THE INFLUENCE OF SUGGESTED EXERCISES BY RUNNING ON ALTRA G ANTI-GRAVITY TREADMILL ON SOME PHYSICAL AND PHYSIOLOGICAL VARIABLES OF YOUNG 400M FREESTYLE RUNNERS

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Abstract
Sport training did not only acquired greater importance in the recent years but also greatly developed in the skillful, physical, tactical and psychological domains. Such a development was widely great that it covered all athletic events, even including the "Track and Field" ones which gained a significant share of that development. The 400m running race was among these events. In this kind of sports, the player tries, shortly after the start of the race, so that he can reach the maximum speed, and maintain the same rate of speed as much as possible without letting it decrease. In this context, personal endurance (endurance of speed and strength) plays an important role in that it enables a runner to retain uppermost speed as long as possible in a way that increases the probability of race winning. The significance of this research lies in the preparation of special exercises by running on an anti-gravity treadmill, which would help to develop endurance of speed and thus reach the best achievement. The research aims at recognizing of the effects of these special exercises on the development of some physical capabilities and physiological indicators for 400m young runners. The researchers used the experimental method associated with the priori and posterior-tests after applying the exercises to an anti-gravity treadmill that lasted for (8) weeks, then statistical treatments were conducted to come out with conclusions, the most important of which was that the exercises of running on the device helped to develop the endurance of speed and maximum speed, as well as the exercises associated with the anti-gravity treadmill and some other training methods which may have helped the development of the runners' achievement.

Introduction

The advance that has recently taken place in all walks of life in most countries of the world, particularly in the athletic domain including various sports and events, was not improvised or coincident. It has stemmed out the great development through the use of modern scientific methods in different areas of life, particularly in sports and mainly in the science of sport training. Therefore, recent developments have made it imperative for us to follow up so that we can keep pace with the progress made through the use of many modern scientific devices, means and tools that help improve the physical and functional aspect, and thus contribute to determining the extent of the success of the training process and an indicator for what the

athlete attained. All of this can be attributable to the role physical education in its various sciences, mainly the science of sports training, which assumes an important and distinctive role in achieving the best results, breaking records and bringing the athlete to the highest levels, as the competition has recently become very complicated and convergent in levels. As a result, training that uses modern and scientific methods has become a necessity for all world champions, and sports training has become of greater importance than before, undergoing a great development in the skillful, physical, tactical and psychological aspects, and this development has become a wide field as it included all kinds of games, even the truck- and-field ones, which greatly developed, too. The use of equipment and means in training may contribute to increasing physical efficiency and skill of the athletes.

Truck and field events are among those games that have recently achieved significant development, as they have maintained their position as one of the most widespread games around the world, and the best evidence of this is the new records that have been achieved. This was what led the researchers to take interest in such athletics and activities which are greatly affected by the elements of physical fitness and through which changes occur in physiological indicators up to the degree of adaptation of the functional systems of the body, as each activity has special specifications and requirements, and each of its competitions forms an appearance that varies according to the characteristics of each event and the 400m freestyle race is among the Truck and Field activities, which has recently brought about higher excitement and suspense due to the high levels of champions' performance in the world. This activity largely depends on physical characteristics and degree of integration between them, especially private speed and endurance (endurance of speed, strength and performance) which enable athletes to resist fatigue resulting from special weights in his activity and maintain the speed of the kinetic frequency. There are several methods for training athletes to increase their physical ability and all of these methods gave positive returns, including the science-based exercises through the use of training methods and modern equipment as well as the adoption of inter-rests and pulse. Shortly after the start of the race, the runner of 400m, tries to attain the maximum speed and does his best to maintain the same speed rate without letting it fall down as much as he can. Here, intervenes the importance of special endurance (endurance of speed, endurance of force) that enables the runner to maintain his maximum speed for the longest possible period, which increases his percentage of winning the race.

The importance of this research lies in the preparation of special exercises by running on an anti-gravity treadmill, which would help to develop runners' endurance of speed and thus reach the best achievement by developing some physical and physiological capabilities for the 400m running activity for young athletes, through which the two researchers seek to add some training information for trainers in relation to the training of this event, by adopting modern training methods.

