



**EXERCISES ACCORDING TO THE PRESSURE APPLIED TO THE FEET AND
THE LENGTH OF THE STEP AND THEIR IMPACT ON REDUCING THE
DIFFERENCES IN THE DISTANCE OF THE STEP BEFORE THE BARRIER FOR
THE TEN HURDLES AND ACHIEVING THE EFFECTIVENESS OF RUNNING
(110 M) HURDLES**

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Abstract

The aim is to prepare exercises for the applied pressure and the length of the step and to find out their effect on the completion and reduction of the differences in the distance before the barrier on the runner of the event of running (110) meters hurdles, as well as knowing the size of the impact of the exercises on the distance before the barrier, the moment of passing the ten barriers and completion before and after applying the exercises. To achieve this goal, the researcher used the experimental approach with a one-person design (A-) (A-B) with multiple attempts, in order to suit the nature of the research problem. Since the nature of the research requires several attempts, six attempts were applied to form a database. Then the researcher worked to determine the research variables, which were represented by (the distance before the barrier at the moment of crossing, the effective completion of 110-meter hurdles). In order to extract the step length of each barrier, the researcher used video imaging as one of the means of analysis through which movement can be studied and described. Note . The 110-meter hurdles run was filmed using (10) iPhone pro devices. They are placed to the right of each of the ten hurdles, at a distance of (4) meters, and at a height of (110) cm from the ground. Then he started applying the pre-tests in the Samawah Olympic Stadium, as the player was tested with 6 attempts within three days, with two attempts every day, and then he started applying the exercises prepared for the player for a period of (12) weeks, with (3) training units per week. Thus, the total number of units for the exercises is (36) units using the repetitive training method, with an intensity ranging from (90-100)%, as the exercises were carried out during the days (Sunday - Tuesday - Thursday) of each week, using the wave (1:1) between weeks and (1). 2) between training units. After completing the application of the vocabulary of the prepared curriculum, the researcher proceeded to apply the post-tests, and after obtaining the results, the researcher used the statistical program (SSPSv27.1) to obtain the results. The barrier between the ten hurdles, which led to regular running speed over a distance of 110 meters hurdles, and this was reflected positively in improving the time of completion by effectively running (110) meters hurdles.

Introduction

Introduction and the importance of research

The world has witnessed a development in various aspects of life as a result of the growth of scientific knowledge and benefiting from the results of studies and research in the field of sports, its aim is to reach the development of the sports levels of players, and to achieve the best achievement. Achieving new numbers requires change and diversification in the use of training methods and methods and continuous tests to identify weaknesses in physical abilities or the form of performance to develop it in order to reach the desired goal, and since the emergence of heroes has become the focus of attention of researchers to present what is hidden from many in this field. The researchers resorted to the science of biomechanics to search and investigate the reasons for the success of athletes and to reach the higher levels without others, and the biomechanical kinetic facts that appear in the form of movement and the force that causes that movement guide us in providing advice to reach the best achievement and achieve the best achievement. What we see today in terms of breaking records and the convergence of levels between competitors in various games, especially the sport of athletics, is only evidence of the advanced level that countries have reached, whatever their classifications, as a result of their coaches adopting various training methods and methods that suit the special requirements of sports effectiveness, through Linking between mathematical sciences in order to reach the best results in this competition by knowing the factors that affect the achievement of physical capabilities and biomechanical indicators such as the characteristics and time indicators represented by the mechanical effects of the activity and investing them towards improving the level of technical performance and achieving high levels of sports for various activities and sports in a manner In general, and for athletics competitions in particular and its various activities, including the 110-meter hurdles event, as this event occupies a prominent place among the athletics activities of its fans, followers and practitioners, as it is characterized by speed, strength, excitement and suspense as one of the Olympic and international short-distance running races. The 110m hurdles run event is one of the activities characterized by excitement, as the player faces challenges that he tries to overcome, the first of which is to challenge the opponent and try to overcome him, and the second is to challenge the ten barriers that hinder the player from running at maximum speed. The best achievement during the hurdles sprint is to cover the distance in the least possible time, which is related to the runner's physical capabilities and special biomechanical characteristics, represented by reaching the hurdle as quickly as possible and crossing the hurdle in the least time without losing speed before crossing the hurdle at the moment of pushing (supporting and pushing) and after landing after passing The barrier with the least time, as well as in the steps between the barriers, so it needs to master the step of crossing the barrier and the correct connection between these steps and between the three steps between the barriers along the race distance, and this requires the speed of continuous exchange between the step of passing and the usual steps between the barriers in order to reduce the time of performance and access to performance This is affected by the position of the body at each passing step, as well as its impact on the three steps between the barriers. Therefore, the path of the body position, especially what is needed during the crossing, and the consequent indicators that affect the passing time Followed by the indicators that follow in each step of passing and during the distance of the race and completion. Therefore, the runner's speed decreases when crossing the barriers due to the loss of speed at the moment of

support and push before crossing the barrier, as well as between the barriers. The correct correlation between the temporal characteristics, which affects the correct technical performance of crossing barriers. Therefore, the activity of 110m hurdles is one of the activities most required for technical performance, as the nature of the movement path of the body over the barrier affects the nature of the movement path of the body between the barriers. Therefore, the nature of the body's conditions during the crossing greatly affects the time of passing each barrier, as this activity is in its movement performance to achieve The highest levels are the repetition of the running steps, and this depends on the amount of pressure applied by the feet during the run to reach the appropriate amount for the push process, in order to maintain ideal proportions regarding their length and frequency over the stages of the race, as they are the decisive and essential factor in the outcome of the race, which requires that monitoring these steps The ability of the player to control it is known through videotaping, which later gives information about the nature of the performance of the players in relation to this event and the degree of integration of its physical and technical construction in order to maintain these ideal proportions for the length of the step and its frequency in the distances between the barriers. However, these two factors are affected by the fatigue factor with the continuation of the effort within race distance, especially in the last stages. The importance of the research lies in the need to develop the athletic level of the player effectively running the 110-meter hurdles by putting scientific touches related to the type of training used, as well as the movement mechanics and technical errors that occur during running and that affect the achievement in an attempt to discover the best training methods and methods suitable for its development in general.

