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The effect of plyometric exercises and rubber ropes on the development of some physical abilities of the 100-meter runners for men

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***Abstract*---**During the development of physical abilities and technical achievement through the use of plyometric exercises using rubber ropes, which is one of the means and tools that help to develop some physical abilities and technical achievement of the 100-meter runner, and the research problem was by informing the researchers of the sources, references and previous studies and their being Practitioners of this activity found that there is a weakness in some of the physical abilities and technical achievement of the 100m runners, so the researchers decided to develop the physical abilities and technical achievement of the 100m runners, through plyometric exercises using rubber ropes to develop the physical abilities and technical achievement of the 100m runners, goals Research the number of plyometric exercises using rubber ropes to develop the physical abilities and technical achievement of the 100-meter runner, and to identify the differences between the experimental and control groups in the research variables (physical abilities and technical achievement) in the tribal and remote tests, and to identify the differences in the research variables of the two groups. Experimental and control in the post tests, and the researchers used the experimental method in a one-group style for its suitability The problem to be researched to complete the research process was the community and the research sample. The researchers chose the research community in a deliberate way, and they represent the players of 100 m in Thi Qar, and their number is (6) players, who represent the original community by (100%), and one of the most important conclusions is that the use of exercises Plyometrics and rubber ropes helped achieve better results in developing the muscular abilities of runners.

Keywords---physical abilities, rubber ropes, technical achievement.

Introduction

Introducing the search

Introduction and importance of the research:

The world is witnessing at the current stage a wide-ranging scientific renaissance in all fields, including the sports field, which adopted scientific research and qualitative development to study various topics. Training exercises and training curricula that are based on sound scientific foundations that achieve the goals for which they were set.

As sports training is a planned process based on scientific foundations aimed at reaching the players to the highest levels of sports by rapidly improving the trainee's ability to develop physical abilities. For the higher levels, so the means and training tools contributed to the preparation of special exercises for the training process aimed at improving some physical abilities and achieving the required achievement, as it became necessary to use various methods and methods in sports training in order to reach the runner to a good level and achieve the best achievement. Plyometric training method This method improves movement energy and flexibility, which has an impact on the development of explosive power through the role of lengthening and shortening of muscle fibers, as the use of this method with modern tools and devices in the learning and training processes in recent times has added a lot to the development of skills through shortening Time and effort in the training and educational process, and the desired benefit in using these means is continuous improvement in Therefore, the researchers studied plyometric exercises using tools and assistive devices.

In the 100-meter sprint competition, a simple and difficult process at the same time, it is as simple as a natural skill and a difficult skill, as we do not find two runners running in the same way and with individuals differing in the anatomical structure and building their bodies, strength and speed, the technical performance is not just the ability to run only, but there are elements and requirements They all work towards the player's success, namely: strength, speed of contraction and relaxation of the muscles used, maximum relaxation with maximum force, working to generate speed.

Hence the importance of research through the development of physical abilities and technical achievement through the use of plyometric exercises using rubber ropes, which are among the means and tools that help develop some physical abilities and technical achievement of the 100-meter runner.

Research problem

The tremendous and rapid development in international levels in the application of technical performance for the 100-meter race came through the use of advanced training methods that depend on various sports sciences in order to

achieve integration in all physical abilities, and by informing researchers of the sources, references and previous studies and being practitioners of these Effectiveness They found that there is a weakness in some physical abilities and technical achievement of the 100m runners, so the researchers decided to develop the physical abilities and technical achievement of the 100m runners, through plyometric exercises using rubber ropes to develop the physical abilities and technical achievement of the 100m runners.

Research aims

1. Preparing plyometric exercises using rubber ropes to develop the physical abilities and technical achievement of the 100-meter runners.

2. Identifying the differences between the experimental and control groups in the research variables (physical abilities and technical achievement) in the pre and post tests.

3. Identifying the differences in the research variables of the experimental and control groups in the post tests

Research hypotheses

1. There are statistically significant differences in the post test between the experimental and control groups in the research variables in favor of the post test.

2. There are statistically significant differences between the pre and post tests for the experimental and control groups in the research variables.

Research areas:

1. The human range: a 100-meter runner in Thi Qar Governorate.

2. Time range: Wednesday 11/24/2021 to 4/20/2022

3. Spatial domain: Souq Al-Shuyoukh Sports Stadium

Research methodology and field procedures:

Research Methodology

One of the most important steps that researchers rely on in the success of their research process for any topic is choosing the appropriate approach to solve the research problem. Especially since the scientific research has identified many means and methods that are appropriate and appropriate for any scientific problem that requires study, investigation and research, so the researchers had to choose the method that is consistent with the research problem.

Therefore, the researchers used the experimental method, in a one-group style, to suit the problem to be researched to complete the research process.

