Effects of pre-competition activation on outcome performance in swimming sprinters

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Abstract

Objective of the study is to identify the influence of warm-up intensity and duration predictors on the competitive results of sprint swimmers.

Methods and structure of the study. During the work, three warm-up options of similar content were analyzed: long (3000 m), short (1500 m) and high-intensity (1000 m). The swimming time for 100 m and the intermediate swimming time of the first 50 m segment were recorded. The duration and intensity of the warm-up varied.

Results and conclusions. It was found that in order to achieve high athletic results in sprint swimming, it is possible to use both long and short (up to 1500 m) warm-up in water – any of the options can be successful. A high-intensity warm-up and a short rest period before the start (10 min) have a decreasing effect on swimming results.

Keywords: *swimming, sprint swimmers, intensity, warm-up duration, different warm-up options, athletic performance.*

Introduction. The question of the optimal duration and volume of swimming during the warm-up of sprint swimmers in water remains open to date. The generally accepted time duration of the warm-up before the start is considered to be a time range from 20 to 45 minutes [7].

The content of the warm-up for swimmers includes preliminary exercises for flexibility and increasing joint mobility [2]. Exercises in water begin with an intensity of 20-40% of the maximum. Most of the warm-up should be performed with an intensity of 30 to 50% of the athlete's VO2max [4]. Warm-up exercises in water should include swimming in elements and in full coordination to warm up all muscle groups. The warm-up ends with starts and turns [5].

To date, there is no standard universal warm-up that could be recommended for swimmers of any specialization. Warm-up is selected individually for each athlete. Moreover, different types of competitive programs in swimming require special warm-up exercises [3]. There are no precise ideas about the content, volume and intensity of pre-start warm-up for sprint swimmers. There is also no consensus on the rest time between warm-up and start [1, 6].

Objective of the study was to identify the influence of predictors of warm-up intensity and duration on the competitive result of sprint swimmers.

Methods and structure of the study. The study involved 12 qualified sprint swimmers aged 22.5±1.5 years with over 10 years of swimming experience.

Three warm-up options with identical content were studied: long, with a total volume of 3000 m; short, with a total volume of 1500 m; high-intensity, with a total volume of 1000 m. After the warm-up, the swimmers competed in the 100 m freestyle. The swimming time for 100 m and the intermediate swimming time of the first 50 m segment were recorded. The duration and intensity of the pre-start warm-up of sprint swimmers were analyzed as predictors of athletic performance.

Statistical data processing was performed using repeated measures analysis of variance (ANOVA). The significance of differences was set at $p<0.05$.

Results and conclusions. After a long warm-up (LW), the average result of sprint swimmers in 100 m swimming was 60.15 sec (σ=6.88); after a short warm-up (SW) – 60.26 sec (σ=7.21), after an intensive warm-up (IW) – 61.83 sec (σ=6.87).

Evaluation of effects within the sample of subjects showed that there are significant differences between the results shown after different warm-up options. Pairwise comparisons revealed that the differences in the results shown after a long and short warm-up are not statistically significant. The results shown after a long and intense warm-up, as well as after a short and intense warm-up, are identified as statistically significant (Table 1).

The average swimming time of the first 50 m at a distance of 100 m after a long warm-up (LW) was 28.45 sec (σ=3.27), after a short warm-up (SW) – 28.64 sec (σ=3.35), after an intensive warm-up (IW) – 28.88 sec (σ=3.42).

Analysis of variance by the method of paired comparisons revealed statistical insignificance of differences in the results in sprint swimming after a long and short warm-up, as well as after a short and intensive warm-up. Significant differences were found between the results of swimmers shown after a long and intensive warm-up (Table 2).

It was found that there were no significant differences in the competitive results after a long and short warm-up of the same intensity (p=0.20).

The differences in the swimming time of the first 50 m were also not significant (p=0.32). It can be argued that low-intensity swimming initiates the processes of working in the body of sprint swimmers with the same efficiency, compared to a long warm-up. It follows from this that before sprint swims, a warm-up of more than 1500 m is inappropriate.

When comparing the effectiveness of a long and high-intensity warm-up, a high significance of differences was found (p=0.02). The differences were also significant when comparing the effects of a short and high-intensity warm-up (p=0.03).

The data obtained indicate that a high-intensity warm-up and a short rest period before the start (10 min) have a decreasing effect on swimming results. This is due to the fact that it takes a certain amount of time to remove lactic acid from the blood, during which it is better to perform low-intensity swimming or massage.

The most creative task is to find a balance between the intensity of the warm-up and the duration of the recovery period before the start. It can be argued that a high intensity warm-up was reflected in the decrease in results. The swimmers showed the best time for the first 50 m of the 100 m distance after a long, low-intensity warm-up. After a long warm-up, swimmers swam the first 50 m much faster, compared to the first 50 m after a high-intensity warm-up. The results in swimming the first 50 m after a short and long warm-up are approximately the same.

Considering that no significant differences were found between the results after a low-intensity and high-intensity warm-up, it can be emphasized that the last 50 m were covered significantly better after a short, low-intensity warm-up. The decrease in the swimming time of the last 50 m after a high-intensity warm-up is apparently caused by a significant increase in the level of lactic acid in the blood.

Table 1. Pairwise comparison matrix of 100 m swimming results

Warm-up option	MD			SE			p		
	P	K	I	P	K	I	P	K	I
P	x	-0,07	-0,64	x	0,101	0,207	x	0,55	0,02
K	-0,07	x	-0,59	0,101	x	0,187	0,55	x	0,03
I	-0,64	-0,59	x	0,207	0,187	x	0,02	0,03	x

Table 2. Matrix of paired comparisons of results in swimming the first 50 m

Warm-up option	MD			SE			p		
	P	K	I	P	K	I	P	K	I
P	x	-0,15	-0,26	x	0,094	0,081	x	0,47	0,04
K	-0,15	x	-0,09	0,094	x	0,087	0,47	x	0,02
I	-0,26	-0,09	x	0,081	0,087	x	0,04	0,02	x

Conclusions. To achieve high athletic results in sprint swimming, both long-term (3000 m) and short-term (up to 1500 m) warm-ups in water can be used with equal success. In the 100 m swim, with an insufficient recovery period after a high-intensity warm-up, a decrease in results is observed compared to low-intensity warm-up swimming. High-intensity swimming as a warm-up exercise before the start is advisable only for selecting a rational tempo of rowing movements, provided that the rest period before the competitive swim is at least 20 minutes.

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