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The effect of physical effort training on developing some physical and physiological abilities and achievement of men's 200m runners

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Abstract

The importance of the research lies in the effect of physical effort training in developing some physical and functional abilities by employing the training program, which leads to physical adaptation and raising the level of physical efficiency. Through the experience of the researchers, it was noted that many runners suffer from a lack of use of some special exercises in distributing training loads for maximum speed and strength. Muscle muscles, how they interact and balance, and the mutual relationship in the various stages of preparation and proportions in their training program, as well as the lack of use of functional tests that depend on studying the changes that occur within the body, as standardized exercises were prepared and laboratory equipment and supplies were used in the sports field, which give the real indicator of evaluating the condition. Runners, the experimental program was used in the research procedures. The research sample was tested intentionally from runners in the 200 meters competition for men in the Iraqi country, and their number was (12) runners. The sample was divided into two groups, an experimental group and a control group, and each group had (6) runners. The most important thing that was concluded There is a positive effect of physical effort training in developing some of the physical and physiological abilities and achievement of men's 200m runners, and the researchers recommended adopting periodic tests in functional physical variables and the extent of knowing the changes in them.

Keywords | **physical effort training, physical and physiological abilities, 200-meter achievement.**

Introduction:

Athletics is one of the Olympic Games that occupies a prominent place in the program of the Olympic Games, and the 200 meters competition is one of the individual races in which running is done at high speed. Raising the level of achievement requires a type of precise organization of the training vocabulary, meaning that the performance of the physical effort is done through the receptors present in the devices. Functional and muscular, which causes a change in their shape, an increase in their number, and an expansion in them, as in the muscular motor units. Thus, physiological adaptation occurs due to the load placed on the body's systems. Maximum speed and muscular strength are among the basic components of the physical performance of any movement carried out by runners, and without them, these movements cannot be completed in competitions. Short distances, and the maximum direction to stimulate the speed of the muscles to contract and relax differs from one individual to another because the speed of the internal changes that occur through the neuromuscular connection is specific to the synapse that ends in the nerve fiber connected to the muscle in the form of branches that spread over the surface of the muscle fiber and each branch ends with a small On the surface of the muscle fiber, as neurotransmitters play an important role in transferring the nerve impulse from the nerve fiber to the muscle fiber as a result of the interaction of the work of the central nervous system. In terms of formation, muscle force means the muscle's stimulation of the nervous stimulus that originates from the cells of the cerebral cortex and is transmitted by the motor nerve. After passing through the spinal cord, where each muscle is

equipped with a motor nerve, and the motor nerve ends in the muscle fiber, stimulating the nervous side, especially the brain, consulting its activity and increasing the secretion of its enzymes responsible for that, which is the transporter enzyme acetylcholine, and the transporting enzyme serotonin, which play the role of facilitating movement and the ability to perform physical effort. Here the importance of the research is evident on the effect of training through regulated amounts of training load, which leads to physical adaptation by changing the functions of the organic systems and raising the level of physical efficiency. Where the research problem is revealed, the researchers noted that many runners suffer from the lack of use of some special exercises in distributing training loads for maximum speed. And muscular strength and how to interact and balance between them, and the lack of specification and harmony of training loads according to the level of runners, as well as the lack of use of functional tests that depend on studying the changes that occur within the body, and here comes the role of neurotransmitters, which are responsible within the body for sensation and movement and stimulate the nervous side and stimulate brain activity to increase the secretion of Its responsible enzymes are acetylcholine and serotonin, in terms of the mutual effects of reactions between the internal organs and the central nervous system. They regulate their work and send stimuli that cause contraction and relaxation of the muscle smoothly and easily, which gives an indication of physical activity. The researchers decided to prepare standardized exercises and use laboratory equipment and supplies. In the sports field, it gives the real indicator of evaluating the condition of runners and identifying the amount of development that has occurred in the 200-meter sprint competition and reaching the highest levels.

Research objective:

- Preparing physical effort exercises to develop some of the physical and physiological abilities and achievement of men's 200m runners.
- Identifying the effect of physical effort training on developing some physical and physiological abilities and achievement for men's 200m runners.

