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The Effect of Different Resistance Exercises on Physical Variables and Performance in 200 m Runners

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Abstract

Study purpose. This study aims to identify effect of specific exercises with various forms of resistance among runners 200-meter short running events, through use of new methods and means in sports training that help improve some physical and motor abilities and level of performance.

Materials and methods. The research method using experimental was used the experimental design of random selection equivalent groups with pre- and post-observation, Researcher selected sample intentionally, numbered (18) runners from Basrah Governorate clubs in 200-meter short-run event, in youth category (16 years old). The validity and reliability of instruments rely on extracted coefficient of self-truthfulness, and by test and retest to inform tests stability.

Results: results of research showed that specific exercises for multi-form resistance have a positive effect on level of achievement among runners. Short distances, which were represented in physical variables and level of achievement, and that there were in variables of physical abilities and level of achievement, where they excelled.

Conclusion. Concluded that experimental group that used proposed multi-form resistance training program over control group that used followed program. Benefiting from specific exercises for multi-form resistance 200-meter short sprint event. Attention to developing physical capabilities of performance stages resistance because their positive effect. Which makes these exercises preferable when training short-distance runners in future.

Keywords: Specific Exercises, Various Types of Resistance, 200-Meter Short Runs.

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Introduction

Global interest has increased in recent times in science of sports training, which is concerned with improving and developing sports performance to achieve sports achievements at various age levels. Modern sports training has an important role in the life of individual athlete, individual athlete to optimal form. And consequent achievement of aim of sports training process, which is to reach individual to highest possible level, as this requires according technical within a unified framework, to reach the highest level of performance, especially during races.(Ayuso-Moreno et al., 2021)

There has already been a clear improvement in level of achievements in running races at global level in general, which requires adopting scientific methods in field of training to confront this development. Use of appropriate training methods and techniques helps improve motor performance and physical fitness components of short track athletes by developing codified training programs based on scientific foundations, moving away from traditional methods of training methods, and necessity of continuity of work as a young person advance from one age stage to an older age stage. explains, "Method of training using different resistances based on scientific foundations leads to improving physical, muscular, and motor fitness in particular, and also helps prevent injuries".(Zhang et al., 2024).

Advancement of sports levels depends on several factors, including raising equipment. Comes about techniques, as (Shareef & Digham 2022) point out, "It provides a type of resistance that progresses from little or no resistance and then begins to increase and become more difficult. This means that resistance here is related to upward curve of strength".(Shareef & A. Digham G., 2022) "A person can continue to increase the force generated during each range of motion".(Fattah & Allawi M. H., 2014)

Both concentric and eccentric to ensure this occurs optimally throughout range of motion, Researcher believes that the success of sports training process using modern methods comes through developing content for a training program based on scientific foundations and appropriate for achieving the set goals, Which is consistent with the opinion of to insure using new approaches in training to develop physical abilities.(Adi & Candra, 2024; Emirzeoğlu M., 2021) Therefore, training process is constantly evolving using various methods and methods, which can be exploited in an accurate and organized manner, including training with multi-form resistances, which it contributes to developing level of achievement of short-distance runners.(Proske & Morgan, 2001).

The research problem was represented in the permanent differences in the type of exercises used in developing and improving physical abilities in general and strength in particular, as they are subject to several standards and visions from which trainers choose what they want. Therefore, the researcher sought to design exercises of different shapes and training loads through resistance training to identify the extent of their impact on the level of performance among runners in the 200-meter sprint race.

Materials and methods

Study participants

The research community was represented by the players of Basrah Governorate national team in the 200-meter short track event, the youth category, aged (16) years, for the season (2024-20245), with (18) players. "controlled change according to conditions specified for a specific incident and observing resulting changes in the incident itself in order to explain them".(Emirzeoğlu M., 2021).

