

The effect of Tabata exercises on muscle power and running speed in under-20 200 metres runners

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ABSTRACT

The primary aim of the present study was to formulate a set of Tabata-style exercises and to identify the effect of these exercises for performance stages on power characteristic of speed and achievement of 200m for runners under 20 years old. The present study had an experimental pre-test & post-test design to solve the research problem of the study. 200-meter race runners were identified as the research community in Najaf Governorate for the 2020-2021 sports season. A total of 6 runners were selected as the participants for the study. The present study was conducted on 200m runners in the Najaf International Stadium, in Najaf governorate within the timeframe of June 2021 to September 2021. Based on the findings of the present study, the researchers concluded that the application of exercises in Tabata style aided in developing the power characteristic of speed for the two legs of the participants of the experimental group.

KEYWORDS

Tabata; muscle power; running speed; runners.

1. INTRODUCTION

In the past decade, a lot of development has been observed in terms of techniques and skills of players in their respective games (Prieto, 2020; Sánchez et al, 2019). This is due to the consistent work of sports authorities and researchers for creating a better learning environment by provision of training to the players using modern methods based on the scientific foundations. In the recent time, scientific progress has been made in order to reach the highest ranks at various levels (López et al, 2022; Poteliūnienė et al, 2021; Sánchez et al, 2018). It is worth noting that the training aspect has witnessed a remarkable development in the methods, means and tools used in the training process and line with the nature and potential of the player by striving to choose the method that suits the

specialized sports (Issa et al., 2022; Monadi et al., 2022). Athletics has also witnessed the great level of achievements in various competitive games. The 200-meter event is an exciting and thrilling event for spectators and runners in terms of competition and high-level motor performance, this event deals with the maximum effort of the contestant with an accurate performance from the first moment of launch until reaching the finish line. Hence the researcher identified the need of inclusion of exercises which require intense effort of the players to develop the precision and accuracy in their performance at various competitive levels. Thus, the importance of research is evident in studying the effect of Tabata-style exercises for performance stages in the power characteristic of speed and the achievement of 200 meters for runners under 20 years.

Through review of the existing literature and researcher's expertise in the field of athletics, it was notified that a large number of trainers' significantly rely on the old training methods. Old training methods are not based on the scientific foundations, without taking into account the specific characteristics of the players. Tabata method is one of the modern training methods in which high-intensity training is given to the players within a short span of time, taking into account the nature and characteristics of the game, thus improving performance under the conditions of extreme work and raising the level of performance of the runners. Tabata-style exercises positively affect the power characteristic of speed and the achievement of 200 m for runners under 20 years. Hence, researcher identified the need to use Tabata method in the training schedule of 200 m runners.

The primary aim of the present study was to formulate a set of Tabata-style exercises and to identify the effect of these exercises for performance stages on power characteristic of speed and achievement of 200m for runners under 20 years old. The research hypothesis was that there would be a significant effect of Tabata-style exercises on physical variables for the performance stages and the achievement of 200m for runners under 20 years old.

2. METHODS

2.1. Participants and design

The present study was conducted on 200m runners in the Najaf International Stadium, in Najaf governorate within the timeframe of June 2021 to September 2021. The present study was an experimental pre-test & post-test design to solve the research problem of the study. 200-meter race runners were identified as the research community in Najaf Governorate for the 2020-2021 sports season. A total of 6 runners were selected as the participants for the study.

2.2. Devices and tools used in the research

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: A Lenovo computer, a tape measure, an electronic calculator, manual stopwatch, a legal running range of 200 metres, barriers of different heights, cones, and ladder of agility.

2.3. Field research procedures

Test variables

- The power characteristic of speed test for the two legs

Jumping test of 5 hops for each leg (Pfaff, 1993). This test was intended to measure the power characteristic of speed for the two legs. The tool required for the measurement of this test included, a tape measure of linen, a whistle to give the start signal. The participant was asked to stand in the space designated for performing this test. The jumping foot of the participant touched the starting line, the free leg was kept back. After hearing the start signal, participants were directed to do five hops forward, one to the right, one to the left at the farthest possible distance. The participant was free to start jumping with either leg. The jumping was completed without the other leg touching the ground. The participants were directed to perform five successive hops with the same leg and then five successive hops with the other leg. They were also directed not to stop while jumping. Measurements were taken to the nearest (cm). Off all the attempts, best attempt was counted. The total distance travelled was also documented.

- 200m achievement test:

Test run 200 meters: The test was intended to measure the achievement of running 200 meters. The tool required for the measurement of this test included three stopwatches, a kickstand, a playground and a legal field and a shooting pistol. Participants were asked to take the sitting position. Each runner was asked to run a total distance of 200 meters as quickly as possible under the legal rules. The time completed for this distance was documented

Exploratory experiments

- The first exploratory experiment

The researchers conducted a first exploratory experiment to test the achievement of the effectiveness of 200 meters. The first exploratory experiment was conducted with the aim to verify

the validity of the tools used in terms of positive assistance, to verify the fitness of the tests for the tester members and the ease of their application, to know the time required to conduct the tests, to verify the understanding and efficiency of the assistant work team in conducting measurements and tests and recording the results, to know the difficulties that the researcher may encounter during the course of the study and providing appropriate solutions to them.

- Second exploratory experiment

The researchers conducted a second exploratory experiment to find out the suitability of the exercises to the research sample, the maximum intensity of each exercise which could be used for the participants. The total time taken by the participants to do complete performance and the obstacle that may be encountered by them during the main experiment.

