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Ten Weeks of Calisthenics Workouts Effects on Some "Hold Elements" on Rings for Under 15 Years Gymnasts

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Abstract

This research aims to identify the effect of ten weeks of calisthenics workouts on some "Hold Elements" on rings for under 15 years gymnasts. The researcher used the experimental design for pre-post measurement of one group due to its suitability to the nature of the research. The research sample was chosen intentionally from gymnasts under (15) years old in the following sports clubs: Al-Ahly Club and Tala'ea El-Geish Club, who are registered with the Egyptian Gymnastics Federation in the 2022/2023 training season. The basic research sample was (10) gymnasts, a number of other (10) gymnasts were chosen randomly as a sample for the exploratory study, representative of the original community and from outside the basic research sample, in order to select appropriate Calisthenics workouts related to the Hold Elements understudy, and codifying the training load for these workouts. The most important results were as follows: The percentage of improvement for the physical variables ranged between (21.5% - 60.9%), and the highest percentage of improvement was for (muscular power of the abdominal muscles) by (60.9%), while the percentage of improvement for the skill variables ranged between (10 3% - 38.8%) and that the highest percentage of improvement was for the Planche skill on rings apparatus, which reached (38.8%). The researcher recommends using calisthenics workouts to develop the technical performance of some Hold Elements on rings apparatus for the under 15 years gymnasts.

Keywords: Calisthenics workouts, Hold elements, Rings apparatus, Gymnastics

تأثير عشر أسابيع من تدريبات كاليستنكس على بعض مهارات الثبات على جهاز الحلق للاعبى الجمباز تحت ١٥ سنه.

ملخص البحث

يهدف هذا البحث إلى التعرف على تأثير عشر أسابيع من تدريبات كاليستنكس على بعض مهارات الثبات على جهاز الحلق للاعبى الجمباز تحت ١٥ سنه، تم استخدام المنهج التجريبى باستخدام التصميم التجريبى للقياس القبلى البعدى لمجموعة واحدة لمناسبته لطبيعة البحث، تم اختيار عينة البحث بالطريقة العمدية من لاعبى الجمباز تحت (١٥) سنة بالأندية الرياضية التالية : النادى الأهلى ونادى طلائع الجيش ، والمسجلين بالإتحاد المصرى للجمباز في الموسم التدريبي ٢٠٢٢/٢٠٢٣ ، وبلغ إجمالى حجم عينة البحث (٢٠) لاعب، وتم إختيار عدد (١٠) لاعبين كعينة للدراسة الإستطلاعية، ممثلة للمجتمع الأصلي ومن خارج عينة البحث الأساسية، تم اختيارهم بالطريقة العشوائية بهدف انتقاء تدريبات كاليستنكس المناسبة والمرتبطة بمهارات الثبات قيد البحث، وتقنين الحمل التدريبى الخاص بهذه التدريبات، وبذلك تصبح عينة البحث الأساسية (١٠) ناشئين جمباز تحت (١٥) سنة، وجاءت أهم النتائج كالتالى، تراوحت نسبة التحسن للمتغيرات البدنية بين (٢١,٥% ، ٦٠,٩%)، وأن أعلى نسبة للتحسن كانت لمتغير (القوة العضلية لعضلات البطن) بمقدار (٦٠.٩%)، بينما تراوحت نسبة تحسن المتغيرات المهارية بين (١٠,٣% ، ٣٨,٨%)، وأن أعلى نسبة للتحسن كانت لمهارة Planche على جهاز الحلق حيث بلغت (٣٨,٨%)، ويوصى الباحث باستخدام تدريبات كاليستنكس لتطوير مستوى أداء بعض مهارات الثبات على جهاز الحلق للاعبى الجمباز تحت ١٥ سنه.

الكلمات المفتاحية: تدريبات كاليستنكس – مهارات الثبات – جهاز الحلق – الجمباز

Ten Weeks of Calisthenics Workouts Effects on Some “Hold Elements” on Rings for Under 15 Years Gymnasts

Introduction and Research Problem:

Sports training is an organized process with goals that work to improve the level of physical fitness of players in the specialized sports activity. It is a

long-term process that leads to gradual advancement of the player's level, taking into account the different requirements for the player's long-term development. (**Jerabek, P., 2003: 37**)

The science of sports training is concerned with developing the player's training status in an integrated and simultaneous manner to help the player being in form. The results of the Olympic games have shown what astonished the world in terms of a technical level that challenges human capabilities, as this was clearly in the individual sports, especially in gymnastics.

(Carrol, M. & Manners, H., 2011: 33)

Muscular strength has a specificity in technical performance, so it is the maximum degree of specialization for developing muscular strength in quantity, quality, and timing, meaning developing muscular strength according to the momentary uses of the working muscles within skill performance. It is also considered a decisive factor in the success of the process of employing muscular work for this performance.

(Watson, A., 2015: 210)

Scientific planning for sports training aims to comprehensively prepare players of all levels and according to their abilities, to reach the highest levels for each component of the training condition. Therefore, it has become required to continuously follow up on everything that is modern in the field of sports training in order to provide the best results. **(Al-Hadi, A., 2016: 11)**

Physical preparation is considered the basis for developing the technical performance of a gymnast. Without it, it is difficult for the gymnast to perform the skill with its motor requirements, in addition to some specific exercises with or without tools, which affect the working muscles in technical performance and connect them to neural pathways in the skill direction. Artistic gymnastics is characterized by the diversity of skills

. (Shehata, M., 2010: 291)

The components of physical fitness are the basis for the player to reach the highest levels of sports. They are necessary qualities for all activities specially the individual sports, and there are close correlations among the various physical components.

(Abdel-Fattah, A. & Khouribet, R., 2016: 455)

Gymnastics requires a high level of muscular strength for all parts of the body in general, especially for the working muscles on the hip joints, trunk muscles, arms, and shoulders. Most gymnastics skills require exerting a great amount of strength, to allow the gymnast developing his Technical performance. **(Tolan, S., Abu Odah, M., 2016: 127)**

Calisthenics exercises are form of exercise consisting of a variety of types, often rhythmical, movement, intend to increase body strength, balance and flexibility with movements, using only one's body weight for resistance. with variety can benefit both muscular and cardiovascular fitness, in addition to improving psychomotor skills such as balance, agility and coordination. **(Panihar, U., & Rani, D., 2022: 23)**

Calisthenics are consisting of variety movements without the use of equipment or apparatus, but mainly using your own body weight. It's intended to increase body strength, balance and flexibility with movements using only one's body weight as a resistance. **(Genc, H., 2020: 233)**