Research problem

The research problem lies in answering the following questions:

1. Does the distance difference before the barrier among the ten barriers have an effect on achievement?
2. Do pressure exercises from the feet and the length of the step have an effect on reducing the distance difference before the barrier between the ten barriers?
3. Do pressure exercises from the feet and stride length have an effect on the completion of the 110-meter hurdles run?

Research Objectives

1. Preparing exercises for pressure and stride length and applying them to the runners of the 110m hurdles event.
2. Identifying the effect of push-ups from the feet and the length of the step in reducing the distance difference before the barrier between the ten barriers.
3. Identifying the effect of push-ups from the feet and the length of the step in achieving the 110m hurdles event.
4. Identifying the size of the effect of the difference between the distance before the barrier between the ten barriers and the achievement before applying the exercises and after applying them

Research Hypotheses

1. The exercises according to the applied pressure and the length of the step have a positive effect in reducing the distance before the barrier between the ten barriers.
2. The exercises, according to the applied pressure and the length of the step, have a positive effect on the effective achievement of running (110) meters hurdles.

Areas Of Research

1. The human field: the Iraqi national team player for the 110m hurdles event.
2. The temporal field: for the period extended from 1/10/2022 to 3/24/2023 AD.
3. Spatial field: Samawah Olympic Stadium.

Research methodology and field procedures

Research methodology

The difference in the approach is due to the nature of the problem and the available capabilities. It is the nature of the problem that imposes the used approach. And since the nature of the current research problem is experimental, so the researcher used the experimental approach to suit the nature of the current research problem and its objectives.

Experimental Design

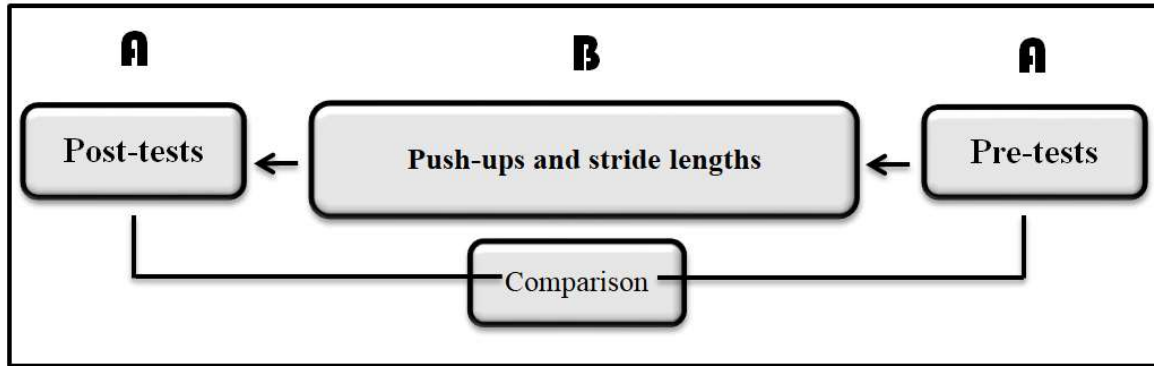
Experiment designs are numerous and varied, and each of them fits a specific goal, as the purpose of conducting the research and the quality of the study necessitate the researcher to have the experiment with this or that design. Accordingly, the researcher used the experimental approach with the design of one individual (A-)(A-B) with multiple attempts, in order to suit the nature of the research problem, as this design is one of the most appropriate evaluation designs for research in the field of behavior modification, where the goal is to bring about a change in the behavior of the individual By applying one of the methods or procedures for behavior modification, such as using a training program, studies that are conducted according to the designs of one subject use multiple procedures in order to achieve experimental control, such as ensuring the stability of the observations made by the examiner of the behavior of the subject and the repeated observation of the nature of the change in the target behavior, as Study procedures conducted according to this design include exposing the subject to three phases of conditions:

The first stage is called the rule and is indicated by the symbol ((A), during which the subject is subject to a series of observations that are conducted at times separated by equal periods of time that continue until the behavior of interest appears stable, and the rate of its occurrence or recurrence is determined in the time period used in the study.

- The second stage, which is represented in exposing the subject to the experimental program, as it is symbolized by the symbol ((B,
- After completing the procedures of the remedial program, the third phase comes, which includes reshaping the floor, which is symbolized by the symbol (A).

Perhaps the addition of this stage allows the researcher to find out the change in the behavior of interest, by comparing this rule with the rule that preceded the experimental treatment and the measurements that were taken during the introduction of the experimental treatment.

Figure (1) shows the experimental design (A-B-A):



form (1) Demonstrates the experimental design of the research

Research Tools

Research community

The researcher identified his research community, which is represented by the Iraqi national team player for the 110-meter hurdles event, and the participant in the official international and local tournaments, and since the nature of the research requires conducting several attempts, and therefore six attempts were applied to form a database.