Research problem:

The 400m running event is considered one of the most difficult Tuck and field events, as it depends heavily on speed and lengthy speed, which experts describe as the challenging force for men for it requires the exertion of more efforts. To win the race, the runner must be fully prepared, physically, skillfully and psychologically, the state to which all the players and trainers around the world do their best to achieve by using training equipment and methods and the development of auxiliary devices to reach the optimal and desired performance.

Building on his field experience as being a former runner for many years and now a coach for the game, the researcher noticed that this event, regardless of its importance, did not receive sufficient attention in terms of modern training devices and means, especially in our dear country, in addition to some trainers' lack of interest in modern training appliances. This is the main reason behind the decline of this sport and records in Iraq globally, so the researchers decided to prepare exercises by running on an anti-gravity treadmill and some training methods, which would contribute to raising the skill level of the players of (400m) freestyle young runners.

Research Objectives:

1. Preparing special exercises by running on the training anti-gravity treadmill that helps in developing some physical potentialities and physiological indicators for the 400m young runners.
2. Knowing the effect of these special exercises on the training (anti- G) in developing some physical capabilities and physiological indicators for the 400m young runners.

Research Hypotheses:

1. The researchers propose that there are significant differences with statistical significance in the development of some of the physical abilities of the young players of the (400m) in both priori and posterior tests for the community under study.
2. There are statistically significant differences in the development of some physiological indicators for young (400m) players in the posterior tests of the community under study.

Research Areas:

Human domain:

A sample selected from the players of the specialized center in Dhi Qar.

Time Domain:

The period from 10/1/2023 to 28/11/2023

Spatial Domain:

Shatrah Olympic Stadium in Dhi Qar.

Research methodology and field procedures:

Research Methodology:

After having obtained accurate and reliable data and information, the researchers chose the experimental method for designing a single experimental group.

Research Sample:

The researchers chose a deliberate research sample of 8 young players taken from Shatrah Sports Club, who make up 100% of the research community. The first exploration experiment was conducted on two players from the research sample to examine the appropriateness of the tests and the second exploration experiment for the purpose of rationing the loads and controlling stresses on the whole sample.

Means of collecting information:

The researchers gathered information from different sources.

Methods of Data Collection:

- ✓ Sources and references
- ✓ Personal interviews

- ✓ Tests and measurements used in research.
  - A form for determining the most important physical abilities.
  - A questionnaire for determining the appropriate tests for physical abilities.
- ✓ A questionnaire form to determine the most important physiological indicators.

Tools and devices used:

- Truck and Field Playground .
- anti-gravity treadmill
- Obstacles _ signs _ boxes of different heights.
- Sandbags of different weights attached to the hands and feet.
- A device for measuring the oxygen saturation rate in the blood.
- A device for measuring the level of lactic acid
- A pulse measuring device.
- Stopwatch.
- Sharp hand-held calculator

Research Procedures:

Determining the physical capabilities for the free 400m running event.

The researchers designed a questionnaire to recognize the opinion of experts and specialists (*) in order to determine the most important physical abilities and physiological indicators. After having collected the questionnaire forms, the most important types of physical abilities and physiological indicators were determined (75%) and upwards, as (Benjamin) (3: p. 126) quotes Bloom as saying (that 75%) of the required variable selection.

Tests used in the research:

A survey form was designed for knowing the opinion of experts and specialists in choosing the appropriate tests for the research sample on physical abilities and after the collection of the forms, the tests were selected that accounted for (75%) upwards, as Benjamin (3: p. 126) quotes Bloom as indicating that 75% of the required variable selection.

Physical tests:

The physical tests that measure the physical abilities under study were selected based on scientific sources as follows:

A 30m Running test from the flying start (8: p. 113):

The purpose of the test is to measure the characteristic of maximum speed.

*Experts and specialists in the field of physical education.

1. Prof. Gamal Sabry - College of Physical Education - University of Babylon - Sports Training.
2. Prof. Ammar Jassim - College of Physical Education - University of Basra – Truck and Field training.
3. Prof. Abdul Abbas Abdul Razzaq - College of Physical Education - University of Dhi Qar - Truck and Field.
4. Prof. Abdul Wahab Ghazi - College of Physical Education - University of Baghdad - Sports Training.