Table 1. Shows values of torsion coefficient

Measurements	Mean	Standard deviation±	Torsion coefficient
Height/cm	160.123	3.041	0.251
Mass/kg	61.325	5.015	0.571
Age/years	19.565	0.516	-0.144
Training age/year	2.11	4.007	0.153
Achievement/s	24.14	0.003	0.021

Table 1 shows the values of torsion coefficient are limited between (+3) and (-3) Where "goodness of sample distribution can be determined from size of the population. Values and their proximity to each other or their dispersion and distance from each other, and thus we have a measure of extent of homogeneity of statistical group".(Sapozhenkova et al., 2024).

Study organization

The researcher used the experimental method because it suits the nature of the research. The researcher used the experimental design called design of random selection equivalent groups with pre- and post-observation.(Ramadhan et al., 2023) Training program for multi-form resistance began 8/ 9/ 2024.

1. Program is appropriate for age group and subject to general goal.
2. Determine aim of program and objectives of each stage of its implementation.
3. Identifying most important training duties and easy availability of capabilities, tools.
4. Taking into account clear rest periods to bring appropriate formation of components of training load
5. Gradual increase appropriate progress loads and Steps to build the proposed program: researcher followed following steps to build and design.

The scientific foundations of the tests (Validity, stability, and objectivity) have been applied, as shown in Table 2.

Table 2. Shows the factors of validity, stability, and objectivity of the physical abilities and performance of the 200 m. runners

No	Statistical Features Tests	Unit of Measurement	Stability Coefficient	Self-Validity	Objectivity
1	10-Second running and jumping	degree	0.95	0.97	0.90
2	Test of running (30) meters from the flying start	degree	0.98	0.99	0.93
3	Running test (40) meters from a low start	degree	0.88	0.93	0.88

Table 2 shows that the values of the correlation factors ranged between (0.83 and 0.99), which indicates that the tests have high validity, stability and objectivity coefficients.

Stability. The tests were applied to the sample of the exploratory experiment of (4) players, and these tests were repeated after three days and then the researcher extracted "correlation coefficient

between the results of the first and second test, where the results of all values were higher than the tabular values, which indicated the stability of these tests".(Majid, 2016).

Validity. The researcher extracted the coefficient of self-truthfulness "by calculating the square root of the coefficient of stability".(Majid, 2016a) Where the results indicate the validity of these tests when applied at any time and as shown in Tabel 3.

Objectivity. Through the exploratory experiment and in the second test and then assigning two specialized referees to indicate the results of the tests. After the implementation of these tests, the data collected by each of them and then analyzed statistically through the use of Pearson's correlation coefficient, so all values were positive and greater than the tabular values, which indicated the objectivity of these tests through the strength of the relationship between the degrees of the two referees as shown in Table 3.

Table 3. shows the scientific foundations of the tests used on the research sample

No.	Tests	Coefficient of stability	Honesty coefficient	Objectivity coefficient
1	10-Second running and jumping	0.95	0.97	0.85
2	Running (30) meters from the flying start	0.88	0.93	0.80
3	Running test (40) meters from a low start	0.90	0.94	0.91

Note that the tabular value is (0.632) under the degree of freedom (8) and the level of significance (0.05)

Research tests:

1- 10-Second running and jumping test: (Fikret & Leyla S., 2020).

Test objective: Measure force characterized by speed:

Tools: a stopwatch, a line drawn on ground to indicate start of jumping, a marker.

Conducting test: Player start line by player to perform run. When player reaches start line, timekeeper begins to run clock in sync with start of player procedure of running and jumping until time reaches 10 seconds. player gives a signal to stop and places a sign to indicate where athlete will finish so that researcher can Measure.

2- Test of running (30) meters from the flying start: (Majid, 2016a).

Tools: a stopwatch, distance between first line

Conducting the test: player stands behind first line, and upon hearing start signal, player runs until his crosses third line, counting time from the second line to the third line.

3- Running test (40) meters from a low start:(Majid, 2016b).

Purpose of test: to measure translational speed.

Time Plan for training programs: The training program included (36) training sessions for the sample, among the experimental group members. The implementation of the training program took six weeks, distributed by (3-4) training sessions per week, and the time of each training sessions was between (65-100) minutes, which it enough to make physiological effort as (Usbah et al., 2024) confirmed the physiological changes occur with minimum 6 weeks for muscle strengthening (Usbah et al., 2024).

