

Effect of special exercises according to the difficulty of the training unit on the physical abilities and the performance of 200m sprinters

Lina Ali Sheerkhan*, Liza Rustum Yaqoob*

¹ Faculty of Physical Education and Sports Sciences for Women, University of Baghdad, Iraq.

* Correspondence:

Lina Ali Sheerkhan; Lena.ali1204a@copew.uobaghdad.edu.iq

Liza Rustum Yaqoob; Leza@copew.uobaghdad.edu.iq

ABSTRACT

The purpose of this study was to identify the effect of special exercises according to the difficulty of the training unit on developing some physical abilities and on the achievement of a 200-meter run. The present study had a parallel group, experimental design. In the present study, 200m sprinters constituted the population and research community. The study was conducted in the clubs of the province of Baghdad. A total of 12 runners were recruited as the sample for the study by the intentional method. The participants were divided into experimental group and control group using odd even method. Considering the findings of this study, the researchers concluded that the adoption of special interval training exercises according to the difficulty of the training unit is useful to develop the physical abilities and the performance of 200m sprinters.

KEYWORDS

Training; Physical abilities; Performance; Sprint

1. INTRODUCTION

An organized sports training of the athletes based on scientific foundations is the gateway to reach the best outcome in the competitive games. Over the years a clear and distinct development has been witnessed in various athletic competitions especially in the short-distance sprint across the globe. The adoption and implementation of modern training methods based on the scientific

foundations helped in a significant increase in the efficiency and effectiveness of training and performance of the players (Sánchez et al, 2019; Skalska et al, 2019).

In sports, athletics is one of the competitions that are greatly affected by physical abilities. The overall achievement in athletic games is directly linked to the physical characteristics and abilities of the players. The specialized training process in these competitions aims to raise the level of physical aspects. Each athletic competition has its specifications and requirements. In a 200-meter sprint competition, the player must possess high-level physical capabilities to reach physical adaptation and endurance in the race to keep pace, as well as control the frequency of steps in an appropriate manner to ensure a high level of sprinting speed. Hence, the importance of this study stems from preparing special exercises according to the difficulty of the training unit for the training load in order to build the training capacity by developing the physical abilities of the runners, the speed of the runners, and the continuous monitoring of them through the training load indicator.

Hence, this study aimed to shed some light on the key importance of training methods according to the scientific foundations that are related to this competition and the special physical abilities that are characterized to bring development in the level of these abilities for runners.

Through the best of the researcher's knowledge and modest experience in the field of athletics, they noticed a significant decline in the performance of the players. Followed by this, the researcher conducted an extensive search for understanding the reasons behind this declined performance. They also identified the weaknesses in the stages of running for partial distances that resulted in the loss of time for the Iraqi runners compared to the world champions in the sprint competition of 200 meters. Hence, the researcher identified the problem and decided to prepare special exercises in terms of accelerating recovery during the level of physical performance in the training units. The exercises were prepared to build the physical abilities of the players based on the scientific methods to increase the level of physical load and muscle fatigue until a dynamic adaptation gained from training occurs. Therefore, the researcher decided to provide a simple solution with exercises to achieve significant achievement in competitive games.

The primary aim of the study was to identify the effect of special exercises according to the difficulty of the training unit on developing some physical abilities and on the achievement in a 200-meter run. The researchers hypothesized that statistical significant differences would be found between the pretests and posttests in favor of the posttests, and between the experimental group and the control group in favor of the experimental group, on developing some physical abilities and on the performance in the 200-meter run competition.

2. METHODS

2.1. Design and participants

The present study had a parallel group, experimental design. In the present study, 200m runners constituted the population and research community. The study was conducted in the clubs of the province of Baghdad. A total of 12 runners were recruited as the sample for the study by the intentional method. The participants were divided into experimental group and control group using odd even method. The homogeneity of the sample is described in Table 1.

Table 1. Homogeneity of the sample

Variables	Unit	Mean	Median	SD	Skewness
70-meter speed	Second	9.462	9.63	0.059	0.670
Endurance strength	Second	27.899	27.89	0.151	0.266
200m performance	Second	23.719	23.790	0.196	0.513

Table 1 shows that the skewness coefficient for all values is less than ± 2 . This indicates that they are distributed normally, and this means that all members of the research sample are homogeneous.

The participants were equally allocated into experimental group and control group using odd even method according to the sequence of their achievements with $n=6$ in each group. Table 2 shows the equivalence between the control and experimental groups.