Means of collecting information

The nature of the hypotheses is what controls the researcher's selection of his research tools as a solution to the problem and in fulfillment of the hypotheses. Accordingly, the researcher has used the following research tools:

1. Arabic and foreign sources.
2. Tests and measurements.
3. Registration form.
4. Kinematic analysis program (kinovea)
5. The Internet.

Tools and devices used in the research

1. Whistle.
2. Barriers number 10.
3. Legal barriers with a height of (76 cm, 84 cm, and 91 cm), number (10)
4. Training barriers with a height of (20 cm, 30 cm, 40 cm), number (30)
5. 110-meter running track.
6. Camera holder.
7. Holders for phones (10)
8. Numbered panels.
9. Sticky tape.
10. Measuring tape
11. Weights of different masses (0.5-2) kg tied to the feet.
12. Tray with a height of 40 cm.
13. Ground ladder.
14. Predicate number (1)
15. Stickers.
16. Characteristics.

17. (14) earrings with a diameter of (50 cm)
18. Sticks.
19. Laser sensor and lighting controller.
20. Laser number 2.
21. Laser holder number 2.
22. Optical sensor panels number 2.
23. Ups charger to operate the laser sensor.
24. Electronic calculator (lenovo)
25. Electronic (manual) stopwatch.
26. Exilim video camera (1 number)
27. 4 iphone pro 13.
28. Iphone pro 12 x 4.

Research Procedures

Determine the search variables

The researcher sought to review many sources and previous studies related to the subject and the opinion of the two supervisors of the research. The following variables were agreed upon:

1. Effectively achieving 110 meters hurdles.
2. The step of crossing the barrier

Description of the 110-meter hurdles completion test

1. Objective of the test: Measuring achievement for the 110-meter hurdles distance.
2. Tools: 110-meter athletics track, stopwatches, registration form, 10 hurdles, whistle.
3. Description of performance: The test was conducted according to the terms and conditions of the International Association of Athletics Federations. The player sits in the starting place, as the referee instructs (take your place), then get ready, then signals the start, and the player starts running 110 meters.
4. Recording: A timer records the laboratory in minutes and seconds to the nearest tenth of a second.

Videography

1. The purpose of videography For the purpose of identifying the kinematic variables of the effectiveness of (110 meters / hurdles), and in order to obtain a scientific formula for the study of these variables, the researcher used video imaging as one of the means of analysis through which movement can be studied and described. It provides the required accuracy in determining the sports movements that take place at a high speed so that they cannot be known through observation.
2. Tools: Sheets numbered from (1-10), adhesive tape, 10 iPhone pro, iPhone holder, 1 Exilim video camera, camera holder.
3. Imaging procedures:Plates numbered from (1-10) shall be placed on the ground according to the sequence of each barrier. iPhone pro devices are placed to the right of each of the ten checkpoints, at a distance of (4) meters, and at a height of (110) cm from the ground.

Exploratory experiments

Scientific research experts recommend conducting exploratory experiments for the tests used in research in order to obtain the necessary reliable results and information, in order to benefit from them when conducting the main experiment

Accordingly, the researcher conducted the following exploratory experiments:

The first reconnaissance experiment

The researcher conducted the first exploratory experiment on Tuesday, 10/10/2022 AD, at the Samawah Olympic Stadium. The aim was to:

1. The availability of the required capabilities in terms of the appropriateness of the place specified for conducting the test on it, as well as the availability of appropriate equipment and tools for the tests.
2. Identify the number of cameras needed to cover the test.
3. Identify the possibility of distributing video cameras correctly and what is the appropriate height for them.
4. Knowing the number of the required assistant work team.
5. Knowing the right time to take the test.

The second reconnaissance experiment

The researcher conducted a second reconnaissance experiment on Thursday 10/20/2022 AD at the Samawah Olympic Stadium, as a test was conducted with 3 attempts for the player with a distance of running 110 meters hurdles, and the aim was:

1. Identifying the negatives and positives that meet the researcher in the main tests.
2. Knowing the safety of the devices and ensuring their validity.
3. Ensure the work and efficiency of the assistant work team and the extent of their understanding of how to shoot video and distribute them to know their tasks when conducting tests for the research sample.
4. Recognizing the number of appropriate attempts performed by the player per day.
5. Knowing the time period needed to rest between one attempt and another.
6. Identify the appropriate height for the camera-carrying drone.
7. Extracting the scientific foundations of the tests (honesty, reliability, objectivity)

Scientific basis for the results

The validity of the test results

It is "the validity of the test or criterion in measuring what was set for it and accordingly the researcher used experimental validity to calculate the validity coefficients of the tests. External is an indicator of the validity of that test, and since the researcher did not have a suitable external criterion, he resorted to the total score of the test being the best criterion in calculating this relationship. The researcher adopted the correlation coefficient (Pearson) between the scores of the subtests and the total score of the test in The validity coefficient is calculated, as shown in Table (1)

The stability of the test results

The constant means "that the test gives the same results or close results if it is repeated more than once on the same group and in the same conditions" As the stability of the test was calculated using the (test and re-application of the test) method, and for this reason, the researcher repeated the tests on Saturday 10/22/2022 AD, as the player was tested with two attempts to run 110 meters hurdles in the Samawah Olympic Stadium, as the period between one test and the last was 15 minutes. The stability coefficient between the two tests was extracted by the law of the correlation coefficient (Pearson), and the results showed that there is a high correlation in the results of the tests, because (the closer the stability value is to (+1), it indicates that the tests have a high degree of stability, as shown in Table (1)

Objectivity of test results

Objectivity means “the tests used are not affected by the change of arbitrators” since the objectivity of the tests was taken in the presence of two arbitrators □, as the Pearson correlation coefficient was calculated between the results of the first judge and the results of the second judge as shown in Table (1)

Table (1) Scientific basis for test results

| significance level | Objective coefficient | significance level | Stability coefficient | significance level | honesty coefficient | variants |
|--------------------|-----------------------|--------------------|-----------------------|--------------------|---------------------|---------------------------|
| 0.000 | 0.999 | 0.000 | 0.998 | 0.000 | 0.903 | Achievement: 110m hurdles |

Table (1) shows that the achievement results enjoy the practical foundations in terms of (honesty, stability, objectivity), as the correlation ratios were all smaller than the error ratio (0.05), and this indicates the significance of the correlations.