Research sample and community:

By the research community, we mean "all individuals, events, or things that are the subject of the research problem, and therefore the researchers have chosen the research community in a deliberate way, and they represent the players of 100 m in Thi Qar, and their number is (6) players, who represent the original community with a percentage of (100%).

Sample homogeneity:

For the purpose of verifying the homogeneity of the sample, the researchers carried out some procedures to control the variables, and that homogeneity was carried out on the population.

Therefore, statistical means were used by means of the mean, standard deviation, and coefficient of variation for morphological measurements to find out the reality of the difference or not. Table (1) illustrates this.

It is proved that the value of the coefficient of variation is less than 30%, and the sources mention that whenever the coefficient of variation is less than 30%, this means that the sample is homogeneous.

Table (1) shows the homogeneity of the research sample in age, height and weight using the coefficient of variation, which shows values less than 30%

Variation coefficient	standard deviation	Arithmetic mean	measuring unit	Measurements and variables	No
2.39	8.48	354	Month	Chronological age	1
5.51	8.16	148	Month	training age	2
4.20	2.82	67.5	kg	Bloc	3
0.45	0.70	179.50	cm	height	4
2.76	1.41	0.62	cm	arm length	5
4.58	3.53	0.106	cm	man length	6

Means and tools used:

✓ Means of collecting information:

☉ Arab and foreign sources

☉ Personal interviews

☉ Forms to empty data

✓ Tools and equipment used:

A Japanese-made Sony video camera with a frequency of 300 frames per second

☉ Japanese-made whistle.

☉ Japanese-made CASIO hand-held calculator

☉ Irish-made Dell Ci7 laptop computer

☉ 3 DVD discs

☉ Rubber ropes of different shapes and sizes

☉ Casio type electronic stopwatch

Field research procedures:

Field Research Procedures:

Research tests

In order to identify the variables under study, the researchers have now prepared a questionnaire (*) and distributed it to a number of experts (**) concerned in the sports field. Then the researchers collected the data in the questionnaire form and adopted the physical variables that got 70% of the opinions of experts and above.

Table (2) shows the candidate variables for the research sample

Unacceptable proportions	acceptable proportions	agreement ratio	Special physical abilities 100m		No
		50%	Maximum strength	muscular strength	1
		70%	Explosive force		
		100%	speed power		
		90%	brute force		
		60%	reaction speed	the speed	2
		100%	maximum speed		
		100%	speed scale		
		100%	scale		3
		100%	Digital Level (Achievement)		4

Percentage of tests recommended by experts to measure physical abilities

agreement ratio	pointing	Tests	physical abilities
84%	*	Long jump from stability.	Explosive power of the legs
		Vertical jump of stability.	
		Vertical jump of movement.	
		Three long and steady.	speed power
89%	*	Flex and extend the legs	
		Sit up from standing for 10	

		seconds.	
		Hijri 10 times, once to the left, once to the right.	
		Three consecutive jumps on the basketball board.	
83%	*	Test run 30m from the high start.	speed
		Test run 18m from the high start.	
		Test runs 4 seconds from high start.	
89%	*	Running 120 m.	speed table
		Run 140m.	
		Run 150 m.	
		Run 200 m.	
92%	*	Jump over the hurdles until tired.	brute force
		Vertical jump on the wall.	
		Put me in the bar for 30 seconds.	

Specifications of the physical tests used.

Leg explosive strength test

❖Test name: Forward jump test.

❖Objective of the test: To measure the vertical explosive force of the muscles of the legs.

❖Tools used: tape measure.

❖Test procedure: The starting line is drawn with a length of (1) meter. The player stands behind the starting line with the feet slightly apart and parallel. The feet must touch the starting line from the outside. The distance after the starting line is measured and marked with points separated from one another (5) cm and for a length of (3) M, then the player begins to perform the test by swinging the arms back from standing with the knees bent and leaning forward a little, after which the player jumps forward with maximum force by extending the knees and hips and pushing the feet with swinging the arms forward, and the jump is with the feet together. The player is given two attempts and takes the best, and the distance is measured from the beginning to the last part of the player's body touching the ground, and the measurement in centimeters is close to (5) cm.

Speed test of the legs - flexion and extension of the legs:

The purpose of the test: to measure the speed characteristic of the legs.

Necessary tools: an electronic clock, a registration form, an assistant, and a training barrier, 40 cm high.

Description of performance: The tester stands in front of the barrier, when he hears the start. He bends the legs and touches the barrier with the hands and gets up quickly in 10 seconds.

Calculation of degrees: Calculates the number of times the legs are bent and extended in a time of 10 seconds.

Number of attempts: once.

Strength test for the legs

- The purpose of the test: To measure the length of the force of the legs.
- Necessary tools: an electronic clock, a registration form, an assistant and a training barrier, 40 cm high.
- Description of performance: The tester stands in front of the barrier, when he hears the start signal. He jumps over the barrier to the point of fatigue.
- Calculation of grades: Calculate the number of times.