Calisthenics exercises are easy to perform alone or in a group format, and can be modified according to the fitness levels. Calisthenics consist of a variety of simple movements that are intended to increase body strength and flexibility, in addition to improving psychomotor skills such as balance, agility and coordination. **(Cintre, N., et al., 2022: 93)**

Calisthenics exercises allow us to systematically exercise our entire body and achieve complete natural conditioning in a surprisingly short amount of time. For most of us, a calisthenics workout will be done 3-5 days per week and each workout will last from 10-30 minutes. As you will soon learn through their regular practice, calisthenics exercises increase strength, even at only a moderate level of intensity. Calisthenics greatly enhance our physical fitness and stamina. **(Santhosh, R., & Davidson, S., 2021: 163)**

Through the researcher's work as an assistant professor in the Department of Physical Education and Movement Sciences - Qassim University, and the Department of Sports Training at the College of Physical Education - Mansoura University, and through continuous communication with the technical staff of the Egyptian clubs understudy, the researcher noticed a deficiency in the level of technical performance of some "Hold

Elements" skills understudy. The implementation of stability skills depends on overcoming the force of gravity and maintaining the correct anatomical position of the skill, which requires a sufficient amount of muscular strength and balance. To accomplish the skills, the player must have the ability to integrate both elements in one framework, as a requirement for executing the motor task. This is done by using a method of muscular work similar to technical performance, and then implementing the skills understudy in a correct technical performance.

From here the research problem emerged, as the researcher used personal observation as a tool of data collection, relying on his training and refereeing experience that exceeded 25 years, where the researcher noticed a varying defect in the players' ability to perform some of the "Hold Elements" skills understudy, which negatively affects the player's overall score. Deductions for formal performance errors range between (0.1 - 0.3 - 0.5) of a grade depending on the type of error. The discount may also reach (1 full grade) in the event that the player loses his balance and falls while performing the basic technical stage of the skill and thus is unable to compete for a medal. The researcher also noticed the recurrence of technical errors by the players when executing some of "Hold Elements" skills understudy, and this became clear through competitive evaluation situations. The researcher assumes that this problem is due to the players' lack of the ability to integrate the exerted muscular strength with the ability to the dynamic and static balance, due to its importance in executing the motor duty in the required technical performance, which affects the player's score.

Through the researcher's follow-up to the tremendous development in modern training methods, to develop special physical abilities as one of the basic requirements for the technical performance, the researcher believes that Calisthenics workouts can be used, as it is a training method that relies primarily on resisting the body's weight, it works to strengthen the core muscles by focusing on physical effort without weights. and this type of training is distinguished by it's in the same motor path for the skills understudy and with the same type of muscle work used when performing the motor task.

The researcher believes that raising the level of players must be through standardized training programs, and the use of the latest exercises,

such as Calisthenics exercises, which contribute to developing the players' performance, as they work to develop the physical abilities related to technical performance such as strength, balance, agility, coordination, and developing muscle work towards motor performance similar to skill. And developing the level of performance, as the success of skill performance requires the development of special physical qualities. Special physical qualities do not appear separately when performing technical performances, as this contributes to developing the type and nature of the work required in technical performance. This is what prompted the researcher to conduct a study targeting Calisthenics workouts, its effect on special physical abilities and the level of technical performance of some "Hold Elements" skills in gymnastics.

By reviewing the related studies in the field of gymnastics, the researcher noticed that there is a scarcity of training programs using Calisthenics workouts in gymnastics, especially on the "Hold Elements" skills understudy, which requires conducting an experimental study as an attempt to develop the level of technical performance of the players understudy. Therefore, the researcher resorted to designing and codifying a group of Calisthenics workouts, to identify its effect on specific physical fitness, and the level of technical performance of the "Hold Elements" skills on rings for under 15 years gymnasts understudy.

Research Aims:

The research aims are to identify the effect of ten weeks of calisthenics workouts on some "Hold Elements" on rings for under 15 years gymnasts, through research goals:

- Developing the level of muscular strength & dynamic balance variables understudy.
- Developing the level of technical performance of Back Lever, V Sit and Planche understudy.

Research Hypothesis:

- There are statistically significant differences between pre & post measurements of the sample members understudy in the level of muscular strength & dynamic balance variables understudy in favor of the post measurement.
- There are statistically significant differences between pre & post measurements of the sample members understudy in the level of technical

performance of Back Lever, V Sit and Planche understudy in favor of the post measurement.

Research Terms:

- **Calisthenics workouts**

Calisthenics originated in ancient Greece and linked to Greco Roman gymnastics. Calisthenics exercises are a form of exercise consisting of a variety of simple, often rhythmical, movement, intend to increase body strength and flexibility with movements such asbending, jumping, swinging, twisting, kicking, using only one's body weight for resistance. Calisthenics when performed vigorously and with variety can benefit both muscular and cardiovascular fitness, in addition to improving psychomotor skills such as balance, agility and coordination. Calisthenics can be done by people in all age groups and genders and without risk of injury when done properly.

(Panihar, U., & Rani, D.,2022: 23)

- **"Hold Elements" skills**

It is a type of strength movements according to the Russian scientist Ukrain, who divided gymnastics movements in 1938 into strength & swing movements. The strength movements were divided into raising movements, lowering movements, and **"Hold Elements"** movements. Performing **"Hold Elements"** movements requires the availability of an appropriate amount of muscle strength and balance. To maintain the anatomical position of the body and resist gravity. **(operational definition)**

Research Procedures:

- **Research Methodology:**
  The researcher used the experimental method using the experimental design of one group and by making the two measurements (pre-post).
- **Spatial Domain:** Gymnastics hall - Al-Ahly Club and Talaie El-Geish Club - Cairo - Egypt.
- **Time Domain:** The exploratory study was conducted in the time period from Saturday, January 7, 2023 to Saturday, January 14, 2023, the pre-measurement was conducted on Monday, January 16, 2023. The basic study was carried out during the period from Saturday, January 7, 2023, until Monday, March 27, 2023, the post-measurement was conducted on Wednesday, March 29, 2023.

- **Research Sample**: The researcher selected a number of (10) gymnasts intentionally from junior gymnasts under (15) years, who are registered with the Egyptian Gymnastics Federation in the 2022/2023 training season, as the main research sample, in the following sports clubs: Al-Ahly Club and Tala'ea El-Geish Club. A number of (10) juniors were selected randomly as the exploratory research sample, representative of the original community and outside the main research sample, with the aim of selecting appropriate Calisthenics exercises related to the stability skills under research, and codifying the training load for these exercises.