Table 2. Equivalence between the two research groups

Variables	Unit	Control		Experimental		T	p
		Mean	SD	Mean	SD		
70-meter speed	Second	9.66	0.065	9.625	0.051	1.028	0.328
Endurance strength	Second	27.941	0.156	27.856	0.146	0.972	0.354
200m performance	Second	23.750	0.216	23.688	0.189	0.525	0.611

2.2. Instruments

In the present study, many tools and devices were used for the purpose of data collection with the aim to achieve the objectives of the research. The various tools used in the present study included video camera with a speed of 120 y/s, stopwatch, tape measure, whistle, laptop, hand-held electronic calculator, starter cubes, different sized plastic cones and flags. Also, the following tests were used in this research:

1) *70-meter speed test.* The test was conducted with the intent to measure speed. This test was conducted in an oval-shaped running tract with 200 m length. The tools used for conducting this test included a stopwatch. The participants were asked to take the initial position from sitting on the starting line of the 200m race. It was launched through an audio indicator. Simultaneously, the timer was started that follows the runner assigned to him.

2) *Run by jumping 150 meters.* The test was conducted with the intent to measure maximum endurance strength. This test was conducted in a running range of 200m in length. The tools used for conducting this test included a stopwatch. The participants were asked to take the initial position from sitting on the starting line of the 200m race. After hearing the start signal, the participant ran in a steady manner. The total time taken by the participant to travel the distance was measured to the nearest tenth of a second.

3) *200-meter speed test.* The test was conducted with the intent to measure the runner's performance in 200 m. The tools used for conducting this test included a firing pistol, and a timer. The participants were asked to take the initial position as standing on the starting line. After hearing the word “absolute”, the runner stood firm. After hearing the word “attend”, the participant rose his arm a little up above his shoulders. When the absolute was released, the participant ran at full speed till the finish line. Only one attempt was given to each runner. The total time taken by the runner was recorded.

2.3. Procedures

The researcher conducted an exploratory experiment in October 2021 on four players out of the main sample participants of the study. The exploratory experiment was conducted with the aim to determine the difficulties and obstacles that will appear during the implementation of the tests, to know the appropriate time in conducting the tests, to test the ability of the participants' members to carry out the tests, and their suitability for them and to identify the devices and tools necessary to carry out the experiment and tests.

Pre-tests for the research sample were carried out in October 2021. The tests conducted by the research team were a 70-meter speed test, a run by jumping 150 meters and a 200 m speed test. The primary experiment was initiated by the researchers in October 2021. The experiment was conducted in the second week of October 2021. A total of 24 training units were included in the study with 3 training units per week. The exercises were performed by the participants on alternate days in a week for a total of 8 weeks. The intensive repetitive training method was used by the researchers in the current study and the method of high-intensity interval training was used (80-90%).

After the accomplishment of the main research experiment, the final tests were accomplished by the researchers and teammates in December 2021, with the same conditions and under the same spatial and temporal conditions.

2.4. Statistical analyses

In the present study, statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS). The researchers calculated arithmetic means, standard deviations, and t tests, with a level of significance of 0.05.

3. RESULTS

Table 3 presents the differences between the pre and post-tests in the control group. Table 4 describes the differences between the pre and post-tests in the experimental group. Table 5 presents the differences between the experimental and control groups in the post-tests. These results showed significant improvements in all the variables studied, both in the control and experimental groups. Furthermore, the results of the post-test of the experimental group were significantly better than the results of the post-test of the control group.

Table 3. Differences between the pre and post-tests in the control group

Variables	Unit	Pre-test		Post-test		Difference between arithmetic means	Difference between standard deviations	T	p
		Mean	SD	Mean	SD				
70-meter speed	Second	9.66	0.065	9.591	0.076	0.683	0.025	6.532	0.001
Endurance strength	Second	27.941	0.156	27.528	0.156	0.413	0.149	6.767	0.001
200m performance	Second	23.750	0.216	23.606	0.226	0.143	0.047	7.7374	0.001

Table 4. Differences between the pre and post-tests in the experimental group

Variables	Unit	Pre-test		Post-test		Difference between arithmetic means	Difference between standard deviations	T	p
		Mean	SD	Mean	SD				
70-meter speed	Second	9.625	0.051	9.431	0.029	0.193	0.051	9.240	0.000
Endurance strength	Second	27.856	0.146	26.966	0.103	0.890	0.131	16.623	0.000
200m performance	Second	23.688	0.189	23.083	0.070	0.605	0.205	7.205	0.001

Table 5. Differences between the experimental and control groups in the post-tests

Variables	Unit	Control		Experimental		T	p
		Mean	SD	Mean	SD		
70-meter speed	Second	9.591	0.076	9.431	0.029	4.812	0.001
Endurance strength	Second	27.528	0.156	26.966	0.103	5.585	0.000
200m performance	Second	23.606	0.226	23.083	0.070	4.506	0.001

4. DISCUSSION

The statistical analysis of the data revealed significant differences in the development of some special physical abilities and the effectiveness of running 200m between the experimental group and control group in favor of the experimental group. The special physical abilities and the achievement of the 200m run have an important relationship to the physiological and morphological susceptibility of the runner, which must play a role in training to improve achievement.

