Pacing strategy in women’s 400 m hurdles accounting for temporal and spatial characteristics

SUMMARY

The women's 400 m hurdles race is a spectacular competition whose origins come from cross-country races. The transfer of cross-country runners' competition to the track was initiated in England. The first women's track and field competition on the hurdle distance took place in 1895 in Poughkeepsie, New York under the "Field Day" name. The first international track and field competition for women was considered to be organized in 1921, the so-called "Monte Carlo Games". In 1984, the women's 400 m hurdles became a permanent discipline of the Olympic Games program.

The 400 m hurdle run is considered one of the most difficult distances among track and field competitions. The difficulties attributed to covering this distance result from the complex character of the run, namely the combination of speed and endurance abilities as well as technical skills related to clearing the subsequent hurdles. The hurdles race consists of two key aspects: the sprint race between the hurdles and the technical elements related to the effective clearing the subsequent hurdles .

For the purposes of the analysis, the 400 m hurdle run is divided into many different variants, the most common of which are the division into the first and second half of the distance or consideration of successive 100-meter sections. For a more thorough analysis, the distance is divided into three components: runway - from the start to the first hurdle (45 m), run between the hurdles - 9 spaces between hurdles, 35 m each, and finish - the distance between the last hurdle and the finish line (40 m) . Covering the individual components of the distance can be described by time and space parameters. Both components form a strategy for covering the distance, namely taking the assumed number of steps at individual stages of the run, called in the coaching jargon "stride pattern" and the appropriate speed, which create the time of covering sections. Both of these components are the basic elements of comparison between competitors and their strategies to cover the distance.

Determining the spatio-temporal strategy of women's 400 m hurdles at the master level was the key objective of this paper.

The research material, which became the basis for studies related to the implementation of the undertaken topic, are the results obtained from the preliminary analysis

of 324 individual 400m hurdles, in which 151 female runners participated, during the most important championship level athletics competitions held in the years 1978 to 2022.

Statistical analysis was performed based on regression analyses, exploratory factor analysis and ANOVA analysis.

The results of these analysis do not indicate that the parameters of the anthropometric characteristics significantly affect the final result of the hurdle race. The large homogeneity of the group may be responsible for the lack of significant correlations with the results of the women's 400 m hurdles. These analyzes did not show that TI significantly correlated with the result of the women's 400 m hurdles run in relation to the finalists of the most important athletics competitions. The correlation analysis of running parameters significantly affecting the final result of the run showed the highest correlation with time parameters - both single (1 JP) and added (combining from two to several JP). The time of covering the section between the 6th and 10th hurdles seems to be one of the most important parameters determining the result of the women's 400 m hurdles race. The regression analysis indicates the section between the 5th and 6th hurdles (t5-6) as the most important part of the run. The difference in the running strategy, taking into account the different levels of advancement of the competitors, indicates changes in the number of steps taken, which is significantly lower in the group of the fastest competitors.

However, the choice of the optimal running strategy should be considered individually and adjusted to the athlete's physical conditions and her coordination abilities and endurance

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