not counting the skill permanently This is due to the presence of shortcomings in the training process (physical - skill) in how to train the skill and what are the working muscles used in performance to reach the correct result.

Given that qualitative exercises require a high effort by those in charge of the training process, the design of qualitative exercises requires compatibility with the movement model used in tournaments and identifying the minute details of the motor skill in terms of (strength - distance - time - direction of muscular work) with working muscles, and on the one hand, putting The body, the extent of movement, and the prevailing contractions of the muscle groups working in the skill to improve skill performance (5) (4)

Based on the foregoing, the researcher resorted to the electromyogram to clarify the working muscles used and affecting the performance of the skill of the back pelvic circle to stand on the hands. The quality fits the basic part of the skill in terms of (force - distance - time - direction).

Research goal:

This research aims to design a qualitative training program for the skill of the pelvic back cycle to stand on the hands through:

1) Determining some variables for the muscles working skillfully in the posterior pelvic circle to stand on the hands.

(2Designing a qualitative training program in light of the muscular variables for the skill of the pelvic back circuit for standing on the hands**.**

Search Queries:

1) What are the muscular variables of the muscles working skillfully in the posterior pelvic circle to stand on the hands?

2) What is the proposed training program for qualitative exercises in light of the muscular variables for the skill of the pelvic back circuit for standing on the hands?

Research Methodology

The researcher used the descriptive method and muscular analysis due to its relevance to the nature of the study.

The research sample:

The study sample was chosen in a deliberate way for the best player of the outstanding players in skill performance, and it is among the requirements of the kinetic sentence in which she got the first place.

Sample Description:

Height: 143 cm Weight: 37 kg Age: 11 years Training age: 8 years

Fields of study:

Time domain:

The survey was conducted on Wednesday 5/11/2019

The basic study was conducted on Wednesday 12/11/2019

Spatial domain:

The exploratory study was conducted and the basic study was applied in the Artistic Gymnastics Hall, Faculty of Physical Education for Girls, Alexandria University.

Data collection tools Data collection:

Equipment used for anthropometric measurements:

1) Calibrated medical scale to measure weight (to the nearest kilogram)

2) A device for measuring length (to the nearest cm)

3) A certified measuring tape (Measure Table) of 2 meters in length to measure along the edges (to the nearest cm).

Equipment used in videography:

1) 1 camera tripod.

2) A video camera.

3) A computer to (Lap Top).

4) (Video JPG) program.

Equipment used to analyze the electrical activity of muscles:

1) 1 Electromyograph (EMG) device of the (Mage ME 6000) type, containing 16 channels to measure the electrical activity of (16) superficial muscles.

2) 1 camera with a frequency of 30 frames/sec (EMG camera).

3) 1 song brand video tape for (EMG) camera.

4) Wireless signal receiver device.

5) a computer.

6) Surface electrodes.

7) Muscular conduction cables.

8) The possibility of relying on a remote control device or using a computer to store data about the shape of the muscle before performance, as well as the time of muscle work during movement.

Skill performance measurement

A form was designed to evaluate skill performance, where the skill was divided into its basic stages, by referring to the results of previous studies and references to determine the technical stages of performing that skill. For gymnastics in order to judge its suitability for measuring the degree of performance of the skill under study attached (1) (2).

Objectives of the study:

1) Determine the working muscles of the skill.

2) Ensure the validity of the device used in the muscle analysis.

3) Detecting problems that may appear during the main parts of the study.

Results:

- Muscles working with the skill under study were identified and 16 muscles were identified to conduct the basic study on them, according to the technical analysis of the skill performance stages.

The validity of the EMG device for measuring and the validity of the program for performance analysis were confirmed.

Basic study:

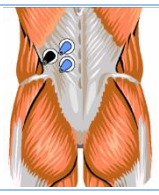
In light of the results of the survey, the main points on which the procedural steps of the basic study were built, were identified:

Preparing the player for filming: At this stage, the player was prepared and equipped before filming.

As follows :

The player performed warm-up exercises for 10 minutes, then the electrodes of the mega wine 1600 electromyogram (EMG) device, consisting of three electrodes for each

muscle, were placed by 16 muscles distributed on the muscles of the upper limb - trunk - lower limb and placed on the midline of the muscle abdomen between the junction of the muscle The tendon of the muscle and the area closest to the area of nerve feeding with the surface of the electrodes upward to the length of the muscle fibers so that they are equal in position and on equal dimensions in position and on equal dimensions as shown in the figure .