The researchers attributed this significant difference to the use of special interval training, in which the level of training was kept difficult to prepare the runners for extreme efforts. This helped in increasing the ability of runners to perform activities at a high and semi-high intensity. In the training units, speed was maintained throughout the race. This ability of the players to withstand speed has a major role in the race. The speed is maintained by the participants when they put constant and maximum effort until the finish line is touched by them. High-speed jogging with relatively short recovery periods falls under the classification of the anaerobic threshold. It aims to develop the

endurance of speed in short and medium distances under conditions of hypoxia (anoxic work), i.e. severely approaching the maximum or almost maximum” (Hamid and Hassanein, 1997).

The special interval training exercises prepared by raising the difficulty level of the exercises helped the runners to reach the highest levels of performance without being exposed to sports injuries or overtraining. High intensity training develops special endurance that helps the runners to perform with the maximum effort possible throughout the duration of the activities. Performance requires high efficiency from functional systems, especially the nervous and muscular systems, which expresses the common relationship between them and training in this capacity with a high intensity or similar to the intensity used in competition (Jastrzebska et al, 2017). In addition, the distribution of the training load in the way of developing special endurance, including endurance of speed and endurance of force, is equal to the load of competitions in terms of (time) and sometimes less than the competition time or more (performance endurance). The degree of difficulty of the training unit and the use of these methods helped to determine the level of the runners in the exercises before or during the competition, as well as the runner’s sense of carrying the competition.

In an athlete the interrelationship between the complex abilities like strength, endurance and speed contribute to gain significant achievement in the game. When the muscle is subjected to a certain intensity that exceeds its natural ability, it responds to some degree to this intensity. If it was greater than its natural ability to a reasonable degree, it will respond effectively and become stronger. There occurs a temporary decrease in muscle capacity after the training unit, but it quickly recovers itself and achieves a level of greater muscular strength afterwards (Nasir et al, 2022).

The results of the present study were found to be consistent with the study conducted by Hassanein (1997). The authors of the study stated that “the athlete’s ability increases as a result of the change in training and its intensity works to stimulate all or most of the fibers in one muscle”. According to these results, it is recommendable to divide the training program in different contents and objectives, in order to achieve a balance between the external and internal load or between the volumes of training.

5. CONCLUSIONS

Considering the findings of this study, the researchers concluded that the adoption of special interval training exercises according to the difficulty of the training unit is useful to develop the physical abilities and the performance of 200m sprinters. Therefore, the authors recommend to adopt

special interval training exercises according to the difficulty of the training unit for 200-meter competition runners.

6. REFERENCES

1. Hamid, K. H., & Hassanein, M. S. (1997). *Foundations of Sports Training for Physical Fitness Development in Physical Education Lessons in Boys and Girls Schools*. Cairo, Dar Al Fikr Al Arabi Publisher.
2. Hassanein, M. S. (1997). *Evaluation and Measurement in Physical Education*. Cairo, Dar Al Fikr Al Arabi Publisher.
3. Jastrzebska, M., Kaczmarczyk, M., Suárez, A. D., Sánchez, G. F. L., Jastrzebska, J., Radziminski, L., & Jastrzebski, Z. (2017). Iron, hematological parameters and blood plasma lipid profile in vitamin D supplemented and non-supplemented young soccer players subjected to high-intensity interval training. *Journal of nutritional science and vitaminology*, 63(6), 357-364. <https://doi.org/10.3177/jnsv.63.357>
4. Nasir, A. M., Hussein, H. I., & Sagheer, A. H. (2022). The effect of a high-intensity training program on BCL2 and BAX proteins and on sprint performance in young 100-m sprinters. *SPORT TK-EuroAmerican Journal of Sport Sciences*, 11, 30. <https://doi.org/10.6018/sportk.539251>
5. Sánchez García, C., Zauder, R., & López Sánchez, G. F. (2019). Analysis of body composition and physical fitness of futsal players at school age according to their level of physical activity, diet and body image. *Atena Journal of Sports Sciences*, 1, 4.
6. Skalska, M., Nikolaidis, P. T., Knechtle, B., Rosemann, T. J., Radzimiński, Ł., Jastrzebska, J., ... & Jastrzebski, Z. (2019). Vitamin D supplementation and physical activity of young soccer players during high-intensity training. *Nutrients*, 11(2), 349. <https://doi.org/10.3390/nu11020349>

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

COPYRIGHT

© Copyright 2022: Publication Service of the University of Murcia, Murcia, Spain.