The researcher calculated the equivalence of the distribution of individuals in the research sample in growth rates (age - height - weight - training age), as well as the equivalence of the distribution of individuals in the research sample in the physical variables understudy, and also the level of technical performance of "Hold Elements" skills on the ring apparatus for junior gymnasts under (15) years, and it becomes clear This is done statistically through tables (1), (2), and (3).

Statistical description of sample

Table (1)
Statistical description of growth rates variables
(Height - Weight - Age - Training Age)

(n=10)

		Statistical data Variables	Measuring unit	Mean	Standard deviation	Median	Coefficient of torsion
Growth rates	1	Tall	cm	148	1.699	147.5	0.882
	2	Weight	Kg	43.63	2.826	42.95	0.721
	3	Age	Year	14.28	0.287	14.35	-0.734
	4	Training age	Year	10.52	0.325	10.5	0.184

From Table (1) it is clear that the values of the torsion coefficient for each of the growth rates variables understudy ranged between (-0.734, 0.882) and these values were limited between (±3) which indicates the moderation of the values of the growth rates of the individuals in the sample understudy before experimenting.

Table (2)
Statistical description of physical variables

(n = 10)

Physical Variables	Test	Measuring unit	Mean	Standard deviation	Median	Coefficient of torsion
Muscular Strength (Arms)	Pull Ups	number	14.1	1.197	14	0.250
Muscular Endurance (Arms)	Push the parallel bars	number	17.2	1.316	17	0.455
Muscular Power (Legs)	Vertical Jump Sargent	cm	40.85	2.963	40	0.607
Muscular Power (Abs)	Raise the legs from hanging on the bar	Number/15s	8.7	0.948	9	- 0.948
Dynamic Balance	Press Balance	degree	6.83	1.195	6.55	0.702

From Table (2) it is clear that the values of the coefficient of torsion for each of the physical variables understudy ranged between (- 0.948, 0.702) and these values were limited between (±3) which indicates the moderation of the values for the physical variables of the sample individuals understudy before experimenting.

Table (3)
Statistical description of technical variables

(n = 10)

Technical variables		Measuring unit	Mean	Standard deviation	Median	Coefficient of torsion
1st skill	**Back Lever** (Hanging Scale Rearways)	degree	7.94	0.334	7.9	0.359
2nd skill	**V Sit** (2 s.)	degree	7.02	1.077	6.8	0.612
3rd skill	**Planche** (Support Scale)	degree	6.19	0.703	7.15	0.170

From Table (3) it is clear that the values of coefficient of torsion for each of the physiological & technical variables understudy ranged between (0.170, 0.612) and these values were limited between (±3) which indicates the

moderation of the values for technical variables of the sample individuals understudy before experimenting.

Means of data collection:

The researcher used the following methods to collect data:

- Means of collecting data related to anthropometric measurements.
- Means of collecting data related to physical variables.
- Means of collecting data related to technical variable.

Means of collecting data related to anthropometric measurements:

The means and tools for data collection that are appropriate to the nature of the study were identified by looking at the scientific references, research and previous studies in the field of gymnastics training and some other sports. The researcher has used the following tests, measures and devices:

- A rest-meter device for measuring the total length of the body up to the nearest 1cm.
- The medical scale device to measure the player's weight up to the nearest 1kg.

Means of collecting data related to physical variables understudy:

Physical Variables Tests understudy attachment (5)

- Pull Ups test (to measure muscular strength of the arms muscles)
- Push the parallel bars test (to measure muscular endurance of arms muscles)
- Vertical Jump Sargent test (to measure muscular power of legs muscles)
- Raise the legs from hanging on the bar (to measure muscular power of abs muscles)
- Press Balance test (to measure dynamic balance)

(Allawi, M. & Radwan, M. 2017: 236); (Hassanein, M. 2015: 149)

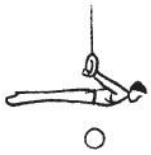
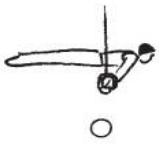
Means of collecting data related to technical variables.

The technical skills understudy was filmed using the "video camera" and the videos were shown to four arbitrators accredited by the Egyptian Gymnastics Federation to evaluate the technical performance of the skills understudy, each arbitrator puts a score of ten degrees for each technical skill understudy, the highest and lowest score has been deleted so that the player's score is the average of the two middle scores.

Subjective Evaluation is the type of evaluation that does not depend on the standards, levels, and criteria, but depends on the experiences of the measurers (arbitrators), subjective evaluation is used in many of sports activities, especially gymnastics, diving, rhythmic gymnastics and water ballet, where unified international legal conditions are set, agreed upon in advance between the arbitrators, in order to reach the greatest degree of objectivity in evaluating the degree.

(Khalil, M. 2020: 9); (Hassanein, M. 2015: 42)

Figure (4)
"Hold Elements" Skills understudy

Skills	**Back Lever** (Hanging Scale Rearways)	**V Sit** (2 s.)	**Planche** (Support Scale)
			
Difficulty	A = 0.1	B = 0.2	C = 0.3

(G.I.F. 2022: 89)

Selecting the assistants:

The researcher selected two assistant coaches, who are members of the technical staff of the two clubs understudy, as assistants, in order to assist the researcher in applying the research procedures.

The Exploratory Study:

The exploratory study was conducted in the time period from Saturday, January 7, 2023 to Saturday, January 14, 2023, on a sample of players representing the original community and from outside the main research sample, and their number reached (10) players who were chosen randomly, the pre-measurement was conducted on Monday, January 16, 2023.

This study has targeted:

- Ensure the safety of the devices and tools used
- Training assistants to take measurements and ensure that the tests are applied according to the specified conditions
- Selection and experimenting Calisthenics workouts and their compatibility with the technical performance of the "Hold Elements" skills understudy.
- Rationing of training load variables for the Calisthenics workouts understudy.
- Conducting scientific transactions for the tests used (validity and reliability) and ensuring their suitability to the research sample.
- Setting the best camera angle to facilitate the process of evaluating the technical performance of the "Hold Elements" skills understudy.

The Exploratory Study resulted in:

Ensure that all of its objectives are achieved, and that the suggested Calisthenics workouts understudy is appropriate for the nature of the sample age, as the members of the exploratory sample performed the suggested Calisthenics workouts without any difficulties, which made the researcher the possibility of applying these exercises to the individuals of the basic research sample.