The training session starts with warm-up 15 minutes general exercises for the internal body systems. Resistances of short running events in particular, were identified based on their frequent performance and simplifying their installation to suit age group, study were determined as follows (resistance of colleague's body, Resistance with medicine balls, resistance with rubber bands, resistance using weights). During specific preparation period used basic formation of (1:2) during

various stages of program, where degree of load was graduated by using medium load during first stage, then high load during second stage, then maximum load during third stage.

Statistical analysis

The researcher used the statistical program (SPSS), which included the following statistical means: (arithmetic mean, standard deviation, simple correlation coefficient (Pearson), test (T) for correlated samples, analysis of one-way variance Anova).(Byshevets et al., 2019; Hartill et al., 2021).

Results

Table 4 Is Pre-Test And Post-Tes Data Experimental

Table 4. Shows Pre And Post-Tests Results For The Experimental Group

Tests	**Unit of measurement**	**Pre-test**		**Post-test**		**Calculated T value**	**significance**
		Mean	Standard deviation	Mean	Standard deviation		
Running 10 seconds with jumping	Meter	49.21	0.021	48.10	0.039	3.11	Sig.
Running 30m from the jump start	Second	3.84	0.046	3.78	0.098	2.34	Sig.
Running 40m from a low start	Second	4.89	0.033	4.77	0.076	2.64	Sig.

Significant difference at the error rate of ≤ (0.05) and in front of the degree of freedom (16) note that the tabular value of (T) = 2.16

It became clear that there were differences arithmetic means and standard deviations for researcher believes of experimental group came as a result processes of the working motor limbs systems by (Ali: 2024) who pointed out that "performing motor paths and making construction of those construction of internal and systems that bear training load, with aim of raising level of achievement. (Qutaiba Younus & Rashid, 2024) Researcher attributes improvement achieved to formulating desired aim of multi-form resistance exercises Which was implemented manner with nature of performance, which was confirmed by both (Hadi et al., 2024). that "in fact, essence of training planning is Planning to achieve physiological reactions of body towards any physical load that is placed on it, and through the body's response, physiological adaptation is achieved and level of sports performance increases." This is confirmed by (Adi & Candra, 2024), who pointed out that "developing training curricula for basic objectives, and choosing exercises are appropriate to nature of effectiveness in each training unit and time span of units is considered one of most important criteria for success of training curriculum."(Adi & Candra, 2024) "Use of exercises are consistent in nature of their performance with general form of performing specialized skills leads to better results in gaining strength."(Nordsborg et al., 2003). Table 5 Is Pre-Test And Post-Tes Data Control Group.

Table 5. Shows Pre And Post-Tests Results For The Control Group

Tests	**Unit of measurement**	**Pre-test**		**Post-test**		**Calculated T value**	**significance**
		Mean	**Standard deviation**	**Mean**	**Standard deviation**		
Running 10 seconds with jumping	Meter	49.59	0.055	49.11	0.039	3.11	Sig.
Running 30m from the jump start	Second	3.79	0.046	3.77	0.098	2.34	Sig.
Running 40m from a low start	Second	4.82	0.033	4.78	0.076	2.64	Sig.

Significant difference at the error rate of ≤ (0.05) and in front of the degree of freedom (16) note that the tabular value of (T) = 2.16

The training program effectively contributed to develop strength characterized by speed and improving numerical level of performance. This was confirmed by (Miguel et al., 2021) as "it is necessary to use non-traditional training methods in developing the athlete's functional potential by increasing load in quantity and quality to an extent that forces athlete to adapt both physically and psychologically to overcome contradiction between requirements of load and achievement ability."(Miguel et al., 2021) Researcher also attribute these results to positive effect of proposed training program using various forms of resistance, as it was taken into account that set of exercises used be similar to nature of performance, as (Буланова, Н Е, 2023) indicates "Main role of specific exercises with different resistances lies in same path."(Буланова, 2023) Performance is therefore concerned with working on muscle groups involved in performance. Researcher attributed of which different resistances components of physical.(Botova & Lopatina, 2024). Table 6 Is Pre-Test And Post-Tes Data The Experimental And Control Groups

Table 6. Shows Post-Tests Results For The Experimental And Control Groups

Tests	Unit of measurement	Experimental group		Control group		Calculated T value	significance
		Mean	Standard deviation	Mean	Standard deviation		
Running 10 seconds with jumping	Meter	48.10	0.039	49.11	0.039	3.11	Sig.
Running 30m from the jump start	Second	3.78	0.098	3.77	0.098	2.34	Sig.