Number of attempts: once.

- Maximum speed test ran 30 meters from the high start.
- The purpose of the test: To measure the maximum speed.
- Instruments: stopwatch - poles - gypsum (bork) - tape measure in meters.
- Description of performance: The tester stands directly behind the line, and upon hearing the start signal, the tester runs and tries to reach the final line in the shortest possible time.

Recording: time is calculated in seconds

The number of attempts: only once.

- Speed endurance test ran 120 meters from a high start.**( ) :**
- Purpose of the test: To measure the maximum speed
- Instruments: stopwatch - poles - gypsum (Burke) - tape measure in meters.

- Description of performance: The tester stands directly behind the line, and upon hearing the start signal, the tester runs and tries to reach the final line in the shortest possible time.

- Recording: Time is calculated in seconds.

The number of attempts: only once.

Achievement test run 100m:

The purpose of the test: - To measure the digital level of 100 in time.

Necessary tools: running track. Launching whistle, starting device.

Performance description: The 100m race is performed as per the approved International Federation law.

Calculation of grades: The grades shall be calculated with the shortest time and number of attempts (1).

Scientific basis for the tests:

Honesty: Honesty is one of the indicators that must be available in the approved test in measuring any of the mathematical characteristics and phenomena.

In order to determine the validity of the tests, the researchers used the apparent validity (the sincerity of the arbitrators), which means that the test appears to be true in its apparent form because its name relates to the job to be measured. In the tests, as (Mustafa Mahmoud and others, 1990) indicates (that the test can be considered honest if it is presented to a number of specialists and they judge that it measures what was designed to measure it efficiently)

Stability: In order to extract the reliability coefficient of the tests, the principle of the fixed test must be applied, “which gives close results or the same results if it is applied more than once in similar conditions” ( ), and this is done in similar circumstances. The researchers used that to calculate the reliability coefficient (test method). And the re-test) with an interval between the first and second test (7) days, where the first test was conducted on Tuesday 5/1/2022 at nine in the morning, and it was repeated on Tuesday 12/2022 at nine in the morning, on the research sample.

Ibrahim Salameh explains, "The method of retesting is one of the most simple methods and is characterized by the determination of coherence, because the error associated with the measurement, fortunately, is always more clear when there is a period between the two tests from one day to more", and the researchers extracted the reliability coefficient from By means of the correlation coefficient (Pearson) between the results of the first test and the results of the second test and extracting the significance of the correlation. The researchers concluded that the tests have high significance as shown in Table (3).

Objectivity

The objective test "is the one in which there is no discrepancy between the opinions of the arbitrators if more than one judgment is given to the test subject"(), as the researchers found the objectivity coefficient for each of the skill tests by finding the simple correlation coefficient (Pearson) between the results of the two arbitrators In the first application that was conducted during the exploratory experiment, the correlation coefficients were high, which indicates the objectivity of the tests used in the research, and Table (3) shows that.

Table (3) shows the reliability and objectivity coefficients of the tests

Objectivity coefficient	stability coefficient	the test	No
0.999	0.999	Explosive power of the legs	1
0.998	0.998	Leg strength test	2
0.998	0.996	brute force	3
0.998	0.998	maximum speed	4
0.999	0.999	speed table	5
0.998	0.996	Achievement test run 100m	6

The correlation coefficient of the tabular value t (0.997)

Survey experience:

The second exploratory experiment was conducted on Thursday, 7/1/2022 at nine o'clock in the morning at the Al-Shuyoukh market stadium in Thi Qar on the research sample, and some complex exercises were applied to the group for the purpose of the following

Codify those exercises and find their load components (intensity, volume and comfort).

Knowing the extent of the sample's ability to apply those exercises

Know the time required to apply these exercises.

The knowledge of the assistant staff and the trainer on how to apply these exercises because researchers do not have the right to apply them themselves because it is considered a currency bias.

Knowing the difficulties and problems that researchers face in applying these exercises before applying them in the main experiment.

Field Research Procedures:

Tribal tests for the research sample:

The researchers conducted tribal tests for the research sample before starting to implement the complex exercises on Thursday, 14/1/2021 at nine in the morning

(in the Al-Shuyoukh market stadium), and the measurements (lengths, mass and age) were identified. Then the researchers, with the supervisor and the assistant work team, performed Tests on the research sample.

Plyometric exercises with rubber ropes:

The researchers informed that the sources and references for sports training to obtain effective exercises that fit the requirements of the research, and in order for this information to be sufficient to enrich the researchers, understand it and apply it correctly, the researchers used one of the scientific research tools, which is the personal interview with the officially accredited trainers in the Games Federation powers

The exercises began on Sunday, 1/17/2022, until Sunday, 3/17/2022, for a period of eight weeks, with three training units per week (Sunday, Tuesday, and Thursday).