• Scientific Transactions:

- **Validity coefficient**

The researcher calculated the validity coefficient using the method (validity of differentiation), between two groups, one distinguished and numbered (5) players, and the other less -distinguished numbered (5) players, from the same research community and from outside the basic research sample, in order to calculate the validity coefficient of the physical and technical tests understudy, as shown in Table No. (5)

Table (5)
Differentiation validity of physical and technical tests understudy

n1=n2=5

Variables		Test	Measure unit	distinguished group		less distinguished group		Subtract averages	T test
				Mean	St.D.	Mean	St.D.		
muscular Strength (Arms)	1	Pull Ups	number	14.80	0.836	13.40	1.140	1.40	2.746 *
Muscular Endurance (Arms)	2	Push the parallel bars	number	18.20	0.837	16.40	1.140	1.80	2.250 *
Muscular Power (Legs)	3	Vertical Jump Sargent	cm	43.30	2.049	38.50	1.322	4.80	4.496 *
Muscular Power (Abs)	4	Raise the legs from hanging on the bar	Numbe r/15s	9.00	1.00	7.80	0.836	1.20	2.058 *
Dynamic Balance	5	Press Balance	degree	7.28	0.41	6.10	0.724	1.180	3.063 *
1st skill	6	**Back Lever** (Hanging Scale Rearways)	degree	8.20	0,223	7.68	0.178	0.520	3.942 *
2nd skill	7	**V Sit** (2 s.)	degree	7.920	0.807	6.40	0.724	1.520	2.272 *
3rd skill	8	**Planche** (Support Scale)	degree	6.620	0.697	5.640	0.364	0.980	2.653 *

Tabular T value at a significant level of 0.05 = 1.860 on one side
* = significant

It is clear from Table No. (4) and by applying the “T” test to calculate the significance of the differences between two independent groups, one distinguished and the other less -distinguished, that the calculated “T” value, which was ranged between (2.058, 4.496), is greater than the tabular “T” value at a significant level. (0.05), which amounted to (1.860), which indicates that there are statistically significant differences between the two groups in favor of the distinguished group, which confirms the validity of the tests understudy

in what they were designed to measure, and that they can differentiate between the distinguished and less -distinguished players of the same age group.

- **Reliability Coefficient**

The reliability coefficient was calculated using the method of applying and reapplying the test (Test - Retest), for the physical and technical tests understudy, the first application of the tests was conducted on 7/1/2023 on a sample of (10) players, while the second application took place on 14/1/2023, with an interval of 6 days between the two applications. and calculate the correlation coefficient between them, as shown in Table (6).

Table (6)
Reliability coefficient of physical and technical tests understudy

n=10

Variables		Test	Measure unit	TEST		RE-TEST		Correlation Coefficient
				Mean	St.D.	Mean	St.D.	
muscular Strength (Arms)	1	Pull Ups	number	14.1	1.197	14.4	0.843	0.735 *
Muscular Endurance (Arms)	2	Push the parallel bars	number	17.2	1.316	18.5	1.080	0.792 *
Muscular Power (Legs)	3	Vertical Jump Sargent	cm	40.85	2.963	42.25	3.155	0.979 *
Muscular Power (Abs)	4	Raise the legs from hanging on the bar	Number/ 15s	8.7	0.948	9.50	1.080	0.925 *
Dynamic Balance	5	Press Balance	degree	6.83	1.195	7.43	1.260	0.740 *
1st skill	6	**Back Lever** (Hanging Scale Rearways)	degree	7.94	0.334	8.10	0.403	0.927 *
2nd skill	7	**V Sit** (2 s.)	degree	7.02	1.077	7.25	1.034	0.994 *
3rd skill	8	**Planche** (Support Scale)	degree	6.19	0.703	6.46	0.724	0.957 *

Tabular value "r" at the level of significance 0.05 = 0.564 on one side
* = significant

It is clear from Table (6) that the values of "r" of physical and technical tests understudy ranged between (0.735, 0.994), which is greater than the tabular value of "r" at the level of significance (0.05), which amounted to (0.564), which indicates the existence of a relationship a statistically significant correlation between the Test & Re-test, which confirms the reliability of the tests understudy.

- **Basics of design the program**
- **Determine the working muscles through the performance requirements of "Hold Elements" skills understudy:**
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Table (7)
working muscles of "Hold Elements" skills understudy

Skills	**Back Lever**	**V Sit**	**Planche**
working muscles	• Deltoid muscle • Triceps brachii • Hip extensor muscles • Gluteus maximus • Back muscles	• Deltoid muscle • Triceps brachii • Hip flexor muscles • Abs muscles • Quadriceps muscle	• Deltoid muscle • Triceps brachii • Hip extensor muscles • Gluteus maximus • Hamstring muscle • Back muscles

(G.I.F. 2022: 142)

- **Suggested Calisthenics Workouts:**

The researcher applied a group of calisthenics workouts attachment (6) that correspond to the motor paths of the technical skills understudy. workouts are divided into:

1- calisthenics workouts for arms muscles.
2- calisthenics workouts for legs muscles.
3- calisthenics workouts for back muscles.
4- calisthenics workouts for Abs muscles.

The researcher also took into account when designing these workouts, the following:

- Pay attention to the anatomical position of the body while performing exercises.
- It must contain the technical stages of the skill or some of its parts.
- Simulating the actual performance of skills in terms of the force exerted.
- Analyze Calisthenics exercises to determine the training load variables for each exercise.
- Gradual exercises, from easy to difficult, from simple to complex, with variety.

- **Training load variables for the proposed calisthenics workouts:**

The researcher has codified the training load variables for the proposed calisthenics workouts by reviewing previous and related studies, specialized references, sports training science references and the international information network. attachment (7)

- **Intensity:** The researcher relied on calculating pulse rates to determine the intensity of the training load using the Carvonein equation to calculate the Target Pulse Rate (TPR)

TPR = resting pulse rate + target load intensity x (heart rate reserve)

Table (8)
Intensity Percentage

load degrees	Percentage	Pulse Rate
Medium	50 : 74 %	130 : 150 p/m
high	75 : 84 %	150 : 170 p/m
Maximum	85 : 100 %	170: 200 p/m

The researcher took into account the gradual increase in the intensity through the gradual control of its variables, and the times of the training loads were organized and distributed over the training weeks and the appropriate degrees of load during the period of training application.

- **Volume, (Repetitions – Sets):**

Calisthenics workouts were applied in the main part of the training unit, and the exercise performance time was for (20-30) seconds with high intensity, followed by (10-15) seconds of positive rest, and the exercise was repeated (8) sets, the time for performing 8 sets of each exercise reached (4)

minutes, rest after each exercise, (1) minute in a session extending to (20-40) minutes.

- **Rest Periods:** Determining the appropriate intermittent rest time after performance based on Calisthenics workouts, the exercise performance time was for (20-30) seconds with high intensity, followed by (10-15) seconds of positive rest.