The main experiment

Pre-tests

The researcher started conducting the tests, after preparing the research requirements, tools and the assistant work team, as the player was effectively tested by running (110) meters hurdles in the Samawah Olympic Stadium at three o'clock, as the player was tested with 6 attempts, which were tested according to the days:

1. On Sunday 11/20/2023 AD, the player was tested in two attempts to run the 110-meter hurdles, the rest period between one attempt and another was 15 minutes.
2. On Tuesday, 11/22/2023 AD, the player was tested with two attempts to run the 110-meter hurdles, and the rest period between one attempt and another was 15 minutes.
3. On Thursday, 11/24/2023 AD, the player was tested with two attempts to run the 110-meter hurdles, and the rest period between one attempt and another was 15 minutes.

A video was filmed for each of the attempts by placing a (pro iPhone) device in front of each barrier for the purpose of filming the stage of crossing the barrier.

The researcher has established all the variables related to the tests, such as place and time, to benefit from them in the post-tests

Extract the research variables

1. Time Obtained by kinetic analysis software (KINOVA)
2. The distance before the barrier (after a man gets up from the barrier before crossing) It is the horizontal distance between the rise point and the barrier, and it was measured by the kinetic analysis program (KINOVA).

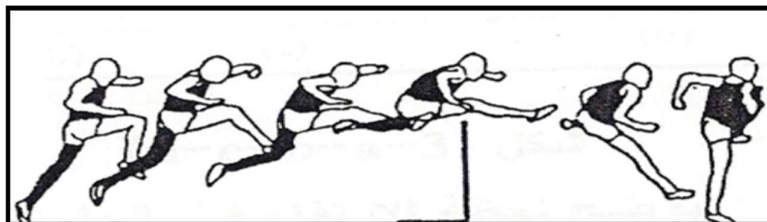


Figure (2) Shows the stride length of the barrier

The third reconnaissance experiment

The researcher conducted a third reconnaissance experiment on Friday 11/11/2022 AD at the Samawah Olympic Stadium at three in the afternoon, as all stomach exercises were applied by the researcher, and the aim of conducting the reconnaissance experiment is:

1. Knowing the suitability of exercises for the player.
2. Extracting the maximum intensity for each exercise used.
3. Knowing the time of each exercise.
4. Ensure the availability of the necessary tools for the exercises.
5. Standing on the difficulties when performing the exercises and finding a solution to them.
6. Knowing the appropriate rest period between repetitions and sets.
7. Knowing the number of exercises that will be applied during one training unit.
8. Adjusting the locations of the laser and the sensor.

Pressing exercises for the feet and the length of the step

The researcher applied the exercises prepared by him under the direct supervision of him and the player's supervisor on Sunday 11/12/2022 AD, until Thursday 2/3/2023 AD, as the researcher included the exercises as follows:

1. The implementation of the exercises took (12) weeks, at the rate of (3) training units per week, and thus the total number of units for the exercises is (36) training units, as the scientific sources mentioned that the speed endurance exercises are performed at the rate of two to three units per week and over a period of two months or Three months, which is sufficient for the occurrence of effects on the functional systems in the body of the athlete
2. The researcher used the exercises and the repetitive training method with an intensity ranging from (90-100%)
3. Apply the exercises at the beginning of the main section and immediately after the warm-up, so that the player is at a level of mental and physical readiness and neuromuscular compatibility to achieve the goal of the exercises.
4. Apply the same exercises amounting to (24) exercises, including stomach exercises for pressing and step length, harmonic exercises.
5. The exercises were graduated in an ascending manner, moving from easy exercises to difficult exercises, and from simple to complex exercises.
6. The researcher applied the principle of diversification in the exercises, that is, the continuous change in the exercises, which depend on the diversity in the motor duty and the few repetitions in order to avoid the occurrence of boredom and within the specified stresses.
7. The time of performing the exercises in one training unit ranged between (60-80) minutes.
8. The ratio of work to rest in the training units ranged between (1:2)
9. Intensity was measured based on repetition.
10. Perform the exercises during the days (Sunday - Tuesday - Thursday) of each week.
11. The researcher took into account the distribution of the fluctuation intensity between the weeks, using the fluctuation (1:1)

12. The researcher took into account the intensity distribution of ripple between the daily training units, using ripple (1:2)

Post-test

After completing the application of the exercises prepared by the researcher, the post-tests were conducted, and the researcher was keen to provide the same conditions in terms of place, time, tools, and the auxiliary team as in the pre-test, as the tests were applied at Samawah Olympic Stadium at five in the afternoon, as the player was tested with 6 Attempts tested by days:

1. On Saturday, 4/3/2022 AD, the player was tested with two attempts to run the 110-meter hurdles, the rest period between one attempt and another was 15 minutes.
2. On Monday, 6/3/2022 AD, the player was tested with two attempts to run the 110-meter hurdles, the rest period between one attempt and another was 15 minutes.
3. On Wednesday, 3/8/2022 AD, the player was tested with two attempts to run the 110-meter hurdles, the rest period between one attempt and another was 15 minutes. A video was filmed for each of the attempts by placing a (pro iPhone) device in front of each barrier for the purpose of filming the stage of crossing the barrier.