					
-6 Latissimus dorsi muscle	**-5**upper oblique muscle	**-4**The triceps brachii muscle	**-3**Biceps brachii muscle	**-2** brachioradialis muscle	**-1**dorsal interosseous muscle
					
-12biceps femoris	**-11**the gluteus maximus muscle	**-10**Spinal erector muscle	**-9**The rectus abdominis muscle	**-8**Pectoral major muscle	**-7**Anterior deltoid muscle
					
-16the medial gluteal muscle	**-15**anterior tibial muscle	**- 14**rectus femoris muscle	**-13**The vastus medial femoris muscle		

Shape (1)

Muscles working during performance and where to place electrodes

Record attempts

Al-La'iah made three attempts. The researcher took into account, during the execution and filming of the attempts, that the imaging cameras are running simultaneously with the recording of the electrical activity of the muscles through the synchronization feature before the

beginning of each attempt until its end, taking into account the recovery time after each attempt to photograph, so that it is at least two minutes, a rest period between Every attempt and the other so that the muscle does not reach the stage of fatigue. The recorded attempts were evaluated by a committee of gymnastics arbitrators accredited by the Egyptian Gymnastics Federation in order to choose the best attempt.

Determining the proposed specific exercises on the following basis:.

1) Designing specific exercises according to measurements of the electrical activity of the muscles working with the skill under study

2) The exercises should be graded from easy to difficult.

3) The exercises should contain the composition of the parts of the skill.

4) Use the necessary auxiliary equipment in the process of facilitating the training process.

5) Use the directed bond at the appropriate time.

Foundations and development of the program:

The program exercises were developed in the light of the motor performance according to the percentages of the contribution of these muscles at each stage

One of the stages of skill performance under discussion is that the exercises should be performed in the same direction as the muscular work. Attachment (3)

- Take into account the physical requirements of the skill in question.

Gradual increase and progression of pregnancy in terms of intensity, size and rest periods.

Presentation and discussion of the results:

First: View the results:

In light of the objectives and hypotheses of the research and from the reality of the data that was reached and according to the kinetic analysis under study, the results are presented and discussed as follows:

Table (1)

Variables of electrical activity of the working muscles of the total skill performance of the posterior pelvic circuit for standing on the hands

S	muscle name	(uv)	standard deviation	Max (uv)	Contribution percentage%
1	First dorsal interosseous	145	237	2256	4%
2	Brachioradialis muscle	194	233	1954	5%
3	Biceps brachii	312	450	3451	7%
4	Triceps brachii	436	469	3860	10%
5	Trapezius muscle	252	260	1864	6%
6	Latissimus dorsi	391	578	4740	9%
7	Deltoid- antherior part	473	624	5257	11%
8	Pectoralis major muscle	182	197	1169	4%
9	Rectus abdominis muscle	195	236	1629	5%

Follow Table (1)
Variables of electrical activity of the working muscles of the total skill performance of the posterior pelvic circuit for standing on the hands

S	muscle name	(uv)	standard deviation	Max (uv)	Contribution percentage%
10	Erector spinae	193	339	2260	5%
11	Gluteus maximus	78	11	499	2%
12	Biceps femoris	156	190	1753	4%
13	Vastus medialis	481	565	4783	11%
14	Rectus femoris	268	260	1819	6%
15	Tibialis anterior	64	61	452	2%
16	Gastrocnemius- lateral part	364	387	3055	9%

Table (1) shows the electrical activity variables for each of the working muscles during the skillful performance of the posterior pelvic circuit skill for standing on the hands. The highest percentage of contribution was in favor of the anterior deltoid muscle and the vastus medial muscle by (11%), while the least contribution was in favor of the anterior tibial muscle and muscle Major glutes (2%)

Table (2)
Variables of electrical activity of muscles working in the introductory stage of the skill of the pelvic back circuit for handstand

S	muscle name	)UV(	standard deviation	Max)UV(	Contribution percentage%
1	First dorsal interosseous	114	247	7251	3%
2	Brachioradialis muscle	157	194	1830	4%
3	Biceps brachii	249	355	2728	6%
4	Triceps brachii	537	500	3777	14%
5	Trapezius muscle	144	506	1782	4%
6	Latissimus dorsi	351	529	4740	9%
7	Deltoid- antherior part	345	529	4141	9%
8	Pectoralis major muscle	188	205	1148	5%
9	Rectus abdominis muscle	223	257	1628	6%
10	Erector spinae	11	65	385	2%
11	Gluteus maximus	65	58	299	2%
12	Biceps femoris	107	92	673	3%
13	Vastus medialis	513	454	3199	13%
14	Rectus femoris	310	261	1819	8%
15	Tibialis anterior	68	59	378	2%
16	Gastrocnemius- lateral part	419	412	3055	11%

Table (2) shows the electrical activity variables for each working muscle during the introductory part of the skill. The highest percentage of contribution was in favor of the triceps brachii muscle by 14%, and the lowest percentage was in favor of the primary large muscles, the spinal erector muscle of the spine, and the tibial anterior muscle by (2%).

