

## STRESZCZENIE W JĘZYKU ANGIELSKIM

### **The application of isokinetic measurement of the glenohumeral joint in optimization of trainings for competitive swimmers**

**Introduction:** Sport swimming is considered as a discipline in which the final result depends significantly on the level of strength capabilities. The significance of quantitative measurement of strength in the process of training, control, diagnosis, treatment, rehabilitation and prognosis is emphasised.

**Aims:** The cognitive objective of the research was to determine relations between shoulder muscle strength and athletic performance of female and male high-level competitive swimmers, and to discover the most representative strength parameters for achieving the best results in competitive swimming. The application objective was to introduce a specific annual training intervention in terms of strength training sufficient to enhance strength parameters of shoulder muscles and to determine the effectiveness of the change of these parameters in an annual cycle on the sports achievements of female and male high-level competitive swimmers.

**Material:** The selection of the researched group was intentional. The research group included 12 female swimmers ( $16,58 \pm 1,93$  years;  $171,25 \pm 2,56$  cm;  $61,25 \pm 4,86$  kg) and 27 male swimmers ( $17,34 \pm 2,51$  years;  $183,48 \pm 5,56$  cm;  $73,41 \pm 8,46$  kg) of the Municipal Swimming Club [Miejski Klub Pływacki] in Szczecin. The athletes represented sports classes from international master class (MM) to 2nd class of 16-year olds (II 16).

**Methods:** The research included: literature search, demographic data collection (by analysis of trainers' documents and interview technique), analysis of swimming results (base of European Swimming Federation LEN), anthropometric and isokinetic measurements. In addition, the analysis of generated graphs, the effectiveness of applied training intervention and statistical analysis was carried out. To determine strength parameters, the isokinetic measurement of the glenohumeral joint was applied, during the flexion and extension movement, using the Biodex System 4 dynamometer. To verify the effectiveness of a specific annual training intervention in terms of strength training, the aforementioned measurements were conducted twice, in January 2014 and 2015.

**Results:** Only selected strength parameters of shoulder muscles obtained during the isokinetic measurement had an influence on athletic performance of female and male swimmers. At the same time they presented a high diagnostic value. A specific annual training intervention in terms of strength training was sufficient to induce partial improvement in strength parameters of shoulder muscles in male swimmers. The changes of some strength parameters of shoulder muscles in an annual cycle positively affected sports achievements only in the case of female high-level competitive swimmers.

**Conclusion:** The level of strength capabilities of shoulder muscles of female and male high-level competitive swimmers partially influences their final athlete performance, so these strength parameters should be developed, which improve swimming results the most. It is worth using the method of isokinetic shoulder measurement to regularly and periodically monitor female and male high-level competitive swimmers and lead long-term personalized programmes to improve particular parameters of shoulder muscle strength, thus their sports achievements.

**Keywords:** strength capabilities, isokinetic measurement, shoulder joint, sports training, sport swimming

Aleksander Wlozka

A handwritten signature consisting of several overlapping, sweeping strokes, likely representing the author's name.