Research hypotheses:

- Physical effort training has a positive effect on developing some physical and physiological capabilities and achievement for men's 200m runners.

Research fields:

- Human field: National track and field team runners in the 200 meters competition for the 2023 season.
- Time field: (8/10/2020) to (28/12/2023).
- Spatial field: Athletics stadium at the Ministry of Youth and Sports Stadium / Baghdad Governorate.

Research methodology and field procedures:

Research Methodology:

The researchers used the experimental method to suit the nature of the research

Community and sample research:

The research sample was tested intentionally from runners in the 200 meters competition for men in the Iraqi country. Their number was (12) runners. The sample was divided into two groups, an experimental group and a control group, and each group had (6) runners.

Sample homogeneity:

Table .1 shows homogeneity in the variables (Length - Mass - Age)

Variables	Measuring unit	Mean	Median	Std. Deviations	Skewness
Length	Cm	178.154	178.000	7.407	0.461
Mass	Kg	76.065	74.000	6.234	0.765
Age	Year	26.326	26.000	3.381	0.634

The value of the skewness coefficient is limited to ±1, which indicates that the population is moderately distributed

Means of collecting information:

Observation and experimentation - Tests and measurements - Arab and foreign sources - The International Information Network, the Internet, an athletics stadium, (100) signs, and (20) boxes of different heights of 30 cm and 40 cm, (20) stopwatches of the type (Rhythm) that measure time to the nearest 0.01 of The second number (20), electronic length measuring device type (OSK) number (1), measuring tape with a length of (50) meters, video camera type (Sony) with frequency (500 images) number 1, laptop type (Dell), Electronic medical scale (1), German-made centrifugal measuring device (CENTER FUDGE), kits to measure acetylcholine, kits to measure serotonin, disposable medical syringes, disposable medical tubes (TUBES), sterile cotton, case (BOX).

Tests used in the research:

- 50-meter running test from a flying start (1)
- Stand broad jump test (2)
- Full knee bend and extension test in 10 seconds (3)
- Achievement test 200-meter sprint (4)

Exploratory experience:

The researchers conducted a reconnaissance experiment on Friday, October 8, 2023, on four 200-meter athletes from the research community, to apply the tests to them, and to train the assistant work team to carry out the tests and apply the experimental program to the research sample.

1- Identify the difficulties and obstacles that will appear during the implementation and conduct of the tests.
2- Know the appropriate time to conduct tests and how long this procedure takes.
3- The ability of the sample members to carry out the tests and their suitability for them
4- Identify the devices and tools necessary to carry out experiments and tests.
5- View the training program for physical exertion exercises.
6- Determine the training intensity through tests to be implemented on the experimental groups.

Pre-tests:

The researchers conducted the pre-tests on Tuesday, 12/10/2023, on the athletics field in the Ministry of Youth and Sports Stadium / Baghdad Governorate.

Equality of individuals in the research sample:

Table .2 shows the equivalence of the research variables

Variables	Measuring unit	Experimental group		Control group		T value calculated	Level Sig	Type Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
maximum speed	sec	6.541	0.779	6.652	0.896	0.773	0.095	Non sig
explosive power of the legs	cm	2.701	2.941	2.612	1.452	1.876	0.315	Non sig
distinctive strength of speed of the legs	repetition	9.001	3.471	8.002	1.123	0.194	0.064	Non sig
Acetylcholine enzyme	nanomol/ml	114.22	0.907	121.73	0.867	0.536	0.421	Non sig
Serotonin enzyme	nanomol/ml	166.40	1.664	155.50	1.701	0.957	0.573	Non sig
Achievement 200 meter sprint	sec	22.276	0.876	22.423	1.838	0.466	0.279	Non sig

Significant below a significance level of ≤ 0.05 and below 10 degrees of freedom

- The researchers prepared the training program to develop tests and measurements of the research variables from Saturday, 26/10/2023, until Wednesday, 25/12/2023.
- The time of the training units on Saturday (28.64 minutes), Monday (46.3 minutes), and Wednesday (46.7 minutes).
- The repetitive training method (90-100%) was determined.
- The training intensity was extracted by percentage according to the equation: best achievement x 100 ÷ required intensity.
- The rest period was extracted by calculating the heart rate and converted to minutes.
- The players' training period was a period of special preparation.
- The training program lasted for (eight) weeks.
- Three units per week.
- The number of training units for each group is 24 training units
- Weekly training days (Saturday, Monday, Wednesday)

Post-tests:

Post-tests were conducted on Saturday, 28/12/2023, on the athletics field in the Ministry of Youth and Sports Stadium / Baghdad Governorate.