Pre-test for the research sample

The researchers conducted pre-tests on the research sample, represented by tests of strength, speed and achievement of the effectiveness of 200 meters in the month of May 2021.

Application of Tabata style exercises

The researchers prepared a regimen of exercises in Tabata style, based on their personal experience. The researchers codified the exercises, based on the scientific foundations. They started the implementation of exercises on the participants recruited for the study in the month of May 2021 until July 2022, taking into account all the components of training which included, the physical abilities of the players to develop the variables of strength characteristic of the speed and the achievement of 200 m for runners.

A set of Tabata style exercises was formulated. Participants of experimental group performed the Tabata style exercises. A total of 24 training units were given i.e. three sessions per week for total of eight weeks. Each training session was completed in 12-20 minutes. Training was completed on alternate days i.e. Sunday, Tuesday, Thursday as these days fit with the nature of the program that was developed by the researchers and the agreement with the coach so that there would be no intersection in the training units, in addition, these days fit with the fluctuation that drawn for the training week (weekly circuit). The goal of the exercises in the Tabata style was to develop the power characteristic of speed and the completion of 200 m for the selected participants. The researcher used the wave (1:2) between the daily and weekly training units when applying the exercises in the Tabata style.

Post-tests

Post training sessions of Tabata style exercises to the participants of experimental group, final tests were accomplished by the researcher and his fellow teammates in the month of July 2021, under the similar conditions in which the pre-tests were conducted in terms of the sequence of the tests.

2.4. Statistical methods

In the present study, the statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS), by computing arithmetic mean, standard deviation and t test

3. RESULTS AND DISCUSSION

In Table 1 significant differences were found between the tests of the research participants, in favor of the post-tests for the selected variables of the study, including power characteristic of the speed of the muscles of the two legs and achievement tests. Exercises formulated in Tabata style contributed an increase in the power characteristic of speed, especially the muscular force resulting from the contractions as a result of this compatibility through various exercises by firing of maximum number of motor units during the performance, thus the exercises in the Tabata style worked to develop neuromuscular compatibility. In a study conducted by Miller *et al.* (2015), authors emphasized on the need to use Tabata-style exercises in training curricula of the players, since “it achieves an increase in strength without gaining weight”. This is one of the key characteristics of neuro-muscular adaptation, in which as a result of appropriate coordination between various muscles. It allows the distribution of the load (heavy) on the different muscles of the body by relieving pressure on one specific muscle or muscle group. Appropriate load distribution of load between muscles prevents these muscles in gaining the large size. Tabata-style exercises work on the same principle. These exercises distribute the load on whole body through neuromuscular synergy.

Miller *et al.* (2015) also pointed out that “the training that includes all the primary and secondary muscles that contribute to the implementation of motor performance, and creates the so-called skill stability during performance, which is the balancing force of continuous neuromuscular work with the recruitment of motor units within the muscle”. In the present study, the exercises formulated by the researcher for the participants of the research group, were characterized by great intensity, which helped to develop a power characteristic of speed for the muscles of the two legs, as per the need of 200-meter runners. During the running race, players need rapid and repetitive muscle

contractions without fatigue. Hence the correlation of strength and speed develops the power characteristic of speed. It has an influential effect on the motor performance of the player.

Table 1. Differences between pre and post-tests in the variables studied

Variables	Measuring Unit	Pre-test		Post-test		T value	P value	Sig
		Mean	Std. deviation	Mean	Std. deviation			
Power characteristic of speed	Meter	26.24	0.382	7.748	0.431	9.003	0.000	sig
200m achievement	Sec	23.23	0.399	21.896	0.742	6.462	0.001	sig

Tabata style exercises utilized by the researcher in the present study, helped the players in developing this power characteristic of speed. Such as obstacle exercises and agility ladders with partridge exercises at appropriate heights and distances in a manner that served to develop the power characteristic of speed for the two legs.

The researchers attribute that difference also to his choice of appropriate exercises and a vehicle similar to racing situations. These exercises permeated a kind of extraordinary strength and speed, which used body weight. The exercise protocol was developed scientifically and appropriately with the level and capabilities of the participants of the study, which led to the development of the strength in the primary group of muscles required for running. All and all, the training with the Tabata style exercises helped the players in raising their level of performance in the competitive games. Findings of this study were in accordance with a study that stated that the power characteristic of speed is connected to the degree of skill performance (Abde-Fattah, 1997).

4. CONCLUSION AND RECOMMENDATIONS

Based on the findings of the present study, the researchers concluded that the application of exercises in Tabata style aided in developing the power characteristic of speed for the two legs of the participants of the experimental group. The duration of the independent variable represented by the training units was suitable for creating adaptations expressing the extent of the expansion of the research sample members to reach 200 m. The development of the power characteristic of speed for the two legs reflected positively on the development of 200 meters for the runners.

According to the set of conclusions adopted and formulated by the researcher from the results obtained in this experiment, some recommendations were made by the researchers. They recommended the use of exercises in Tabata style in their regular training schedules in order to increase runners' efficiency in short races during training and competitions. They also emphasized on adopting the exercises formulated by the researchers as primary data when training 200m runners, the necessity of rationing the training load for exercises (Tabata) to suit the type of practitioners in terms of gender, biological and training age, since these factors have high impact on the body during a performance. Researchers also recommended conducting similar studies on other individual and collective activities and different age groups.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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