- **Calisthenics Workouts Duration:**

- The duration of calisthenics workouts was (10 weeks), with 4 training units per week.
- The researcher determined the time of the training unit in the week with an average load between (90 - 120 min), taking into account the wavy load between the training units.
- The time of The duration of calisthenics workouts within the training unit was on average (20-40) minutes. The load intensity used (medium - maximum).

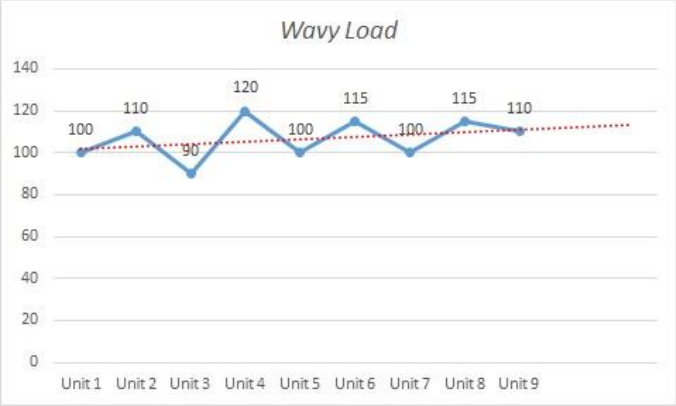

Figure (1)
Wavy Load of training units

The distribution of training load degrees over the training weeks during the stages of the training program to the degree of the medium load between (50 - 74%), the high load between (75 - 84%) and the maximum load between (85 - 100%).

- **The stages of applying the suggested calisthenics workouts:**
-

Table (9)
Stages of applying calisthenics workouts

Stages	Weeks	Units/ week	unit time	Load Cycle
First stage	3	4	90 - 120 minutes	1 : 2
Second stage	3			
Third stage	4			

Training methods: The researcher used: High Intensity Interval Training.
Training Load Cycle: Formation the training load cycle on units was chosen using the way of training load (1 : 2), which means a medium load for one unit, followed by a high load in the following two units.

Basic study: The basic study was carried out during the period from Saturday, January 7, 2023, until Monday, March 27, 2023, the pre-measurement was conducted on Monday, January 16, 2023. the post-measurement was conducted on Wednesday, March 29, 2023, and the pre & post technical performance was filmed at the in the gymnastics hall of the following sports clubs, Al-Ahly Club and Talaie El-Geish Club. As shown in the time distribution table of research application, attachment (10).

Calisthenics workouts were applied to the main research sample in the physical preparation part of the training program, where the time of performing these exercises per week ranged between (80 - 160) minutes, for a period of 10 weeks, with 4 training units per week.

Table (10)
Axes of the Calisthenics Workouts

	Axes	Content	
1	program duration	10 weeks	
2	Number of training units in the program	40 training units	
3	Number of training units per week	4 training units	
4	training unit time	(90 - 120) minutes	average 105 minutes
5	Calisthenics workouts time in the training unit	(20-40) minutes	average 30 minutes
6	Total program time	4200 minutes	100%
7	General physical preparation time	2016 minutes	48% of the total time

8	Private physical preparation time	2688 minutes	64% of physical preparation
9	Calisthenics workouts time in the program	1263 minutes	47% of private preparation
10	Technical preparation time in the program	2184 minutes	52% of the total time
11	Training load degrees used	Medium - High - Max	
12	Training load weekly cycle	(1 : 2)	

Statistical Treatments: The researcher used the program (Statistical Package for Social Sciences) (SPSS v25) Using the following statistical parameters: Mean - Standard Deviation - Torsional coefficient – Wilcoxon test - Percentage of improvement.

Presentation and discussion of the results:

Present the results:

Presenting the results of the first hypothesis:

Table (11)
Significance of differences between pre & post measurements for the experimental group in physical variables understudy

n = 10

Physical Variables	Test		Pre mean	Post mean	Positive ranks		Negative ranks		(Z) Value
					Mean rank	Sum of ranks	Mean rank	Sum of ranks	
muscular Strength (Arms)	1	Pull Ups	14.10	18.40	5.5	55	0.00	0.00	- 2.821 *
Muscular Endurance (Arms)	2	Push the parallel bars	17.20	25.70	5.5	55	0.00	0.00	- 2.812 *
Muscular Power (Legs)	3	Vertical Jump Sargent	40.85	49.65	5.5	55	0.00	0.00	- 2.818 *
Muscular Power (Abs)	4	Raise the legs from hanging on the bar	8.70	14.00	5.5	55	0.00	0.00	- 2.820 *
Dynamic Balance	5	Press Balance	6.83	9.43	5.5	55	0.00	0.00	- 2.831 *

* Tabular value (Z) at the level of 0.05 = ± 1.96

From Table (11) it is clear that the calculated value of (Z) for each of the physical variables understudy has ranged between (-2.831, -2.812) and these values are not limited to (± 1.96) which indicates the presence of statistically significant differences. between the mean of the pre-post measurements of the experimental group in favor of the post measurement at the level of significance (0.05) in the physical variables understudy.

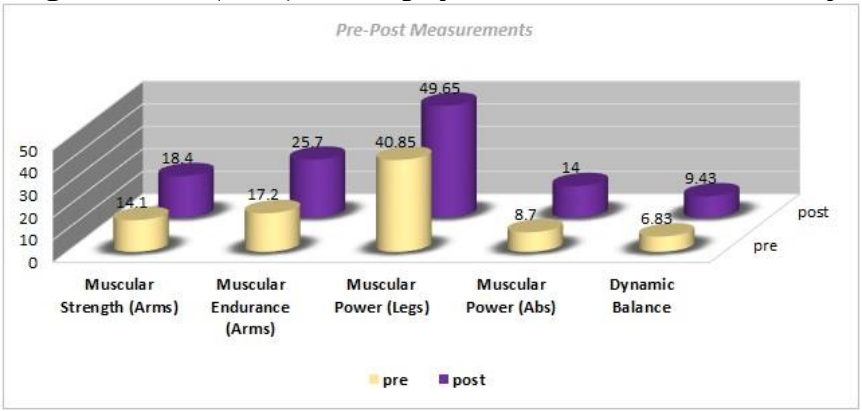

Figure (2)
Significance of differences between pre & post measurements for the experimental group in physical variables understudy

Table (12):
Percentage improvement of the experimental group in physical variables understudy

Physical Variables	Test		Measure unit	Pre mean	Post mean	Means Difference	Percentage of improvement
muscular Strength (Arms)	1	Pull Ups	number	14.10	18.40	4.30	30.5%
Muscular Endurance (Arms)	2	Push the parallel bars	number	17.20	25.70	8.50	49.4%
Muscular Power (Legs)	3	Vertical Jump Sargent	cm	40.85	49.65	8.80	21.5%
Muscular Power (Abs)	4	Raise the legs from hanging on the bar	Number/ 15s	8.70	14.00	5.30	60.9%
Dynamic Balance	5	Press Balance	degree	6.83	9.43	2.60	38.1%

From Table (12) it is clear that the percentage of improvement of the experimental group in the physical variables understudy ranged between

(21.5%, 60.9%) and the highest percentage of improvement was for the variable of abs muscular power by (60.9%), and the lowest percentage of improvement was for the variable of Legs muscular power by (21.5%), and the percentage of improvement of the rest variables ranged between them.