Statistical methods:

The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Results and discussion:

Presentation, the results of the pre- and post-tests for the research variables: maximum speed, muscle strength, excitatory neurotransmitter activity, and 200-meter performance.

Table .3 shows the results of the experimental pre-tests regarding maximum speed, muscle strength, excitability of neurotransmitter activity, and 200-meter achievement.

Variables	Measuring unit	Pre-test		Post-test		standard deviation of differences	T value calculated	Level Sig	Type Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation				
maximum speed	sec	6.541	0.551	6.321	0.779	0.662	4.996	0.002	sig
explosive power of the legs	cm	2.701	0.896	2.811	0.734	1.135	3.986	0.001	sig
distinctive strength of speed of the legs	repetition	9.001	4.472	10.231	3.178	1.524	6.508	0.001	sig
Acetylcholine enzyme	nanomol/ml	114.22	0.876	124.01	1.197	1.054	2.829	0.001	sig
Serotonin enzyme	nanomol/ml	166.40	1.838	176.10	1.703	1.159	7.364	0.001	sig
Achievement 200 meter sprint	sec	22.276	0.734	22.070	0.551	1.361	2.553	0.000	sig

Significant below a significance level ≤ 0.05 and below 5 degrees of freedom

Presentation the results of the pre- and post-tests, maximum speed, muscle strength, excitatory neurotransmitter activity, and achievement of 200 metres.

Table .4 shows the results of the pre- and post-tests for the control group for the research variables: maximum speed, muscle strength, excitatory neurotransmitter activity, and 200-meter achievement.

Variables	Measuring unit	Pre-test		Post-test		standard deviation of differences	T value calculated	Level Sig	Type Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation				
maximum speed	sec	6.652	2.865	6.401	1.954	1.248	3.989	0.000	sig
explosive power of the legs	cm	2.612	3.829	2.743	1.178	3.587	2.657	0.000	sig
distinctive strength of speed of the legs	repetition	8.002	1.703	9.012	1.703	4.437	4.453	0.003	sig
Acetylcholine enzyme	nanomol/ml	121.73	1.541	128.01	1.823	6.298	3.872	0.002	sig
Serotonin enzyme	nanomol/ml	155.50	1.867	163.21	1.742	5.499	2.651	0.001	sig
Achievement 200 meter sprint	sec	22.423	0.654	22.211	0.789	2.267	2.967	0.004	sig

Significant below the significance level ≤ 0.05 and below the degree of freedom 5

Presentation, analysis, and discussion of the results of the tests to develop maximum speed, muscle strength, stimulation of neurotransmitter activity, and 200-meter achievement for the experimental and control groups.

Table .5 shows the results of the post-tests on the variable tests: maximum speed, muscle strength, stimulating neurotransmitter activity, and 200-meter achievement for the two groups (experimental and control).

Variables	Measuring unit	Experimental group		Control group		T value calculated	Level Sig	Type Sig
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
maximum speed	sec	6.003	1.867	6.207	2.053	1.553	0.000	Sig
explosive power of the legs	cm	2.995	0.907	2.846	0.624	3.017	0.002	Sig
distinctive strength of speed of the legs	repetition	12.001	1.053	10.004	0.924	3.627	0.000	Sig
Acetylcholine enzyme	nanomol/ml	145.24	2.743	135.01	3.657	2.977	0.001	Sig
Serotonin enzyme	nanomol/ml	185.12	1.368	172.01	1.593	3.761	0.001	Sig
Achievement 200 meter sprint	sec	21.820	0.731	22.053	1.391	1.589	0.000	Sig