5. Prof. Haider Balash Jabr - College of Physical Education - University of Al-Muthanna – Tuck and Field training.
6. A.M.D. Majed Ali Musa - College of Physical Education - University of Basra - Training Physiology, and Tuck and Field.
7. A.M.D. Kamel Melioukh - Faculty of Physical Education - University of Al-Muthanna - Training Physiology
8. A.M. Dr.. Muhannad Abdul-Sattar Al-Ani - College of Physical Education - University of Baghdad - Sports Training.
9. A.M. Dr.. Hussam Muhammad Jaber - College of Physical Education - University of Basra - Sports Training.
10. A.M.D. Mustafa Abdel Rahman - College of Physical Education - University of Basra - Basketball.
11. M. Dr.. Qusay Muhammad - College of Physical Education - University of Basra -Truck and Field.
12. A.M. Dr.. Zulfiqar Saleh - College of Physical Education - University of Basra - Football.
13. M. Dr.. Silwan Saleh Jassim - College of Physical Education - University of Baghdad - Basketball.

Test requirements: an athletics track with a length of not less than (50m), stopwatches, shooter, timers, observers.

Description of the test: The test begins with each tester taking the standby position behind the first line and at a distance of 10 meters from the second starting line. When the shooter shoots for the start, The tester runs as fast as he can to reach the maximum speed rate at the second start line. For each tester an observer is appointed standing at the second start line with one of his arms up. When the tester crosses the second starting line, the observer lowers his arm quickly, then the timer starts the clock with this signal, and when the tester crosses the finish line, the timer stops the clock and calculates the time.
Recording: The time taken to travel the distance is recorded to the nearest 1/100th of a second.

300m Running test from the high start (11: p. 28):
The purpose of the test is to measure the endurance of speed.
Test requirements: a legal track for force athletics, and the start of the distance (300 m) is determined so that the end is at the end of the (400 m), stopwatches, whistler, timers.
Description of the test: The tester shall stand at the starting line from standing position, ready for setting out and as soon as he hears the starting whistle, he runs at full speed to the finish line.
Recording: The time taken to travel the distance is recorded.

(400m) Running test from the start of sitting:
The purpose of the test is to measure achievement.
Test requirements: force athletics legal track, stopwatches, whistler, timers.

Description of the test: The test begins as each tester takes a sitting position behind the starting line ((where the runner rests on his back leg knee where the toes of this foot are placed along the heel of the front leg (that is, the front and back feet are placed close to each other) and the distance between them is usually about (8-10) inches or about (25-30) cm. When the whistler shouts "attend", the runner raises his hips slightly higher than the shoulders and the knees are slightly fixed, while the player's body weight tends slightly forward towards the arms, which are straight, and the elbows are closed (9: p. 25). The tester remains in this position until the whistle is heard, then he will run as quickly as possible.
Recording: The time taken to travel the distance is recorded in seconds and its parts.

Measurement of physiological indicators:
Measurement of the concentration of lactic acid in the blood (7: p. 209) :

- Name of measurement: Lactic acid concentration in the blood after physical exertion using the LACTATE PRO TEST METER.
- The objective of the measurement: Knowing the level of lactic acid concentration in the blood.
- Method of use: Before the player initiates any physical effort (during the break period) and after the completion of the achievement test (travelling of the race distance), as well as after completing the performance of repetitions (exercises), the concentration of lactic acid in the blood is measured (5) minutes after the performance, taking the following steps for measuring:

Prepare the device to work using the following:

- Two lithium batteries.
- A check tape, then removing it.
- The calibration tape, then removing it.
- The test tape and fixate it in the device.

1- Sterilize the finger from which the blood sample is to be taken
2- Prick the tip of the finger with the needle drill supplied with the device.
3- After a drop of blood comes out of the finger, it is placed on the measuring tape attached to the device.
4- The device works by transmitting a sound of beep, then, it starts counting down from (59) seconds to (1) second to show the result of measurement (concentration ratio) on its screen.

Recording: The concentration of lactic acid in the blood using (mmol/L of blood) unit after exertion.

Measurement of the lung capacity:

A member of the auxiliary work team uses a (Spirometer), where the tester blows into it as the device measures the tester's lung capacity and records the data, that is ranging between (0-800) milliliters in the meter of the device.
Measuring the percentage of blood saturation with oxygen (Rossmax Pulse Oximeter SB220) (10: p. 282)".

