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Pace Strategy Profiles of Elite Women Athletes in 20km of Race Walking

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ABSTRACT

Purpose: The purpose of this research was to study the timeline evolution of walking, as well as the Pacing Strategy Profiles of high-level women in the 20 km of race walking. Material: The practical example of applying the theoretical basis was made during the Women's Greek Championship (Megara 2016), in which 12 athletes aged 19 to 40 participated (28.50 ± 7.20). Methods: The certified distance of the 20km route was divided into 10 sections of 2 km each. The same happened with the times (intermediate, final) corresponding to the individual sections (2 km) of the route. The athletes were divided into 4 groups: the first 3, those who finished 15% slower than the first, those who finished 15% - 30% slower, and those who finished more than 30% slower than the winner, and finally became comparison of the first 6 and last 6 athletes' groups. Results: The individual pace strategies, that describe the tactics of the athletes in this race, have been calculated. Conclusions: It was found that the winners of the race used Even Pacing Strategy, maintaining a steady speed on most of the route. As the level of women athletes became lower, Variable Pacing Strategy was used, while the athletes who finished last, did not seem to be able to maintain any particular pacing strategy. It is suggested that athletes should follow Even Pacing Strategy during the race, in order to improve their performance.

Introduction

Various activities that are repeated on a daily basis put the human body on a motor alert, whether it is for social, working or sporting purposes. Beginning of walking from stillness is considered to be one of the most common activities of a person in its daily living. Depending on the purpose and the method, we can divide it as follows:

1) Simple walk or walk is considered as the natural way of moving the human body into space from its infancy [1].

2) The healing walk, which is the acceptance of exercise as a practical form of rehabilitation, promotion and preservation of health, as it was known by Byzantine medicine [2].

3) Recreational walk or walk as a recreation. Mannel & Reid, [3] and Sylvester, [4] define three dimensions based on: (a) Leisure as free time, (b) Leisure as an experience, (c) Leisure as an activity. It is therefore understood that recreation is a broader concept that involves active activity, whereas entertainment involves passive activity [5].

4) Nordic walking is walking with specially designed walking sticks, to improve fitness [6].

5) Race walking is a part of the classical athletics and one of the Olympic Games, in which athletes move as fast as possible without running in routes of 20 km and 50 km.

The present study was a targeted review work with a practical example of applying the theoretical basis.

Independent Variables

High-level women athletes in the 20 km racetrack, initially divided into 4 groups: the first 3, those who finished 15% slower than the first, those who finished 15% - 30% slower and, finally, those who finished more than 30% slower than the winner. Then, they are splatted into two groups: those finishing in the top 6 and bottom 6. Also, the predefined distances of the sections of the route.

Dependent Variables

The performance of top-level women athletes in the race of 20 km. The individual times of the athletes in the predetermined sections of the track, as well as their pace strategy. The purpose of this research was to study the timeline evolution of walking, as well as the Pacing Strategy Profiles of high-level women in the 20 km of race walking. The importance of the research was significant as follows: the above information would be able to extend theoretical knowledge, so that the methodology of analyzing the data of races, that have been or will be conducted in the future, is applied in practice. The following research questions will be investigated in the present study:

a) Will analyzing the strategy of the race help coaches and athletes?

b) Do athletes or groups of athletes differ in terms of pace strategy?

The great schools of race walking were created after the war. First the Soviet School, later the Italian, Spain, the Mexican, Poland, the German and last the Chinese. The most important athlete of race walking was the Polish Robert Korzeniowski, who has had gain four gold Olympic medals (3 in 50 km and 1 in 20 km), and four medals in World Championships (3 gold and 1 bronze, all in 50 km).

Pace Strategy in Race Walking

The observation that athletes' speed during a race varies caused interest as far as the pace strategy they should follow is concerning. This strategy is a key factor in the success of athletes in sports events [7]. Pace strategy is the ability to regulate the speed of an athlete's movement, in order to reach the end of the race in a shorter time [8,9]. The tempo or pace strategy relates to racing: (a) up to 40 sec (sprint), (b)from 40 sec up to a few minutes (short distance), (c) medium and long distance and overtime, which last for hours [10]. Aschenbrenner, Erdmann, Giovanis & Lipinska, [11] had investigated the tactics and technique of race walking at the 2004 Athens Olympics. Ruchlewicz et al. [12] studied the tactic of race walking, based on measurements made in athletes on a floor meter. It is well known that athletes should not run at high speed early in their race. Often the elite athletes run the second part of a distance faster than the first part [13, 14].

Material and Methods

The practical example of applying the theoretical basis was made during the Women's Greek Championship (Megara 2016), in which 12 athletes of race walking aged 19 to 40 participated (28.50 ± 7.20). Athletes had experience in endurance training in race walking for at least 5 years [15,16]. A prerequisite for their participation in the study was their ability to have reached the qualifying thresholds for the Race-Walking National Championships, which means that these athletes had a high level of training experience and endurance [17]. The racecourse was certified and measured by SEGAS at 20km, which took place on the Megara beach on a public road, and consisted of a 2km circular route, which athletes were required to walk 10 times.

Measurement Procedure

Initially, the certified distance of the racetrack (St-20km) divided into 10 sections of 2km each was recorded. The same happened with the times (intermediate, final) corresponding to the individual sections (2 km) of the route. Based on the data of the individual track distances and the respective times of the athletes, the individual pace strategies were found that describe the athletes' tactics in this race.

The appliances that were used to perform the measurements and to evaluate the data were:

a) One video camera (Sony, Full HD 1080, 50 Hz). The camera's resolution was 0.02s and it was firmly positioned at the start-stop (where the athletes completed the 2km cycle) for video recording of the athletes' passes at 2km and recording the electronic timer,

b) The protocols in which the distances of the race and the kinematic parameters were written.

