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Biomechanical factors in 200 meters freestyle swimming and their relationships with anthropometric characteristics.

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Abstract

Aim:

The purpose of this study is to determine the relationships between velocity (V), stroke length (SL), and stroke rate (SR) in each 50 meters distance in 200-m freestyle competitive swimmers and assess their relationships with anthropometric characteristics. We believed this would enable us to specify whether these characteristics are discriminating factors in the performance of Top- level swimmers.

Methods:

The sample consisted of twenty one male inter universities swimmer with a mean age of $18/66 \pm 1/11$ years mean height $177 \pm 7/76$ cm, mean arm span $188 \pm 8/42$ cm, mean foot length $27/28 \pm 1/63$ cm, mean weight $70/04 \pm 1/02$ and mean body max index (BMI) $22/09 \pm 2/46$ kg/m², were studying at university levels who participated in the 200 meter swimming event at All India Inter-University level. All swimmers had a training background of $7/90 \pm 3/63$ years and over the last two years, they had been practicing for $9/52 \pm 2/82$ h/week.

Means and standard deviations were computed for all the measured variables. One factorial analysis of variance (ANOVA) is used to show significant difference in SR, SL, and V values (Dependent variables) to establish significant differences between each 50-m distance in male groups. Stepwise regression is used between V, SL, SR, and all the anthropometric variables. Each of the 21 subjects swam and recorded biomechanical factors with video camera (150 Hz) and stopwatch at each 50 meters distances.

FINDING:

Correlations show that there are significantly related between SR, SL and V in 200 meters freestyle swimmers ($F=12/81$ $p = 0/00$). The post hoc test (Tukey) show there are significant differences in SR & SL, SR & V and SL & V in 200 meters freestyle swimmers. The results of the stepwise regression technique shows that there are significant differences between velocity and anthropometric characteristics such as standing, height, weight, difference of arm span and height and BMI .

Conclusion:

The V of swimming is governed by SL and SR. Difference between height and arm span may explain the difference in stroke length. Difference between different technique, strength and anthropometric characteristics can be explained by advantage in start owing to their great muscular power. There is significant difference between SR, SL and V among swimmers. SR and SL is thus the main contributor to the higher velocity of the swimmer. Since the magnitude of SL is related to the propulsive forces that a swimmer exerts while stroking.

Key words: stroke rate, velocity, stroke length, anthropometric characteristics