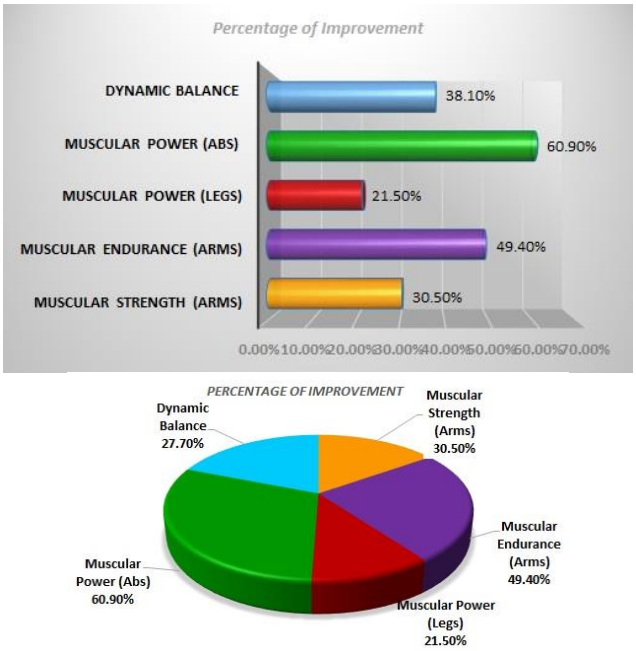

Figure (3)
The percentage improvement in the physical variables understudy

Presenting the results of the second hypothesis:

Table (13)
Significance differences between pre & post measurements for the experimental group in technical variables understudy

n = 10

Technical Variables			Pre mean	Post mean	Positive ranks		Negative ranks		(Z) Value
					mean rank	Sum of ranks	mean rank	Sum of ranks	
1st skill	1	**Back Lever**	7.94	8.76	5.5	55	0.00	0.00	-2.807 *

		(Hanging Scale Rearways)							
2nd skill	2	**V Sit** (2 s.)	7.02	8.54	5.5	55	0.00	0.00	-2.810 *
3rd skill	3	**Planche** (Support Scale)	6.19	8.59	5.5	55	0.00	0.00	-2.823 *

* Tabular value (Z) at the level of 0.05 = ± 1.96

From Table (13) it is clear that the calculated value of (Z) for technical variables understudy has ranged between (-2.809, -2.823) and these values are not limited to (± 1.96) which indicates the presence of statistically significant differences. between the mean of the pre-post measurements of the experimental group in favor of the post measurement at the level of significance (0.05) in technical variables understudy.

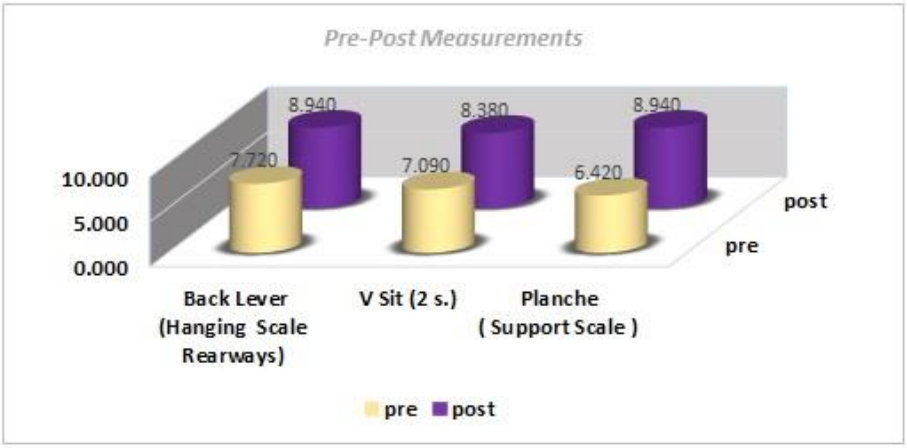

Figure (4)
Significance differences between pre & post measurements for the experimental group in technical variables understudy

Table (14)
Percentage improvement of the experimental group in physiological & technical variables understudy

Technical Variables			Pre mean	Post mean	Means Difference	Percentage of improvement
1st skill	1	**Back Lever** (Hanging Scale	7.94	8.76	0.820	10.3 %

		Rearways)				
2nd skill	2	**V Sit** (2 s.)	7.02	8.54	1.520	21.7 %
3rd skill	3	**Planche** (Support Scale)	6.19	8.59	2.400	38.8 %

From Table (14) it is clear that the percentage of improvement of the experimental group in technical variables understudy ranged between (10.3%, 38.8%) and the highest percentage of improvement was for **Planche** (Support Scale) by (38.8%), and the lowest percentage of improvement was for **Back Lever** (Hanging Scale Rearways) by (10.3%), and the percentage of improvement of kip to **V Sit** (2 s.) ranged between them by (21.7%).