Descriptive Analysis

The analysis included:

1) Descriptive statistics: mean (M), standard deviation (SD) and coefficient of variation (V).

2) Pace strategy analysis for the top 3 athletes, those who finished 15% slower than the first, those who finished 15% to 30% slower than that and, finally, those who finished more than 30% slower than the winner [18].

3) Relation of the times (intermediate and final) of the 12 athletes, as well as the first 6 and last 6 athletes, in relation to the distances of the sections of the track.

4) After a detailed explanation of all the terms used for the statistical processing of the work, follows a reference to the t-test. The t - test method investigates the difference between

the mean values of a variable at two time points. In other words, it examines whether the difference of two averages is due to random factors. A prerequisite for the above hypothesis to be valid is that the index t to be greater than or equal to the criterion (tc) value of the t-test. The criterion value is derived from the special t-student price table by selecting any level of significance and any degrees of freedom. In this work the t - test calculations were performed with 5% statistical significance and two -sided control, with degrees of freedom N - 1, where N is the sample population.

Result

The following results expand the theoretical knowledge of women's pace strategy in 20km of race walking, so that the methodology of analyzing the data of races that have been or will be conducted in the future is applied in practice. Correlation coefficients (r) in relation to the performance of the women's teams were significant, while the t-test between the team of the first 6 athletes M1-6 (9.69 ± 0.48 min) and that of 6 last athletes M7-12 (11.92 ± 0.97 min), with a correlation r = 0.97, showed the difference in performance between the two groups of athletes (Figure 1) t = 6,255> tc = 2,179 with bilateral control (p <0.05). It was found that none of the athletes who belonged to the first group, who were the winners, started the race faster than their personal record, while the athletes of the last group started the race faster than their own performance [19].

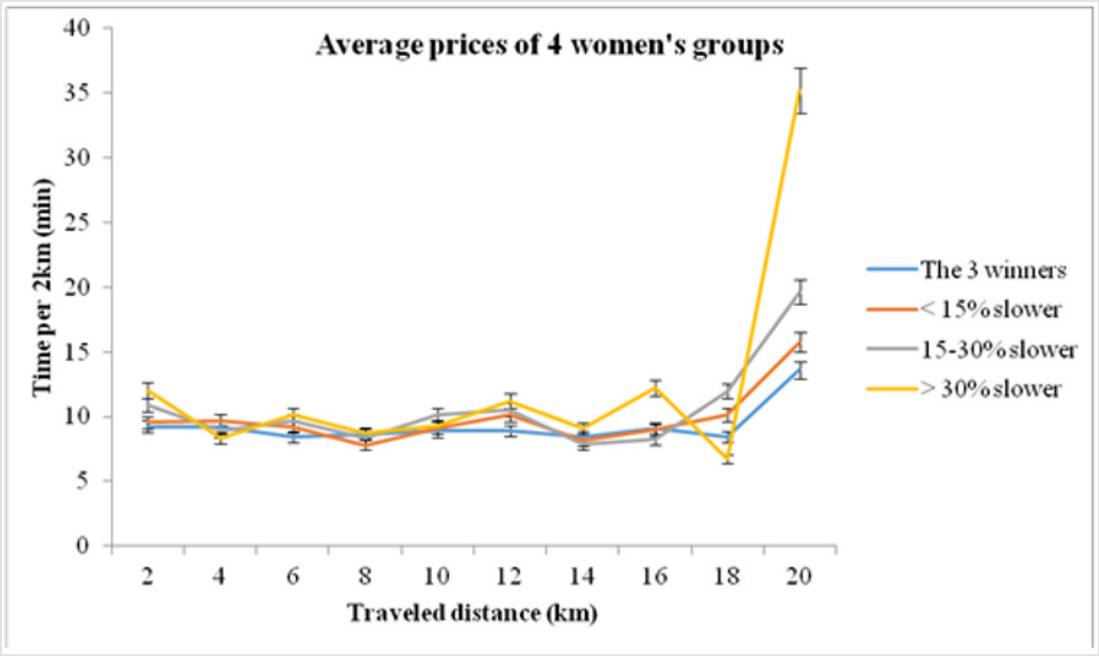

Figure 1.

Discussion

As we can observe by studying the profiles of the pace strategy at 20km of race walking in the practical example of application of the theoretical basis, there are differences from athlete to athlete. The winners (the first three athletes) seem to follow the Even Pacing Strategy, which deals with the uniform distribution of the cost expenditure of their forces during the race. In other words, these athletes tried to maintain a constant passage time, in each circular route of 2km and a small difference of their individual speeds between their passes [19]. The lower this deviation, the better the performance of the athletes, which leads us to the conclusion that, the optimal tactic at this distance is the constant passes of the athletes at a speed equal to the average speed. After all, the tactics of walking, like all long-distance roads, must be accompanied by specialized technique and speed distribution [19]. These findings are in line with previous studies that have analyzed the path of athletes in the marathon and found that the change in speed was less for the best runners compared to the slower athletes [19,20]. Athletes, who finished up to 30% slower than the winner, show Variable Pacing Strategy. These athletes had greater fluctuations in the intensity of their effort, or rhythm, during the race. The pace strategy in race walking, as in all long-distance roads, must be accompanied by the specialized technique [19]. It was found that, the optimal deviation of the speed from the average speed improves the final performance of the athletes, which was expected according to previous studies conducted in this subject [8,9].

Conflict of Interest

The authors declare that they have no conflict of interest.

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