Table (3)

Variables of electrical activity of the muscles working in the basic stage of the skill of the pelvic back circuit for standing on the hands

S	**muscle name**	)**UV**(	**standard deviation**	**Max**)**UV**(	**Contribution percentage**%
1	First dorsal interosseous	138	200	1813	3%
2	Brachioradialis muscle	222	245	1954	5%
3	Biceps brachii	425	543	3451	9%
4	Triceps brachii	392	457	3960	9%
5	Trapezius muscle	308	265	1864	7%
6	Latissimus dorsi	385	564	4278	8%
7	Deltoid- antherior part	611	730	5257	13%
8	Pectoralis major muscle	161	177	1169	4%
9	Rectus abdominis muscle	133	174	1183	3%
10	Erector spinae	278	427	2260	6%
11	Gluteus maximus	90	86	499	2%
12	Biceps femoris	202	232	1753	4%
13	Vastus medialis	485	617	4783	11%
14	Rectus femoris	272	265	1622	6%
15	Tibialis anterior	70	67	452	2%
16	Gastrocnemius- lateral part	329	416	2762	8%

Table (3) shows the electrical activity variables for each of the working muscles during the skill performance of the basic stage of the posterior pelvic circle skill for standing on the hands. The highest percentage of contribution was in favor of the anterior deltoid muscle with a contribution rate of (13%) and the lowest percentage of contribution in favor of the gluteus maximus and the anterior bronchial muscle with a percentage of Contribution (2%)

Table (4)
Variables of electrical activity of muscles working in the final stage of the skill of the pelvic back circuit for standing on the hands

S	muscle name	)UV(	standard deviation	Max)UV(	Contribution percentage%
1	First dorsal interosseous	129	137	871	6%
2	Brachioradialis muscle	94	80	418	4%
3	Biceps brachii	123	109	712	6%
4	Triceps brachii	307	319	2367	15%
5	Trapezius muscle	169	179	1039	8%
6	Latissimus dorsi	105	121	912	5%
7	Deltoid- antherior part	175	254	2061	8%
8	Pectoralis major muscle	70	43	188	3%
9	Rectus abdominis muscle	144	186	1324	7%
10	Erector spinae	57	57	596	3%
11	Gluteus maximus	23	22	139	1%
12	Biceps femoris	82	82	349	4%
13	Vastus medialis	202	151	884	10%
14	Rectus femoris	126	104	536	6%
15	Tibialis anterior	39	34	230	2%
16	Gastrocnemius- lateral part	255	220	1180	12%

Table (4) shows the variables of electrical activity for each of the working muscles during the skill performance of the final part of the skill of the pelvic posterior circuit for standing on the hands. The highest contribution rate was in favor of the triceps muscle (15%) and the lowest contribution was in favor of the gluteus maximus muscle (1%).

Second: Discussing the results

Discussing the results of the first hypothesis:

The results of Tables (1), (2), (3), (4) show the electrical activity variables of the muscles working in the skill performance stages of the pelvic back cycle skill for standing hands. Rear pelvis for standing hands, which indicates that the average electrical activity of these muscles ranged between (64-481UV), and the maximum electrical activity of the muscles during skill performance ranged between (452-5257UV) and the percentage of muscle contribution also ranged between (2-11) The highest contribution rate was in favor of the vastus medialis and the anterior deltoid muscle by 11%, then the triceps brachii muscle by (10%), then the latissimus dorsi muscle and the twins muscle (the lateral part) by (9%) and the biceps brachii by 7%. The rectus femoris muscle and the upper oblique muscle accounted for 6%. The radial brachioradialis and the rectus abdominis muscle erecting the spine contributed 5%, followed by the muscle between the dorsal bones, the

pectoralis major and the biceps femoris by 4%, while the lowest percentage was With a contribution in favor of the anterior tibial muscle and the gluteus maximus muscle, with a contribution rate of 2%.

This is due to the nature of the skillful performance of the free pelvic cycle skill for handstand, which requires wrapping the body around the device beam in an oval path to gain momentum to help in the upward direction to push the legs close to the vertical position to reach the handstand position.

