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KINEMATICS ANALYSIS OF MOZAMBICAN ATHLETES IN THE 100 METERS RACE

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ABSTRACT

This study aimed to analyze the variations of the kinematic parameters (time, speed, acceleration and mechanical power) during the running of the 100-meters dash in Mozambican athletes. The sample consisted of 10 athlete's senior of Maputo (5 women and 5 men). As for the results, there were no significant differences between the two study groups regarding the speed ($Z = -2,888$; $p = 0.2331$). However, there was a statistically significant difference between the two groups ($Z = -3,361$, $p = 0.007$) results in acceleration. Concerning the variable power a statistically significant difference was observed ($Z = 0.576$; $p = 0.034$).

Keywords: biomechanics, speed, acceleration, mechanical power.

INTRODUCTION

The 100-meter dash race is a test considered merely a motor task of cyclic nature and with variable rhythmic structure, consisting of phases. This has been analyzed since the decade 70, in order to maximize yield. This can be seen by observing the literature that gives us indication and focusing on this subject (Bruggmann and Nixdorf, 1990; Hay, 1981 and Less, *et al.*, 1994). These studies have concentrated on the cinematic aspects. However, most of these studies focus on the approach run in the instant output, and on the other hand, the special exercises to improve aspects of the acceleration running. Thus, the present study seeks to analyze the variations of the kinematic parameters during the running of the 100-meters dash in Mozambican athletes.

MATERIALS AND METHODS

The sample consisted of 10 athletes seniors (5 women and 5 men) of Maputo. All athletes were sprinters and were chosen by their coaches as the best sprinters in their clubs. For the present study, the distance of 100 m was divided into 5 parts, so that each of them spanned a distance of 20 meters. Each athlete performed 6 runs of 100 m. In the end, it was considered the average of the top five attempts. After the data was collected, it was determined the speed ($v=e/t$), the acceleration ($a=\Delta v/\Delta t$) and the mechanical power ($P=Fv=ma v$).

RESULTS AND CONCLUSIONS

The results of this study are shown in Figure 1 (speed curve), Figure 2 (acceleration curve) and Figure 3 (power curve).

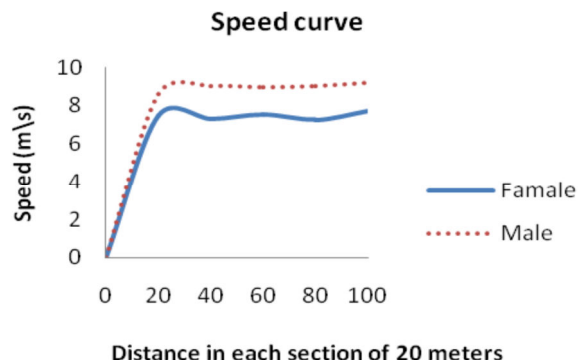


Fig. 1 - Speed curve

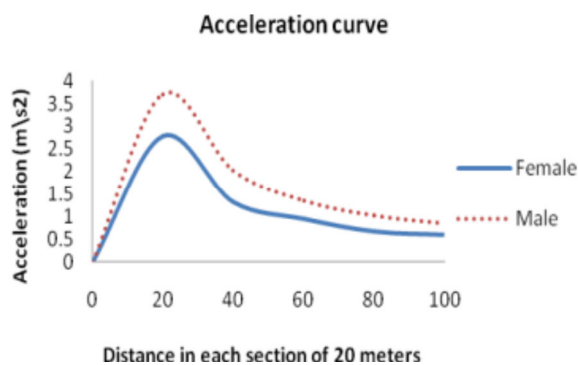


Fig. 2 - Acceleration curve

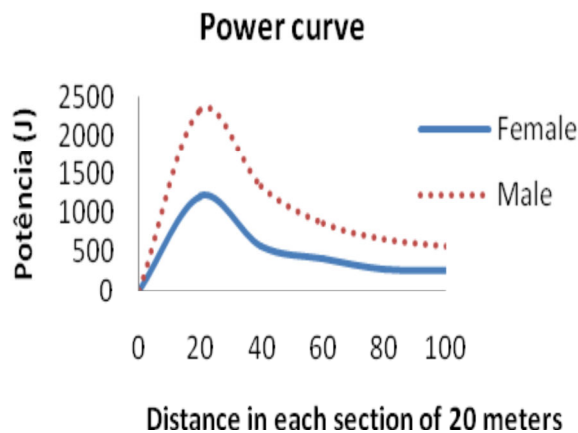


Fig. 3 - Power curve

As can be seen in Figure 1, in all cases, it appears that the rate decreases from 30 meters, then increasing to 40 and 50 m. After that, it decreases and to increase further, from 80 m to 100 m, which does not go according to the results found by Yamashita (2002). It found that in both groups, the average speed increased from the start of the race to a distance of 60 m and, after that, had a downward trend. This evidence is justified by the author when he says that, the speed at the end of the race, due to the exhaustion of the total energy should decrease despite the fact that our results do not show a single standard for the two study groups.

However, the highest speed in the two study groups was an accomplished distance of 20 m. In any case, our results did not corroborate the results obtained by Fernandes (1979) and

Mackala (2007), when they say in the sprints, the highest speed of an athlete of 100 m is between 40 and 70 m, depending on your fitness.

This difference is due to the fact that the horizontal component of the force that the athlete applies against the soil decreases very markedly as the time passes, making it insufficient to, even overcome the air resistance. Thus, we believe that the result is obviously a loss of speed.

But also corroborating Yamashita (2002), these results are due to the fact that each player has a different characteristic, that is, some athletes start with a lower acceleration and reach the maximum of its speed later than others. Some athletes, however, have an income drop at the end of the less intense competition.

The results obtained did not obviously show differences between the two study groups with respect to velocity curve ($Z = -2,888$, $p = 0.2331$).

By observing the graph of Figure 2, it is seen that the maximum acceleration achieved by the subject is achieved within the first 20 m of the race. In this stretch, the speed achieved is more expressive. The fact that the athletes reduce the acceleration immediately after this distance is probably related to the speed values obtained by athletes, from the distance of 80 m for both groups.

However, the acceleration upon starting was more pronounced in male athletes, so a statistically significant difference between the two groups ($Z = -3,361$, $p = 0.007$) was discovered.

Regarding the performance of athletes (Figure 3), the power point of view dissipated during the race, it was found out that, compared to the female group, the male group had a significantly higher performance. We believe that this difference is due to the fact that we consider the male group applied greater effort, both to raise the body from the starting position of the race, as well as to cross the air resistance.

Note that, if this power is zero at the start of the race, despite the great force that he is applying to accelerate his body since the initial velocity is zero. This power tends to increase as a result of speed-up and tends to decrease as a result of reduction of the acceleration. As observed in the results for acceleration and in the variable power, it has also been found statistically significant difference ($Z = 0.576$; $p = 0.034$).

From the results of the speed curve in the 100 meter dash, held by the subjects, it was found to possess an acceleration phase that is characterized by 20 m of proof. From this point, you begin to experience loss of speed, thus characterizing a slowdown, which progressively increases until the finish line. It was also found that our athletes have differences in velocity curve 100 m, pointing smaller capacity acceleration and lower velocity resistance in these individuals, who start to suffer loss of speed of effects early, even before reaching half of the test. Regarding the performance of the athletes, the power point of view dissipated during the race, it was found out that, compared to the female group, the male group had a significantly higher performance.

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