Significant below a significance level of ≤ 0.05 and below 10 degrees of freedom

Discussion:

Tables (3, 4, 5) show that the pre- and post-tests and measurements of the results of the research variables showed that the results showed that there were significant differences in the post-test between them. It was shown that both of them developed in the tests and that the experimental group excelled over the control group, that the experimental group advanced in its results in the variable Maximum speed in post-tests. This development is due to the use of the vocabulary of the standardized training program and their continuation of training This is confirmed by the study ((Israa Kamil Hasan, & Asmaa Hameed Gambash): "This is due to the effect of the exercises used and their diversity in the exercises used, which is appropriate to the level of the runners first and the goal of the training second" (5).

This is consistent with the study of (Nagim, J., & Al-Sudani, A.), which led to a noticeable development of maximum speed by giving the runner a set of exercises that lead to the development of maximum speed ability, and these exercises focused on the muscles of the feet, legs, and thighs. It is one of the main muscles responsible for an athlete's speed, and speed training is essentially training the nervous system and fast muscle fibers, and developing the strength of the leg muscles is the main part of the movement and performance of players, so increasing their strength gives a positive effect" (6). This was confirmed by the study (Ali, A. N., Easa, F. A. W., & AbdulRida, B. K). Also, the use of these exercises, the progression of these exercises, the use of the difficulty of performing the training unit, and the rest periods used between repetitions to restore recovery and return to performing the exercise with the same strength and performance have helped to achieve The development of the level and the emergence of significant differences" (7), and this is what the study of (Robert A) concluded, "whereby distributing effort and intensity and controlling it among the runner helps through it to distribute effort, regulate intensity, and control it" (8), and this is what I confirmed. Study (Novich, M.M. and Toylor B) "Where force is considered the kinetic reality and speed is the kinetic appearance, that is, the greater the force and the force exerted in the shortest time, the greater the ability to overcome resistance and benefit from moving at full speed in the starting phase" (9), This is what was confirmed by the study (Hadeel Talib Mohammed, & Suhad Qassim Saeed) and the exercises used that contain exercises for the two strengths (explosiveness - the strength characterized by speed), which serve the 200-meter running competition. These exercises included running and jumping - training boxes of different heights, and using hurdles. And the difference in height and intensity that works to generate additional speed and endurance in the muscles holding the legs" (10).

This is confirmed by the study (Rana FM Al-Dulaimi, Fahem Abdul Wahid Easa): "Physical practice has a significant impact on the work of the internal systems and increases their efficiency and adaptation to training for runners. The possibility of rationing and distributing the training load on a scientific basis between intensity, volume and rest" (11), this is confirmed by the study (Easa, F. A. W., Shihab, G. M., & Kadhim, M. J) "which helps in developing the achievement of the 200 meter sprint. The runner's ability to distribute his speed and effort is one of the important and required matters in the success of the 200 meter sprint competitions, as The runner cannot complete the aforementioned race distance at one speed until the end. Controlling the running speed and distributing effort are the two important factors at the moment of pushing each step of the run, with high frequency in the fast movements, in addition to using the repetitive training method, which contributed to developing the level of achievement at 200 meters" (12) , This is consistent with the study of (Naeem, A., & Al-Fadhli, S) "where the ability of runners develops when training on the rhythm of steps during special distances" (13). This was confirmed by the study (Morad, H., & Shbeeb, H. B.), in addition to the variation in the use of repetitions to perform the exercises, as well as the specificity that distinguished the exercises prepared for development, as the exercises were prepared in a consistent and balanced manner, giving full importance and sufficient time in the selection. Appropriate exercises during training units" (14). This is what was confirmed by the study (Antidaar Juma Mubarak et al.): "The

selection of exercises, training load, and rest periods has become necessary to pay attention to because they are the mainstay and an important indicator for sports coaches" (15). (Badwi) The responses that result from physical effort are physiological, physical, and skillful, which requires us to find clear and real ways to develop athletic achievement in various events (16).