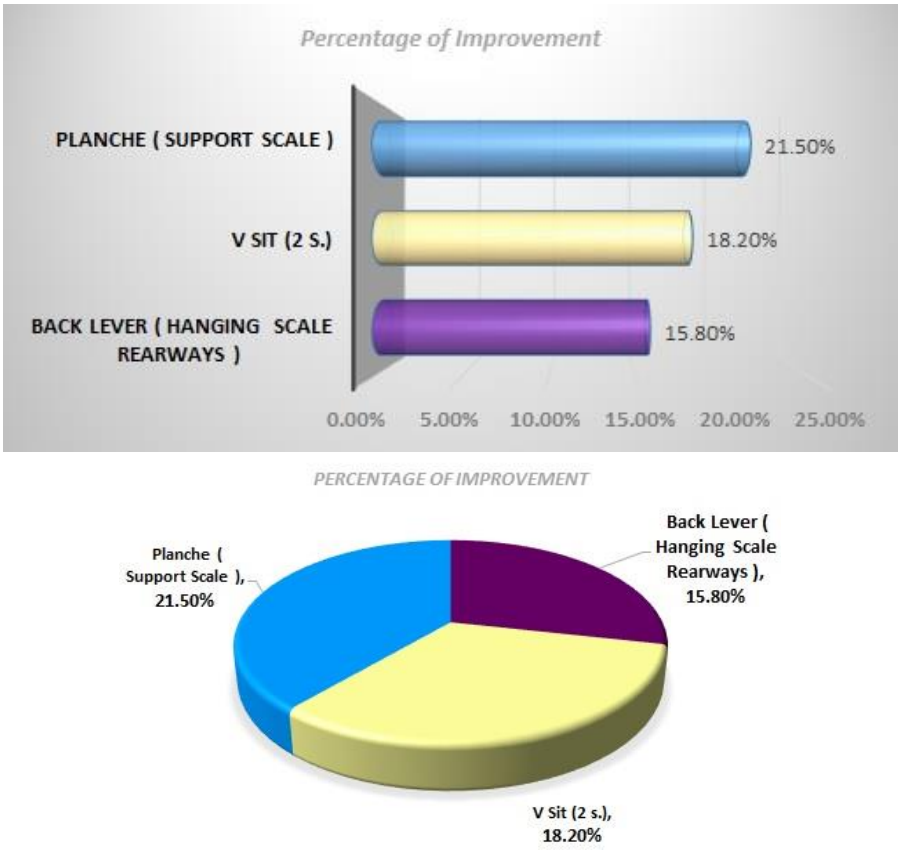

Figure (5)
Percentage improvement of the experimental group in technical variables understudy

Discuss the results:

Discussing the results of the first hypothesis:

Which states, "There are statistically significant differences between the pre and post measurements of the experimental group in the physical variables understudy in favor of the post measurement."

It is clear from Table No. (11) and Figure No. (2) that there are statistically significant differences at the level (0.05) between the pre and post measurements of the experimental group in favor of the post measurement in the physical variables understudy, where the tabular (Z) value was at the level of 0.05 = (±1.96), while the calculated (Z) values for the physical variables understudy ranged between (-2.831, -2.812) and that all of these values are less than (-1.96), meaning that they are not limited between (± 1.96), which indicates the existence of statistically significant differences between the means of pre & post measurements of the experimental group in favor of the post-measurement at the level of significance (0.05) in physical variables understudy. The researcher attributes these results to the effect of the Calisthenics workouts used, and the regularity of training weekly for a period of (10) weeks, at a rate of (4) training units per week.

It is also evident from Table No. (12) and Figure No. (3) that there are statistically significant differences between the pre and post measurements of the experimental group in favor of the post-measurement in the physical variables understudy, with percentage of improvement that ranged between (21.5%, 60.5%) and the highest percentage of improvement was for the variable of abs muscular power by (60.9%), and the lowest percentage of improvement was for the variable of Legs muscular power by (21.5%), and the percentage of improvement of the rest variables ranged between them.

In light of the previous improvement rates, it was found that the proposed Calisthenics workouts had positive effect on physical variables understudy for the players, as Calisthenics workouts were characterized by specific goals and diverse and interesting methods that motivate the players, the researcher took into account the codifying the training loads according to the players' capabilities, taking into account individual differences and gradation when implementing, adjusting rest periods to give the body's systems an opportunity to adapt, and applying the principle of privacy in training that takes into account the specificity of muscular work, the form and

path of motor performance, and the prevailing energy system. The researcher took into account the training of motor muscles as well as the supporting muscles, for balanced muscle development, without defect the technical performance and to avoid injuries.

The researcher attributes the positive effect on the physical variables understudy (muscular power for Arms & Legs) to Calisthenics workouts used, where the researcher took into account, during the design of the exercises, the diversity of muscular work directions, and the using of physical variables in the motor paths of the technical skills understudy, which contributed to the development of physical fitness for the research sample members.

Calisthenics exercises are a form of exercise consisting of a variety of simple, often rhythmical, movement, intend to increase body strength and flexibility with movements such asbending, jumping, swinging, twisting, kicking, using only one's body weight for resistance. Calisthenics when performed vigorously and with variety can benefit both muscular and cardiovascular fitness, in addition to improving psychomotor skills such as balance, agility and coordination. **(Panihar, U., & Rani, D. 2022: 23)**

Calisthenics is a form of exercise consisting of variety movements without the use of equipment or apparatus, but mainly using your own body weight. It's intended to increase body strength, balance and flexibility with movements using only one's body weight for resistance. **(Genç, H. 2020: 233)**

Gymnastics is depending on long-term planning to prepare the gymnast in a comprehensive and balanced manner, especially physical abilities, to help the gymnast to meet the new skill requirements on different apparatuses. **(Al-Hadi, A. 2017: 291)**

Calisthenics training led to the development of physical fitness components, especially the components of muscular strength, ability and motor balance. **(Cintre, N., Prabhakar, R., Methe, A., 2022: 93); (Santhosh, R., & Davidson, S., 2021: 163)**

The highest percentage of improvement for (abdominal muscular power) was (60.9%), and the researcher attributed this to the direction of muscular work of the Calisthenics workouts understudy, which were carefully

designed to conform to the nature of the technical performance of hold elements skills understudy, by combining static and motor muscle work.

In this regard, performance requirements on gymnastics apparatuses are considered the most important components of building training programs, as well as continuous interest in developing methods of physical preparation, and muscular strength is extremely important in gymnastics as a basic physical requirement. **(Abdel-Baseer, A. 2019: 18)**

The researcher also attributes these statistically significant differences between the averages of the pre and post measurements and the percentages of improvement in the physical variables understudy (muscular strength & dynamic balance) to the positive effect of the various Calisthenics workouts.

In this regard, regular training causes several physiological changes to the muscle, represented by an increase in the size of the muscle fibers, and thus increasing the ability of the nervous system to produce the contraction of the fibers, which leads to an increase muscular power. **(Shehata, M. 2010: 56)**

Calisthenics workouts had a positive impact on improving special physical abilities (muscular strength, ability, dynamic balance), and they recommended conducting more scientific studies related to Calisthenics training to identify its effectiveness in various sports activities. **من(Sakinah, M. et al. 2022: 45), (Thomas, E. et al. 2017: 215), (Thakur, R. et al. 2016: 51), (Franks, B. & George, C. 2013: 288), (Srivastava, R. et al. 2013: 75), (Colakoglu, F. 2008: 306), (Preisinger, E. et al. 2001: 61)**

Based on the foregoing results, the first hypothesis has been achieved, which states: "There are statistically significant differences between pre & post measurements of the sample members understudy in the level of muscular strength & dynamic balance variables understudy in favor of the post measurement".