This is consistent with what Lukasst (T) (2008) (10) and Karen Goeller (2012) (9) have pointed out that reaching the roll-and-roll position in the basic stage of the skill's hands-free pelvic cycle requires the The player maintains the position of the spoon for the body's Hollow Position, which is required in the abdominal muscles and not arching the back muscles so as not to hinder the player from reaching the vertical position, and the player's keeping the position of moving her body near the keel of the device without touching it with the thighs during the performance requires the work of the arms and legs greatly for the success of the skill .

This is explained in detail by the results of Table (2), (3), (4), which show the changes in the electrical activity of the working muscles during each stage of the skill performance and the percentage of contribution. It resulted that the average electrical activity of those muscles ranged between (537 - 11UV), and the maximum electrical activity of the muscles during the preliminary skill performance ranged between (7251 - 299 UV) and the percentage of muscle contribution also ranged between (14% - 2%) and it was higher The proportion of contribution in favor of the three-headed brachii muscle by 14%, followed by the vastus medial muscle by (13%), then the gluteus maximus by (11%), followed by the latissimus dorsi and the anterior deltoid muscle by (9%), then the rectus femoris by Contribution (8%), then the brachioradialis and rectus abdominis muscles with (6%) and the pectoralis major muscle with (5%), followed by the radial and upper inferior muscles with (4%), followed by the interdorsal muscle and the cephalic femoral muscle with (3%).) followed by the three erectile spinal muscles of the The spine, gluteus maximus, and anterior tibial sacrum contribute (2%). These results agree with the nature of the performance of this preliminary stage of the skill of the pelvic floor to stand on the hands with what was indicated by Aisha Abdel Mawla and Iman Suleiman Abu Al-Dahab (2013) (3), which requires a balance of power between muscles The front and rear torso and the shoulders due to the nature of the performance of the skill, which begins with swinging the legs back high until it reaches the horizontal level as a preliminary stage to reach the handstand so that the shoulders are above the vertical fulcrums and slightly forward while the head is low so that the player can control the speed required to perform the rotation around the bar**.**

Where in Table (3) the variables of electrical activity of the muscles working in the basic stage of the skill in question, which resulted in the average electrical activity of those muscles ranged between (611 - 70 UV), and the maximum electrical activity of the muscles during the skill performance of the basic stage ranged between (5251 - 452UV) and the percentage of muscle contribution also ranged between (13% - 2%) and the highest percentage of contribution was in favor of the anterior deltoid muscle by (13%), followed by the vastus medial muscle by (11%), followed by the cephalic and three-headed muscles with a percentage of (9 %), followed by the latissimus dorsi and twins muscle with (8%), then the upper oblique muscle with (7%), followed by the spinal erector muscle of the spine and rectus femoris with (6%), then the brachioradialis muscle with (5%), followed by the pectoralis major muscle with (6%). 4%), then the muscle between the dorsal and rectus abdominis bones with a percentage of (3%), followed by the anterior tibial muscle and the gluteus maximus muscle with a percentage of (2%).

This is due to the nature of the skillful performance in the basic stage, where the muscles of the arms, back and abdomen play an important role in the performance of this stage, where the player wraps around the bar and the body is flat while keeping her body near the device and completes her arrival to standing on the hands on the bar during this stage and this is consistent with what was mentioned by Sahar Morsi (2017) (2) In the role of these muscles in the successful performance of this stage correctly.

Table (4) shows the electrical activity variables working for the final stage of the skill in question, which resulted in any average electrical activity for those muscles ranging between (307-23UV), and the maximum electrical activity of the muscles during the skill performance of the final part ranged between (2367-139UV) The percentage of muscle contribution also ranged between (15% - 1%), and the highest percentage of contribution was in favor of the three-headed brachii muscle (15%), followed by the twin muscles (12%), then the vastus medialis (15%), followed by the oblique muscles The upper and front deltoid muscle by (8%), then the rectus abdominis muscle by (7%), followed by the muscles between the dorsal bones and the biceps brachii and rectus femoris by (6%), then the broad dorsal muscle by (5%), followed by the radial and cephalic femoral muscles with a percentage of (4%), then the pectoralis major muscle with a percentage, and the spinal erector muscle with a percentage of the spine (3%), followed by the tibial anterior muscle with a percentage of (2%), and finally the gluteus maximus muscle with a percentage of 1%.

Which is commensurate with the nature of the skill performance during that stage, the end of which requires reaching a handstand position so that the skill of the player is calculated and not exposed to the opponent.