Here are some clarifications on the compound exercises:

1- The duration of the exercises is one month (four weeks).

2- The number of training units per week is three units.

3- The number of training units in the curriculum (12) training units.

4- Training days (Sunday - Tuesday - Thursday) in the morning.

5- The training method used - the high intensity and repetitive interval training method

6- Finding the average intensity of the group for each exercise and adopting the principle of gradual intensity.

7- Using the corrugation 2-1 in the stress between the training units.

Post-tests for the research sample:

The post-test of the research sample was conducted on Tuesday 19/3/2022 (in the Al-Shuyoukh market) after the completion of the application period, which took (4) weeks, and the researchers were keen to provide the same conditions for the tribal tests.

Statistical means:

The researchers used the statistical methods that helped in processing the results and testing the research hypotheses through the use of the statistical portfolio (IBM SPSS Statistics 24), which are:

Arithmetic mean - standard deviation - coefficient of variation - Pearson correlation coefficient - T test)) for correlated samples - percentage.

Presentation, analysis and discussion of the results:

This chapter deals with the presentation, analysis and discussion of the results of the research, after the researchers completed the collection of data resulting from the analysis and the tests used that were put in the form of tables because of the ease in extracting scientific evidence and because it is an explanatory tool suitable for research that enables the achievement of the hypotheses and objectives of the research in the light of the field procedures that did it.

Presentation, analysis and discussion of the results of the explosive force:

Table (4) shows the differences between the tribal and remote tests in the values of explosive power for the members of the research sample

Indication	(t) computed value	post test		pretest		measuring unit	Variables
		A	S	A	S		
0.009	4.153	1.967	2.20	0.049	1.90	meter	Explosive force

In light of the data extracted for the members of the research sample, Table (4) shows the differences in the values of explosive power in the two tests, the pre and posttests, and as shown in the above table, the nature of the sample members showed significant differences and by using the (T) test of the interconnected samples to extract the differences, as its calculated value amounted to (4.153).) at the level of significance (0.009) and the degree of freedom (4) between the pre- and post-tests and in favor of the post-test.

The researchers attribute this development in the explosive power values to the nature of the plyometric exercises and the rubber ropes that the researchers used for the research sample applied by that group, which the researchers intended during the preparation of these exercises to be in a way that serves the training goals that were set for their development (as study variables), taking into account The principles of training and the correct codification of the components of the training load that fit the research sample and the shape that simulates the kinetic paths of the runner, the appropriate repetitions and intensity that he formulates for each exercise and the diversification of exercises and tools and many things that serve the training situation of the research sample, and this is confirmed by (Talha Hossam Al-Din and others) To the need to diversify in the use of exercises or their method of performance, as one of the most common training mistakes among trainers is to neglect the process of changing the training excitement, and these changes, for example, change in the number of repetitions or the number of sets or through the intensity of the load used or in the speed of exercise performance and rest periods.

Table (5) shows the differences between the pre and posttests in the achievement values of the research sample members

Indication	(t) computed value	post test		pretest		measuring unit	Variables
		A	S	A	S		
0.000	12.314	0.397	12.55	0.750	14.09	meter	Explosive force

In light of the data extracted for the members of the research sample, Table (9) shows the differences in achievement values in the pre- and post-tests. At the significance level (0.000) and the degree of freedom (4) between the pre- and post-tests, and in favor of the post-test.

The researchers attribute this development in the achievement between the pre- and post-test as shown in Table (5) to the exercises used and the rubber ropes used, which worked to increase the strength in the lower extremities, which in turn affected the increase in the explosive power of the muscles of the legs, in addition, the exercises The ropes have worked to increase the rapid frequency of the two legs. Al-Sufi mentions that “plyometric exercises reduce the performance time by increasing speed and strength, and that the force distinguished by speed is what the player needs during the performance, which contributed to the development of the final speed rate of the runners and thus the development of achievement.

Conclusions and recommendations

Conclusions

The researcher reached the following conclusions:-

1. The use of plyometric exercises and rubber ropes helped achieve better results in developing the muscular abilities of the runners.

2. The use of plyometric exercises and rubber ropes contributed effectively to developing the achievement of the 100m runners for men.

3. The use of plyometric exercises and rubber ropes contributed to the development of step length and frequency, which is reflected in the development of the final average speed of the 100-meter runners for men.

Recommendations

Based on the research results, the researcher recommends the following:

Emphasis on the use of plyometric exercises and rubber ropes in the training process as they give a great benefit.

1. The necessity of using plyometric exercises and rubber ropes in training other sports skills in the arena and the field.

2. Conducting other studies on different age groups and for both sexes in the arena, field and other games.

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