- ✓ Test name: blood oxygen saturation:
- ✓ Objective: To measure the oxygen saturation of the blood.

- ✓ Instruments: Oximeter.
- ✓ Description of performance: The oximeter is placed in the index finger after zeroing it, then pressing the power button to show two numbers, one indicating the pulse rate and the other indicating the digital value of blood oxygen saturation.
- ✓ Registration: The result is recorded in the registration form.

Exploratory Experiments:

The first exploratory experiment:

The two researchers conducted the first exploratory experiment on 10/2/2023 in order to evaluate the proposed exercises as well as to form the training load for the proposed exercises and to know their suitability for the research sample before being evaluated by experts.

The second exploratory experiment:

The two researchers applied the second exploratory experiment on November 17, 2023 to the eight young players of the Specialized Center, the Truck and Field events in Dhi Qar, who are still in ongoing training. The aim of this exploratory experiment is to

- o Identify the efficiency of the assistant work staff(*)
- o Ensure that the players understand the test vocabulary.
- o Ensure the safety of the device and its work with the research sample and the possibility of conducting the main experiment on it.
- o Ensure the exercises for the device (anti G)
- o Identify all the difficulties that the researchers may face during his main experiment.

Field experiment

Pre-tests:

(*) Assistant Staff.

1. Abdullah Abdul Razzaq/ Master of the College of Physical Education and Sports Sciences/ Dhi Qar University.
2. Hamza Muhammad / Master's degree in the College of Physical Education and Sports Sciences / Al-Mustansiriya University.

The priori tests were conducted on 22/1/2023 and ended on 23/11/2023. This was done by conducting physiological tests and then conducting physical tests on the next day

Implementation of the exercises:

The exercises began on November 25, 2023 and ended on January 20, 2023

Posterior tests:

Posterior tests were conducted on 21-22/1/2023

The researchers fixed the variables through the place of the test and the assistant staff as well as the time of performance.

The exercises used

After having acquainted themselves with many available research, sources and studies, the researchers worked out special exercises to develop the two qualities of (speed and endurance)

and their different types. The researchers gave the exercises during the main section, the included exercises of using body weight and others using weights.

The researchers used all the fixed playground areas (a quarter of a court, a half a court, a full court). The researchers calculated the intensity of the exercises, the comfort volume, and determined the appropriate method for those exercises before submitting them to specialists and experts for evaluation with notes given in an (Appendix)

The researchers applied the exercises in the special preparation period (8 weeks) at a rate of (3) units per week, and one of these units is conducted on the anti-gravity treadmill device. This period is assigned for the preparation of the team set by the trainer without manipulation in his training program, except for the application of the exercises suggested by the two researchers by running on the anti-G device on experimental group.

Statistical means:

The researchers used the statistical package (spss).

Presentation, analysis and discussion of the results:

This section includes the presentation of the results of the tests that were used in the research and to which the research sample was subjected in the priori and posterior tests according to tables and illustrative figures to find out the differences and compare the results of the statistical operations to reach the final results, and discuss the attained results to achieve the objectives and hypotheses of the research.

Presenting the (pre and post) test results for the experimental group in the physical tests:

Table (1) Arithmetic means, standard deviations, and the calculated T value for physical tests

Variables	Degree of measure	Priori Arithmetic means		Post arithmetic means				T calculated value	sig	Significance
30m test	second	5.069	0.445	4.788	0.404	0.281	0.041	20.374	0.000	Significant
300m test	second	47.950	1.810	42.960	0.050	4.990	1.031	4.069	0.007	Significant
400m test	second	66.150	1.600	62.180	1.110	3.097	0.049	10.954	.000	Significant

At the level of significance (0.05) and degree of freedom of (8-1=7)

Table (2) Arithmetic means, standard deviations, mean difference, deviation, and (T) value

Variables	Degree of measure	Priori Arithmetic means		Post arithmetic means				T calculated value	sig	Significance

Tactic acid	Milli /mol	16.745	1.178	15.630	1.835	1.115	0.650	7.556	0.000	Significant
Blood oxygen saturation	Milligram	92.714	1.112	96.285	1.100	3.571	0.012	11.366	0.000	Significant
Lung capacity	Milliliter	531.428	81.123	628.571	79.880	97.142	34.016	17.678	0.000	Significant

At the level of significance (0.05) and degree of freedom of (8-1=7)