The statistical methods and equations used in the research

The researcher used the statistical program (SPSS V 27.1)) to process the data and show the results and the program (Excel) for the calculations, and the following is a presentation of the statistical methods used:

First - statistical methods

- Arithmetic mean.
- standard deviation.
- Pearson correlation coefficient.
- T-value for correlated samples.
- Analysis of Variance value (F)
- Cohen's effect size value.
- The value of the effect size, Eta.
- Shapiro-Wilk value.
- the fourth chapter

Presentation, analysis and discussion of results

Display and analyze the results of the distance before the barrier

Table (2) Arithmetic means, standard deviations, (t) value, and the significance of the differences between the pre and post tests for the distance before the barrier for the ten barriers

| Statistical significance | significance level |) value (calculated | Post-test | | Pretest | | measruin g unit | barrier |
|--------------------------|--------------------|----------------------|-----------|---------|---------|---------|-----------------|---------|
| | | | p | s | p | s | | |
| moral | 0.036 | 2,856 | 2,041 | 216,167 | 3,651 | 221,985 | poison | first |
| moral | 0.002 | 6,000 | 1,563 | 215,883 | 1,603 | 213,062 | poison | second |
| moral | 0.009 | 4,091 | 1,062 | 215,722 | 1,323 | 217,598 | poison | third |

MULTI-OBJECTIVE OPTIMISATION TECHNIQUES FOR THE REDUCTION OF TORQUE RIPPLES IN SWITCHED RELUCTANCE MOTOR

| | | | | | | | | |
|-------|-------|--------|-----------|-------------|-----------|-------------|--------|---------|
| moral | 0.021 | 3,300 | 1,21 1 | 215,86 7 | 1,84 4 | 214,32 3 | poison | fourth |
| moral | 0.008 | 4,271 | 1,04 7 | 217.1 | 1,04 8 | 216.97 | poison | Fifth |
| moral | 0.000 | 14,403 | 1,74 8 | 216.05 | 2,02 7 | 229,20 2 | poison | Sixth |
| moral | 0.000 | 10,824 | 1,00 1 | 216,81 7 | 1,10 4 | 215,92 3 | poison | Seventh |
| moral | 0.014 | 3,691 | 1,47 5 | 215.15 | 1,58 9 | 213.61 | poison | Eighth |
| moral | 0.001 | 7,310 | 1,50 6 | 214,66 7 | 1,37 8 | 207.5 | poison | ninth |
| moral | 0.007 | 4,462 | 1,59 7 | 216,05 5 | 1.95 | 212.99 | poison | tenth |

The table above shows that the value of the significance level of the (t) test for correlated samples and for all ten barriers was less than the error rate (0.05). The percentage of this difference is shown in Table

Table (3) The size of the effect and the percentage difference between the pre and post tests for a distance before the barrier at the moment of crossing

| rate the difference | effect type | Cohen's Value | difference circles | Arithmetic circles | | measruing unit | barrier |
|---------------------------|----------------|------------------|-----------------------|--------------------|---------|-------------------|---------|
| | | | | remote | tribal | | |
| -2.62% | strong | 1,166 | -5,818 | 216,167 | 221,985 | poison | First |
| 1.32% | Very strong | 2,449 | 2,821 | 215,883 | 213,062 | poison | second |
| -0.86% | strong | 1,670 | -1.876 | 215,722 | 217,598 | poison | Third |
| 0.72% | strong | 1,347 | 1,544 | 215,867 | 214,323 | poison | Fourth |
| 0.06% | strong | 1,743 | 0.13 | 217.1 | 216.97 | poison | Fifth |
| -5.74% | Very strong | 5,880 | -13.152 | 216.05 | 229,202 | poison | Sixth |
| 0.41% | Very strong | 4,419 | 0.894 | 216,817 | 215,923 | poison | Seventh |
| 0.72% | strong | 1,507 | 1.54 | 215.15 | 213.61 | poison | Eighth |
| 3.45% | Very strong | 2,984 | 7,167 | 214,667 | 207.5 | poison | ninth |
| 1.44% | strong | 1,822 | 3,065 | 216,055 | 212.99 | poison | Tent |

Table (3) shows that the barriers (second, sixth, seventh, ninth) had a Cohen's value greater than (2), and according to the interpretation of the value, the effect is very strong between the pre and post tests.

As for the barriers (first, third, fourth, fifth, eighth, ninth), the value of ((Cohen's) was confined between (2-1.2), and according to the interpretation of the value, the effect is strong between

the pre and post tests.

