

A new direction in solving the problem of speed-strength and technique in dolphin style swimmers

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Abstract. *The purpose of the article is to give an accurate assessment of speed-strength and technique in dolphin style swimmers.*

Materials and methods: *When searching for more advanced technical options that correspond to the age and physical fitness of an athlete, it is necessary to apply methods that would give a clear picture of the current trends and create an image of the future sports movement of the swimmer. The research is based on a methodology of forced external dynamic resistance. The results were obtained with the help of a unique device designed and manufactured by the department of physical education and sports and department of instrument engineering of the South Ural State University. The technique of forced external dynamic resistance was used. Simultaneously with the speed-strength data, underwater video was recorded in the frontal and sagittal planes. Computer processing of the material was used. Results: the work proves the effectiveness of the technique of forced external dynamic resistance.*

Conclusion. *The use of electronic dynamometry and a pressure recorder allow conducting research in the field of special physical and technical fitness of swimmers and providing their objective assessment.*

Keywords - *sports equipment, electronic dynamometry, power impulse, video recording, swimmers*

I. INTRODUCTION

Hand stroke technique in dolphin style swimming is most difficult because it encompasses a complex system of interactions between body parts working in various kinematic and dynamic modes that are unnatural for human [1, 2]. Therefore, swimming results are determined by the close interconnection of such morphological and functional indicators as shoulder and chest circumference, mobility of the shoulder and ankle joints, flexibility of the spine and strength abilities [3].

It becomes obvious that dolphin-style swimmers should be selected with respect to these requirements, especially in speed-strength training, since a hand stroke with both hands requires five times more effort than a one-handed stroke in crawl swimming [4].

Therefore, an accurate assessment of the speed-strength and technique in dolphin style swimmers can be considered as relevant [5, 6].

II. MATERIALS AND METHODS

The study was carried out on the premises of the youth sports school "UNIKA" of the South Ural State University. For analysis, we used the data obtained from a 16-year-old athlete "P" (1st sports category).

To determine the speed-strength and technique of a dolphin swimmer, the method of forced external dynamic resistance was used.

The athlete performed swimming movements with one leg - 10 s., with one hand - 10 s., in full coordination - 30 s. The following indicators were evaluated: power, speed-strength endurance, coordination coefficient.

Simultaneously with speed-strength data, underwater video was recorded in the frontal and sagittal planes. Computer processing of the material was used.

The results of dynamometry are presented in (Fig. 1, Table 1).

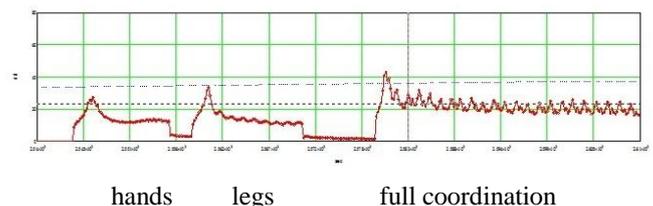


Fig. 1 Speed-strength characteristics of the athlete

TABLE I. QUANTITATIVE DATA OF SPEED-STRENGTH AND TECHNICAL CHARACTERISTICS

F max (kg)				F mean (kg)				Fendurance(kg)
legs	hands	coordination	coefficient %	legs	hands	coordination	coefficient %	
27	33	43	-28	15	16	23	-26	53.5

III. RESULTS AND DISCUSSION

In dolphin style swimmers, the shoulder girdle determines hand stroke movements. Swimmer “P” (Table 1) shows a slight difference in strength indicators when working with arms and legs (F max. 6 kg, F mean 1 kg.).

The athlete is well versed in dolphin style leg movements and actively includes the muscles of the back and abdomen, as well as the muscles of the hip, ankle, and foot.

The following situation is considered. Firstly, strength indicators are assessed as low, and compared to the movements of legs as very low. Secondly, large intra-cycle power oscillations (up to 10 kg.) are traced. Typically, such oscillations are associated with the features of the dolphin style technique, since the swimmer is in an unsupported position while the hands are carried above the water and the athlete’s body moves by inertia. But the idea is that the speed of advancement of the body in this phase, and hence the tension of the dynamometer cord, depends on the effectiveness of the previous hand stroke, and the more powerful the stroke was, the less losses in the speed of advancement. Underwater video records will help to deal with this situation. Time-laps processing of hand stroke movements revealed serious errors. Namely, at the end of the pull-up phase and at the beginning of the push-off phase, the hands are at a great distance from each other, going the entire way of the stroke, as if away from the body with excessively bent arms in the elbow joints. Traditionally, the stroke trajectory has the shape of a “keyhole”, that is, in the “pull-up” phase, the arms should tend to come closer, and the hands should converge under the longitudinal axis of the swimmer’s body at a distance of 10-15 cm, thereby lengthening the stroke path. It is the “pull-up” phase that is conventionally called the “accelerating” phase and creates the conditions for a force impulse ($F \times V / T$) in the final part of the stroke.

An indirect confirmation of the poor technical readiness of the swimmer is his low strength values when performing swimming movements in full coordination (Fmax. 43 kg., F mean 23 kg.) This results in a negative coordination coefficient (Fmax. - 28 kg., F mean - 23 kg.). The athlete is poorly skilled in coordinating the movements of arms and legs. More attention should be paid to his low speed-strength endurance (53.5%).

IV. CONCLUSION

The use of electronic dynamometry and a pressure recorder allow conducting research in the field of special physical and technical fitness of swimmers and providing their objective assessment.

By tracking the individual characteristics of the swimmer’s speed-strength and technique and introducing such an express control into the training process, trainers will have a possibility to make timely adjustments to the training program by targeting the main muscle groups. This is especially relevant for dolphin style swimmers.

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