Discussing the results of the second hypothesis:

Which states, "There are statistically significant differences between pre & post measurements of the experimental group in the level of technical performance of some hold elements skills understudy in favor of the post measurement."

It is clear from Table No. (13) and Figure No. (4) that there are statistically significant differences at the level (0.05) between pre and post measurements of the experimental group in favor of the post-measurement in technical variables understudy, where the tabular (Z) value was at the significance level of 0.05 = (±1.96), while the calculated (Z) values of the technical variables understudy ranged between (-2.823, -2.809), and that these values are all less than (-1.96), meaning that it is not limited between (±1.96), which It indicates that there are statistically significant differences between the means of the pre and post measurements of the experimental group at the level of significance (0.05) in technical variables understudy in favor of the post-measurement.

As it is clear from Table No. (14) and Figure No. (5) that there are statistically significant differences between the pre and post measurements of the experimental group in favor of the post-measurement in technical variables understudy, with percentage of improvement that ranged between (10.3%, 38.8%), As the average of Back Lever skill on rings apparatus in the pre-measurement reached (7,94) degrees, and the development in the post-measurement reached (8.76) degrees, with percentage of improvement of (10.3%), and the average of V Sit skill on rings apparatus in pre-measurement reached (7,02) degrees, and the development in post-measurement reached (8,54) degrees, with percentage of improvement of (21.7%), while the average degree of Planche skill on rings apparatus in pre-measurement reached (6,19) degrees and the development in the post-measurement reached (8,59) degrees, with percentage of improvement of (38.8%).

The researcher attributes these statistically significant differences between the means pre & post measurements and the percentage of improvement in technical variables understudy to the implementation of Calisthenics workouts used in the main part of the training unit, as shown in attachment (6), where the researcher took into account during the design of the exercises the diversity of muscular work direction, and the employment of physical variables in the motor paths of the ‘Hold Elements’ skills understudy, The time to perform each exercise for (20-30 seconds) with high intensity, followed by positive rest for (10-15 seconds), and the exercise was repeated (8) sets, time for performing groups of each exercise reached (4) minutes, Rest after each exercise (1) minute in a session of (20-40) minutes. The duration of the training program was (10 weeks), with (4) training units per week.

Calisthenics workouts develop technical performance through the mechanics of these exercises as a result of the different methods of 'Hold Elements' skills, and requires harmony of muscular work, between the working and corresponding muscles as a result of diversity between stability and motor exercises, which helps the body to work as a single unit to maintain balance. **(Dires, G. 2020: 98)**

The researcher also attributes the improvement in the level of technical performance to the application of Calisthenics workouts. It is a form of training that depends primarily on the resistance of body weight. It works to strengthen the core muscles by focusing on physical effort without weights. The development of physical abilities using the muscular work method similar to technical performance is one of the best training methods for developing techniques.

Calisthenics workouts had a positive impact on the development of the technical performance level of 'Hold Elements' skills understudy, due to the development of the physical requirements for the implementation of 'Hold Elements' skills understudy, through Calisthenics workouts, especially the muscular strength requirement, in addition to the similarity of the performance of these exercises with the technical performance of 'Hold Elements' skills. And recommended conducting more scientific studies related to Calisthenics exercises to know its effectiveness on different gymnastics equipment.
(Dires, B. 2020: 99); (Franks, B. & George, C., 2013: 288)

Based on the foregoing results, it is clear that the proposed Calisthenics workouts have a positive effect on the level of technical performance of some 'Hold Elements' skills understudy, through the development of special physical requirements and their employment in the same motor path of skill performance.

Thus, the second hypothesis has been achieved, which states, "There are statistically significant differences between pre & post measurements of the sample members understudy in the level of technical performance of Back Lever, V Sit and Planche understudy in favor of the post measurement".

Conclusions and Recommendations:

- **Conclusions:**

Based on what the research results showed, and in light of the research goal and hypotheses, the researcher reached the following conclusions:

- **The suggested Calisthenics workouts are effective on some physical variables understudy, through:**

- The percentage of improvement in the physical variables understudy ranged between (21.5% and 60.9%).
- The average degrees for the muscular strength variable of the arm muscles in the pull-ups test in the pre-measurement reached (14.10 reps) and improved in the post-measurement and reached (18.40 reps), with an improvement rate of (30.5%).
- Average degrees for the muscular endurance variable of arms muscles in the parallel bars push-ups test. In the pre-measurement, it reached (17.20 reps), and it improved in the post-measurement, reaching (25.70 reps), with an improvement rate of (49.4%).
- The average degrees for the muscular power variable of legs muscles in the vertical jump test (Sargent test) in the pre-measurement reached (40.85 cm), and it improved in the post-measurement and reached (49.65 cm), with an improvement rate of (21.5%).
- The average degrees for the muscular power variable of the abdominal muscles in the test of raising the legs from hanging on the bar in the pre-measurement reached (8.70 reps) and improved in the post-measurement and reached (14.00 reps) with an improvement rate of (60.9%).
- The average degrees for the dynamic balance variable in the force arm stand test (Press Balance) in the pre-measurement reached (6.83 degrees) and improved in the post-measurement and reached (9.43 degrees), with an improvement rate of (38.1%).

- **The suggested Calisthenics workouts are effective on some 'Hold Elements' skills understudy, through:**

- The percentage of improvement in technical variables understudy ranged between (10.3%, 38.8%).
- The average degrees of "Back Lever" skill on rings apparatus understudy, in the pre-measurement reached (7.94) degree, and improved in post-measurement reached (8.76) degree, with an improvement rate of (10.3%).

- The average degrees of "V Sit" skill on rings apparatus understudy, in pre-measurement reached (7.02) degree, and improved in post-measurement reached (8.54) degree, with an improvement rate of (21.7%).
- The average degrees of "Planche" skill on rings apparatus understudy, in pre-measurement reached (6.19) degree, and improved in post-measurement reached (8.59) degree, with an improvement rate of (38.8%).

Recommendations:

- Applying Calisthenics workouts to develop the technical performance of "Hold Elements" skills understudy.
- The combination of physical and technical training in proportion to the motor paths of the skills required to be developed with the aim of comprehensive preparation of the player, to reach the highest level of achievement.
- Awareness of trainers about the importance and how to apply Calisthenics workouts, in proportion to the requirements of technical performance on each gymnastics apparatus.
- Applying Calisthenics workouts in the technical preparation phase and the competition period, to make the most of mastering the technical routine on various gymnastics apparatuses.
- Applying Calisthenics workouts to different gymnastics apparatuses, and to other age stages.
- Applying Calisthenics workouts instead of weight training for juniors to avoid injuries.

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