To find out the direction of the difference in favor of either the pre or post test, the researcher resorted to the analysis of variance test (F) between the ten barriers, and Table (4) shows that Table (4) The value of (F) calculated for the comparison between the ten barriers in the distance before the barrier at the moment of crossing

| value Eta | Statistical significance | significance level |)F (value | circles square | degrees of freedom | sum of squares | source of contrast | Test |
|--------------|-----------------------------|-----------------------|---------------|-------------------|-----------------------|-------------------|-----------------------|------------|
| 0.9 13 | moral | 0.000 | 58,08 5 | 207,381 | 9 | 1,866,43 3 | between groups | trib al |
| | | | | 3,570 | 50 | 178,516 | within groups | |
| | | | | | 59 | 2,044,95 0 | Total | |
| 0.4 90 | moral | 0.000 | 5,331 | 7,274 | 9 | 65,466 | between groups | rem ote |
| | | | | 1,365 | 50 | 68,228 | within groups | |
| | | | | | 59 | 133,693 | Total | |

The table shows that there are significant differences between the ten barriers for the pre and post tests, because the significance level of the analysis of variance test for multiple measures was smaller than the error rate (0.05), and to know the superiority between the two tests (pre and post) the researcher resorted to the value of (F), as we note that the value of (F) in the post-tests was smaller than the value of (F) in the pre-tests, and this indicates that the differences between the ten barriers in the post-tests are better than the differences between the ten barriers in the pre-tests, and the researcher also used the value of effect size (Eta) for the differences between the pre-tests And dimensionality in the ten barriers, as we note that the value of the effect size among the ten barriers in the pretests has a high value, and this indicates that the differences have a high impact, but when observing the value of the effect size in the posttests, we find that its value is less than it was in the pretests, and this indicates that the differences between The ten barriers in the post-tests became less than they were in the pre-tests, and this indicates that the differences between the pre- and post-tests came in favor of the post-tests, and to give a clear idea of the differences in the ten barriers between the pre- and post-tests, the researcher used the chart (3)

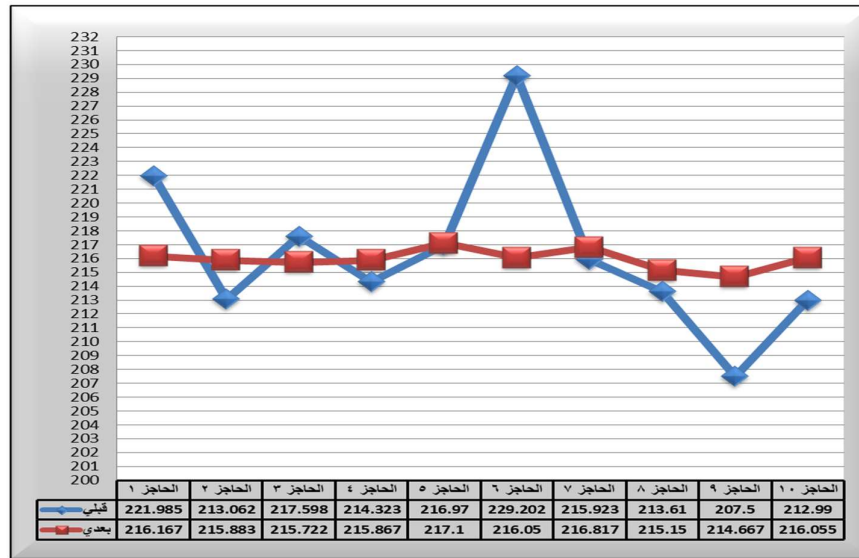


Figure (3) Shows the arithmetic mean of the pre and post tests of the differences between the ten barriers for the distance before the barrier at the moment of crossing the barrier. We notice from the above figure that there is a high dispersion between the ten barriers in the pre-tests, in contrast to what is in the post-tests, as we note that the dispersion between the ten barriers has become less than it is in the post-tests, because the little dispersion in the distance before the barrier at the moment of passing indicates regularity. Passing step between the ten barriers.

Presentation of achievement results

Table (5) Arithmetic means, standard deviations, (t) value, and significance of differences for achievement

| Statistical significance | significance level |) value (calculated | Post-test | | Pretest | | lonliness measurement | variants |
|--------------------------|--------------------|----------------------|-----------|--------|---------|--------|-----------------------|-----------------|
| | | | p | s | p | s | | |
| 2,604 | 0.000 | 6,380 | 0.036 | 13,987 | 0.029 | 14,105 | second | completion time |

The table above shows that the value of the level of significance for the (t) test for interconnected samples of achievement at a distance of 110 meters running hurdles was smaller than the error rate (0.05), and this indicates the existence of significant differences between the pre and post test and in favor of the post test. The effect (Cohen's) to find out the effect between the pre and post tests and the percentage of this difference as shown in Table (6)

Table (6) The size of the effect and the percentage difference between the pre and post tests for the achievement of 110 m running efficiency

| rate the difference | effect type | Cohen's Value | difference circles | Arithmetic circles | | measuring unit | barrier |
|---------------------|-------------|---------------|--------------------|--------------------|--------|----------------|-----------------|
| | | | | remote | tribal | | |
| 0.84% | Very strong | 2,605 | -0.118 | 13,987 | 14,105 | second | completion time |

In Table (6), Cohen's value for achievement was greater than (2), and according to the interpretation of the value, the effect is very strong between the pre and post tests.

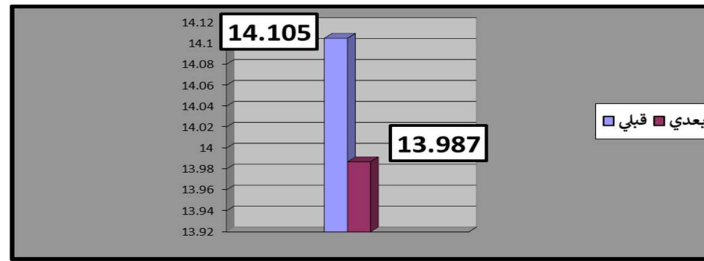


Figure (4)The arithmetic mean of the pre- and post-test shows the completion of the 110-meter hurdles run.