Conclusions:

- The training program contributed to the development of the research variables, and thus the objectives and research hypotheses were achieved
- The training program that was used had a positive and effective impact on the development of the research variables, which reflected its impact on the level of achievement in the 200-meter running competition.
- The results showed that the development of the experimental group was more advanced than that of the control group for all tests.

Recommendations:

- Emphasizing on conducting tests during the training process and ensuring that its set goals are achieved.
- Adopting periodic tests on functional and chemical variables and the extent to which changes in them are known.
- Conduct similar studies on different age groups and both genders.

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Appendix (1)

Week: first
Training unit: (1 - 2 - 3)
Intensity of training units: (90 - 100%)
The training method used (repetitive training method)
Objective of the training units: (maximum speed - explosive strength of the legs - distinctive strength of the legs)

Training unit	Exercise vocabulary	Intensity %	repetitions	Sets	Rest between		Repetition time	exercise time	total time
					repetitions	Sets			
Saturday	- Starting from sitting, running 30 metres	%100	3	2	1min	2min	4sec	8.24min	28.64 min
	- Run 40 meters from the jumper position	%100	3	2	1min	2min	5sec	8.30min	
	- Jumping in pairs on 3 boxes of different heights, the first box is 30cm, the second is	% 90	5	2	45sec	90 sec	10sec	12.10 min	

	50cm, and the third is 70cm, and the distance between the boxes is 1m.								
Monday	- - Run 50 meters from the jumper position	% 100	5	2	90sec	2min	19sec	22.10 min	46.3 min
	- Jump up by pulling the legs to the chest, stopping each time	% 90	5	2	45sec	90 sec	10sec	12.10 min	
	- Double jumping over 8 hurdles with a height of 80 cm	% 90	5	2	45sec	90 sec	10sec	12.10 min	
Wednesday	- Run 60 meters from the jumper position	% 100	4	2	2min	3min	25sec	25.20 min	46.7 min
	- Jump forward with both legs, stopping each time	% 90	3	2	1min	2min	10sec	9.40min	
	- Side jump on the terrace: 5 jumps at a distance of 30 cm, with a sprint of 40 metres	% 90	5	2	45sec	90 sec	10sec	12.10 min	

تأثير تدريبات الجهد البدني في تطوير بعض القدرات البدنية والفسيولوجية والانجاز لعدائي 200م رجال

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مستخلص البحث

ان أهمية البحث تكمن تأثير تدريبات الجهد البدني في تطوير بعض القدرات البدنية والوظيفية بتوظيف البرنامج التدريبي مما يؤدي الى التكيف البدني ورفع مستوى الكفاءة البدنية, ومن خلال خبرة الباحثان لاحظ أن الكثير من العدائين يعانون من قلة استخدام بعض التدريبات الخاصة في توزيع الاحمال التدريبية للسرعة القصوى والقوة العضلية وكيفية التداخل والتوازن بينها والعلاقة المتبادلة في مراحل الاعداد والنسب المختلفة في برنامجهم التدريبي , وكذلك قلة استخدام الاختبارات الوظيفية التي تعتمد على دراسة التغيرات التي تحدث داخل الجسم , حيث تم اعداد تدريبات مقننة واستخدام الاجهزة والمستلزمات المختبرية في الميدان الرياضي التي تعطي المؤشر الحقيقي على تقويم حالة العدائين , تم استخدام البرنامج التجريبي في اجراءات البحث , تم اختيار عينة البحث بالطريقة العمدية من عدائي مسابقة 200 متر للرجال في القطر العراقي وكان عددهم(12) عداء وتم تقسيم العينة مجموعتين مجموعة تجريبية ومجموعة ضابطة ولكل مجموعة (6) عداء, وأهم ما تم استنتاجه هنالك اثرا ايجابيا لتدريبات الجهد البدني في تطوير بعض القدرات البدنية والفسيولوجية والانجاز لعدائي 200م رجال , واوصى الباحثان اعتماد الاختبارات الدورية في المتغيرات البدنية الوظيفية ومدى معرفة التغيرات عليها.

الكلمات المفتاحية | **تدريب الجهد البدني ، القدرات البدنية والفسيولوجية ، الإنجاز 200 متر.**