From the above, the first question has been answered, which states: “What are the muscular

variables of the muscles working for the skill of the posterior pelvic circuit for standing on the hands?"

Discussing the results of the second hypothesis**:**

Through the results of the muscular analysis and in the light of the electrical variables of the muscles working skillfully in the posterior pelvic circle for handstand under study, a qualitative training program was designed in an attempt to raise the level of skill performance and mastery of performance according to scientific bases in light of the ratios of muscle contribution to performance for each stage separately and the overall skill performance .

The following is the suggested training program in the light of the electrical variables of the muscles working skillfully in the pelvic back circuit for standing on the hands.

Table (5)

The program is developed in light of this to achieve the validity of the third hypothesis, which states: Specific training program for the skill in question

نسبة العمل الراحلة	زمن الراحة	مرات التكرار ع**mm**	زمن ا**exercise**	**working degree**	**time**	**the week**	**exercise**
1- 2	40ث	5-4	20ث	%50	**35**m	the first	(1) (From a prone position), pushing with both hands while moving forward. 2) (handstand) leaning the shoulder for safety and back with open shoulders strongly. 3) (handstand) falling of the body to reach an oblique prone position by the method of the rubber elastomer device. **) (4**from a prone position) grab a weight and swing the arms back with strength and speed**.**
2-1	40ث	5-4	20ث	%55	**35**m	The second	(1) (From a lean position on the bar), go down behind the shoulder with a sponge under the chin and the bar touching the pelvic area. 2) (from a prone position) with the arms forward while holding a sponge, standing for half of the stability. **) (3**from a standing position) hold a weight of half a kilo or an iron bar and turn the palm of the hand up**.**

Follow Table (5)
The program is developed in light of this to achieve the validity of the third hypothesis, which states: Specific training program for the skill in question

نسبة العمل الراحلة	زمن الراحة	مرات التكرار **mm**ع	زمن ا**mء exercise**	**working degree**	**time**	**the week**	**exercise**
1-1	20ث	5-4	20ث	%60	**35**m	the third	1) (from a standing position) Install the rubber slats in a fixed bar and pull the slats from front to back strongly and quickly. 2) (Putting on the bar) swinging back to make a quick back pelvic circle far from the goat. **) (3**the arms stand high) placing a sponge under the chin, a tape on the foot, and a back swing to stand on the hands, while fixing the sight on the healers**.**
1-1	**20ث**	**5-4**	**20ث**	**%65**	**35**m	the fourth	**1)**) (From a lying position) the arms next to the thighs, while holding the bar, making the vibrating movement of the chest with the chest and legs burning. **) (2**from the position of attachment) on the low parallel bar, holding the lower bar, placing a plastic bar as an auxiliary device, lowering some of it behind the thigh and returning to the bar with the feet in the position of the light bar**.**
1-1	**20ث**	**7-5**	**20ث**	**%65**	**40**m	Fifth	1) Giving a model for the skill on the language. 2) Performing the skill by using the tongue and the bond. 3) (from the standing position) we put a high rank and stand on it, holding the parallel bar and doing the skill, then landing on the mattress in a prone position. **(4**From (the prone position) to hold the iron operation and the partner of the firmness of the hand**.**

Follow Table (5)
The program is developed in light of this to achieve the validity of the third hypothesis, which states: Specific training program for the skill in question

نسبة العمل الراحلة	زمن الراحة	مرات التكرار mmع	زمن ا ءexercise	working degree	time	the week	exercise
2-1	30ث	8-5	10ث	%70	40m	sixth	1) (Putting the prone) on a high rank, holding the bar from behind, pushing the mattress with the back and the legs, and pushing the bar with a firm hand to go down to the other side.) (2From lying on the back) from the closed mattress, holding the low bar from behind and pushing the bar to reach the handstand position.
2-1	30ث	8-5	15ث	%70	45m	seventh	. 1) Work the skill on the longa alone from weighted. 2) Work the skill on the lunge alone from a standing position on the hands. (3Doing the skill from the lunge and linking it to the kneeling movement, then standing on the hands, and then a skill under discussion
2-1	**30ث**	**8-5**	**15ث**	**% 75**	**45**m	VIII	• Performing the skill in a year with parallel repetitions. • Players access to perform alone. • Link the skill from a standing position on the hands. • Linking the skill of Long Blush. • Performing the skill in the middle of the motor magazine. •The performance of the skill in the middle of the kinetic magazine in the form of competition between the players

From the above, the second question was answered, which states "the proposed training program for qualitative exercises in the light of muscular variables for the skill of the posterior pelvic circle for handstand."

reviewer

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