Discuss the results

The results in the tables show that there are differences between the pre and post tests and in favor of the post tests for the player. The researcher attributes these differences to the exercises prepared by the researcher, which contributed to improving the reduction of differences in the passing step between the ten hurdles and the effective completion of 110 meters hurdles. The researcher also believes that the prepared exercises had a role in improving the distance before the barrier at the moment of crossing the barrier, as this step is considered one of the exaggerated fast sprint steps, and this is done by means of specific jumping, which differs from those used in jumping activities because the runner does not sacrifice his speed and shortens the jumping process by making it The change in the trajectory of the center of gravity is as small as possible. As the step was divided into two stages, the first (stage before the barrier) and the second (stage after the barrier) in order to be able to interpret the results according to the stages of its performance. Because of the short distance in the third step that precedes the barrier, and there is no doubt that two-thirds of the distance before the barrier explains to us the importance of moving from running to jumping on the barrier, and this means trying to build horizontal momentum and speed that turns into vertical speed, momentum and capacity according to the law of conservation of momentum. Another body is the horizontal loss for the purpose of the vertical, which allows and helps to pass as quickly as possible. The increase in the distance before passing explains the increase in vertical vehicles, and its effect is negative on the speed obtained by the body in the stage of maximum speed. The main goal in the pre-hurdle stage is to "optimize the use of the forward momentum during the uphill stage" and thus there will be no loss in the amount of the maximum speed stage values. We note that the player in the pre-tests has differences between the ten barriers in the distance before the barrier (increase, decrease), and this affected the player's motor performance mechanics, as the farther the player's leg moved away from the barrier before crossing, an appropriate distance would be between (2-2.20 meters), the more This contributed to the consistency and smoothness of performance The appropriate distance before the barrier will lead to reaching an angle of rise commensurate with the mechanical goal that focuses on not exaggerating the passing movement in order not to lose the horizontal speed to calculate the vertical speed and thus affect the final outcome of the speed. Harmony and coordination of the movement of the body parts before, during and after the crossing in order to maintain as much as possible the horizontal velocity vehicle over the barrier and between the barriers as possible, as the runner

who moves a suitable distance from the barrier before crossing will naturally be able to attack at a better angle of rise, which is reflected positively on the degree of inclination. The torso above the barrier and extending the leading leg better and faster over the barrier, and these variables from the angle of rise and the angle of inclination of the trunk made the center of gravity of the body mass at the lowest possible height, and this affected the trunk to be in control of the rest of the body variables, and this positively affects the continuation of the maximum speed, considering that the step. The pre-barrier mainly and directly controlled the variables above the barrier.

Conclusions, recommendations and suggestions

This chapter includes the most important conclusions reached by the current research from its results, and recommendations to benefit from it in the light of its results and conclusions, and then proposals for conducting subsequent research that complements or develops it.

Conclusions

1. The pressure exercises and the length of the stride prepared by the researcher contributed to reducing the distance differences before the barrier between the ten hurdles, which led to regular running speed during the 110-meter hurdles distance.
2. The push-ups and stride length prepared by the researcher contributed to the improvement and development of achievement in the effectiveness of running 110m hurdles.

Recommendations and proposals

First - Recommendations

1. The researcher recommends the trainers to use stride length and pressure exercises, which include coordination exercises, as they have a role in reducing the distance before the hurdle between the ten hurdles and improving achievement effectively in the 110-meter hurdles.
2. Directing the trainers to identify the results of technical performance analysis due to their importance in the performance evaluation process (knowing the negatives and correcting them, knowing the positives and strengthening them) and achieving achievement.
3. The necessity of directing trainers to pay attention to the bio-kinematic variables of performance, being the directing factor for speed and productive power, and thus influencing the achieved achievement.

Second - Proposals

1. Applying push-ups and step length exercises to another activity and knowing their impact on achievement, such as the 100-meter running event.
2. Applying neuromuscular coordination exercises to the 110-meter hurdles player and knowing their effect on biomechanical variables and achievement.
3. Conducting other studies regarding the greatest contribution to the distance of crossing the barrier, is the pressure exerted by the feet or the speed of the player.
4. Conducting other studies regarding the impact of the interaction of pressure applied and the length of the step together on the step of crossing the barrier.