Running 40m from a low start	Second	4.77	0.076	4.78	0.076	2.64	Sig.

Discussion

It appears from the presentation in Table 6 of the results of the differences that there are significant differences in most of the tests between the experimental and control groups and in favor of the experimental group in their post-tests, as the results of each of (Running 10 seconds with jumping, Running 30m from the jump start) showed significant differences, which the researcher attributes with (Miguel et al., 2021) in fact that these abilities were affected by the independent variable represented by the use of physical exercises that were used in the experimental group's curriculum.(Miguel et al., 2021).

Which are special exercises that were included according to the literature of sports training science in small, standardized training courses in the form of training sessions in the specific preparation period at a rate of three training sessions per week, as indicates that in order to obtain real physiological adaptations, the athlete must continue in organized and continuous training for a period of no less than (8-12) weeks.(Banwan shareef, 2020) .

While there were no significant difference in the results of the test (Running 40m from a low start). The researcher attributes this to the fact that the control group received training from their specialized trainer, which raised their physical abilities, as perseverance in training leads to raising the physical abilities of the players when they are regular in performing it for an appropriate period.(Adi & Candra, 2024).

The researcher attribute the reason for these differences in post-test to the fact that the use of resistance exercises helped players in the implementation of performance with good and influential way, where the diversity of exercises using several strength contributed to expanding players' perceptions in order to better understand the skill, its clarity and ease of application. This is only done if the process is accompanied by various exercises, as (Sonchan, 2017) points out that "We contend these influences on the performance and learning of motor skills are similar across human learners, though perhaps amplified or dampened within individuals.(Sonchan et al., 2017).

Presumably not coincidentally, certain motivational factors, in particular those that underlie intrinsic motivation or which satisfy fundamental psychological needs (Zullig & White, 2011).

The researcher add that the strength exercises that were used helped players to realize the required motor duties, as well as being new and innovative training means for players, which led to increased suspense and motivation to perform activities and motor duties, Skilled movement is fundamental to surviving and thriving in the world and the basis as well for many of the highest human endeavors and cultural achievements, from sport to art to music.(Fatimah & Ramah, 2024).

This, in turn, reflected positively on the development performance of the variables selected in track and field, as (Adi & Candra, 2024) adds that training aids work to achieve communication and transfer training goals from coach to players, and they increase the effectiveness and improvement of the learning process, and motivate players to participate in more training situations and their excitement to participate in more sessions and continue in it.

Also, the performance of these exercises helped the players to improve their skill performance by obtaining immediate feedback, which the young players get as a result of completing the required performance duty, this is pointed out in (Leeder, 2019).

The internal and external feedback works to indicate the wrong and correct performance during the subsequent motor performance, so the feedback stimuli the motor performance that work

to refine and develop the motor performance of the novice player and direct responses towards the motor goal during situations successive training (Leeder, 2019).

Conclusions

The research results showed that the exercises used by the researcher were of positive benefit, and this is what the statistical results showed, making it a suitable tool for trainers to adopt in their training approaches. The research shows that specific with multiple forms of resistance have a positive effect on level of performance among 200-meter short-distance runners. The experimental group that used proposed multi-form resistance training program over control group that used followed program. Benefiting from specific exercises for multi-form resistance 200-meter short sprint event. Attention to developing physical capabilities of performance stages resistance because their positive effect. The author recommends to do other researches with another skills and different variables to cover all types of players need to go far in competitions. This study could be a link in future to consider its results to expand more exercises and approaches in short distance run for youth.

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Conflict of interest

Author stated that there was no interest conflict.

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