Presentation of the results of the tests and functional indicators:

By studying the two tables (1-2), we notice that the significant differences in the pre-test and the post-test are in favor of the post-test. The researchers attribute this development to the special exercises they developed to be executed on the anti-gravity treadmill because these exercises focused on developing the capabilities related to (400m) running event, which includes speed, and maximum speed and achievement. Some of the suggested exercises targeted the increasing of all forms of endurance and the maximum speed. Because the end of the race entails that the runner has to exert the maximum speed to finish the race, much care should be given to the selection of the appropriate repetitions and the appropriate rest for each player separately as (Ahmed Naji Mahmoud) confirmed indicating "that anyone can train to run faster, if he follows up prepared special and regulated exercises which enable him to increase his maximum speed within the boundaries of his sufficient capabilities" (1: p. 31). In order to acquire the general endurance needed by the runner to accomplish this activity, the researchers focused on the exercises that have been designed for this event through repetitions of these exercises so that the level of general endurance of the runners is highly raised. “The training load is the main means of creating the physiological effects of the body, which improves its responses and then adapts the body’s organs and raise the efficiency of performance, so it is one of the most important factors for the success of the training program and then improving performance. They also focused on the muscles that are involved in this activity, especially the lower muscles of the legs, for the concentration on exercises of different and alternating stresses contributes to raising the efficiency of the muscles working for that activity for " the training directed to a specific muscle group will lead to develop those muscles” (4: p. 99).

The use of diverse exercises has raised their functional capabilities due to the effect of physical exercises by running on an anti-G as was confirmed by (Qassem Hassan and Mahmoud Al-Shati) that “all the functional and chemical changes in the organs and organs resulting from the effect of external load” (9: pg. 39), that is, there are quick functional adaptations as considered a direct response of the body to the effect of the physical load, and another is a long-term one, “because the adaptation is a group of functional, anatomical and psychological changes that occur to the organs that correspond to the intensity of the training program, for a long period that imparts functional changes to the organs of the individual’s body” (5: p. 31).

These changes were apparent in all functional indicators that were affected by the special and regulated exercises on the anti-G, which are (lung capacity, blood oxygen saturation rate, lactic acid rate) as was indicated by (Ahmed Nasr El-Din Sayed, 2014) that the regular training using modern methods leads to the occurrence of two types of central adaptations by increasing the size of the heart and its functions and improving the aerobic capacity represented in the maximum volume of oxygen consumption VO2max as well as increasing the volume of pumped blood and cardiac output (2: p. 173).

The anti-gravity treadmill has also effectively contributed to raising the level of speed endurance and general endurance, as was confirmed (Sarih) that there is a relationship between gravity and endurance "and the type of endurance required for a particular sport can be determined by determining the relationship between the relative muscular strength required for this sport and the duration of Its constant exertion (such as if the performance is endurance, or general endurance) as it can achieve the required relative strength either by increasing muscular strength or losing weight in an attempt to reduce the force of gravity on the body and by reducing weight, it became possible to reduce metabolic requirements less than running (by complete weight) as some studies indicated that “running at a slower speed requires the same metabolic strength when reducing weight at a higher speed, as well as by reducing weight, it became possible to increase the performance time and increase the distance traveled without being subject to the risks of overload, stress, fatigue and injury, so it was possible to increase the training volume.” (6: p. 21) This was confirmed by studies through “reducing stress when reducing gravity and affecting the reduction in pulse rate during exercise.” (12: p. 297)

Conclusions and recommendations:

Conclusions:

1. The exercises associated with the (anti-G) device prepared by the researchers affected the physical and physiological abilities and achievement.
2. The exercises accompanying the device led to the development of the maximum speed.
3. The exercises associated with a device helped to develop speed endurance.
4. Special exercises accompanying a device and some training aids helped in the development of the achievement of the runners.
5. The exercises prepared by the researchers, by running on the anti- G device and training aids, helped to develop physiological indicators, pulse, oxygen saturation of blood, and lung capacity.

Recommendations:

1. The coaches should use modern training equipment and means to develop performance in various activities in athletics.
2. Applying the device (G anti) to other activities.
3. Conducting research using training devices and means on the rest of the groups.
4. Trainers shall use different resistances to improve physical and physiological variables and achievement.

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