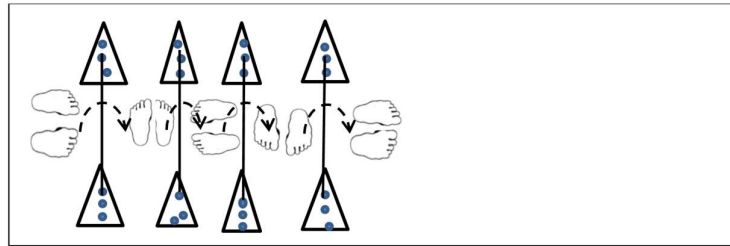
References

1. Abu El-Ela Ahmed Abdel-Fattah and Ahmed Nasr El-Din Radwan: Physiology of Physical Fitness, 1st edition: Cairo, Dar Al-Fikr Al-Arabi, 1993.
2. Zaki Darwish: Zaki Darwish: The Art of Running and Relaying, Egypt, Dar Al-Maarif, 1987.
3. Salah Mohsen Naga and Bakr Salem: Salah Mohsen Naga and Bakr Salem: Athletics, Fundamentals of Organizing Learning, Tanta, 2003.
4. Ali Hassanein, Hasaballah and others: Contemporary Volleyball, Cairo, Al-Ghad Library and Press, 2000.
5. Qasim Hasan Hussain: Qasim Hasan Hussain and Nizar al-Talib: Theoretical and Mechanistic Foundations in Training the Decimals for Men and the Seven for Women, Mosul, Dar Al-Kutub for Printing and Publishing, 1987.
6. Mezan, S. O., Jabbar, A. H., Hamzah, M. Q., Tuama, A. N., Hasan, N. N., & Agam, M. A. (2018). Synthesis and Characterization of Zinc Sulphide (ZnS) Thin Film Nanoparticle for Optical Properties. *Journal of Global Pharma Technology*, 10(07), 369-373.
7. Abdullah Hasan Jabbar, Hayder Shkhair Obayes AL-Janabi, Maytham Qabel Hamzah, Salim Oudah Mezan, Alaa Nahad Tumah, Amira Saryati Binti Ameruddin, Mohd Arif Agam, "Green synthesis and characterization of silver nanoparticle (AgNPs) using pandanus atrocarpus extract," *Int. J. Adv. Sci. Technol.*, vol. 29, no. 3, 2020.
8. Laila Al-Sayed Farhan; Measurement and testing in physical education, 4th Edition: Al Cairo, Al-Kitab Center for Publishing, 2007.
9. Muhammad Nasr al-Din Radwan; Introduction to Measurement in Physical Education and Sports, 1st Edition, Cairo, Al-Kitab Center for Publishing, 2006.
10. Muhammad Walid Al-Batsh and Farid Kamel Abu Zina: Scientific Research Methods, Research Design and Statistical Analysis, 1st Edition, Dar Al-Maysara for Publishing, Distribution and Printing, 2007.
11. Nader Fahmy Al-Zyoud and Hisham Amer Elyan; Principles of Measurement and Evaluation, 3rd Edition: Cairo, Dar Al-Fikr Al-Arabi for Publishing and Printing, 2005.
12. Nuri Ibrahim Al-Shawk and Rafi Saleh Fathi Al-Kubaisi: Researcher's Guide to Writing Researches in Physical Education, Baghdad, Al-Shaheed Press, 2004.

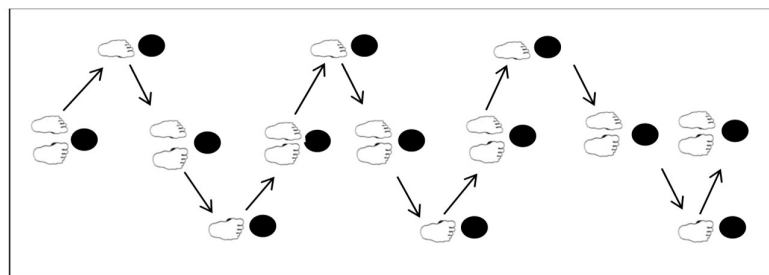
Accessory (1) The exercises prepared by the researcher

Exercise (1) The player stands in front of the signs with a height of 20 cm and starts jumping with both feet and spinning in the air to the right and going down with both feet to the side and then jumping and turning right again and going down with both feet and repeating the performance to the end of the signs in order to complete a complete turn around himself and then start a distance of 5 meters to pass 4 barriers (84 cm in height and the distance between them is 4 meters) with full movement (leading and covering), a laser is placed that determines the field distance

MULTI-OBJECTIVE OPTIMISATION TECHNIQUES FOR THE REDUCTION OF TORQUE RIPPLES IN SWITCHED RELUCTANCE MOTOR



Exercise (4) Stickers are placed, the players stand behind the sticker, jumping and landing on the sticker on the ground with both feet, the sticker on the right side with the right foot, and the sticker on the left side with the left foot to the end (the distance between all stickers is 1 meter).



Accessory (2) Build training units prepared by the researcher

| the first week | | | | | | | | |
|----------------|---------------|--------------|-------------|----------------------|-------------|----------------------|-----------------|----------------|
| total | time | rest between | | time the performance | duplicat es | exercis e intensit y | exercis es | Trainin g unit |
| | the exercis e | exercis es | Repetiti on | | | | | |
| 49.3 0 d | 9 d | 120 sec | 60 sec | 40 sec | 6 | 90 % | Exercise 1 | First |
| | 9 d | 120 sec | 60 sec | 40 sec | 6 | 90 % | Exercise 2 | |
| | 9 d | 120 sec | 60 sec | 40 sec | 6 | 90 % | Exercise 3 | |
| | 7.15 d | 120 sec | 45 sec | 30 sec | 6 | 90 % | Exercise 4 | |
| | 7.15 d | | 45 sec | 30 sec | 6 | 90 % | Exercise 5 | |
| 57.1 8 d | 11.06 d | 120 sec | 60 sec | 40 sec | 7 | 95 % | exercise (5) | Second |
| | 8 d | 120 sec | 45 sec | 30 sec | 7 | 95 % | Exercise (9) | |
| | 11.06 d | 120 sec | 60 sec | 40 sec | 7 | 95 % | Exercise (11) | |
| | 11.06 d | 120 sec | 60 sec | 40 sec | 7 | 95 % | exercise (7) | |
| | 8 d | | 45 sec | 30 sec | 7 | 95 % | Exercise (15) | |

| | | | | | | | | |
|-------------|--------|---------|--------|--------|---|------|--------------------|-------|
| 49.3 0 d | 7.15 d | 120 sec | 45 sec | 30 sec | 6 | 90 % | Exercise (12) | Third |
| | 9 d | 120 sec | 60 sec | 40 sec | 6 | 90 % | Exercise (20) | |
| | 9 d | 120 sec | 60 sec | 40 sec | 6 | 90 % | Exercise (16) | |
| | 9 d | 120 sec | 60 sec | 40 sec | 6 | 90 % | Exercise (3) | |
| | 7.15 d | | 45 sec | 30 sec | 6 | 90 % | Exercise (13) | |