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ORAL PRESENTATION – O38

BIOIMPEDANCE-DERIVED PHASE ANGLE AS AN ADDITIONAL PREDICTOR OF TREADMILL SPIROERGOMETRIC PERFORMANCE IN YOUNG ELITE ATHLETES

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Background: Understanding the relationship between athletes' structural characteristics and functional performance requires assessment of both body composition and internal physiological status. Bioimpedance analysis provides parameters related to tissue bioelectrical properties, including phase angle. Evidence on the relevance of phase angle in spiroergometric assessments of young elite athletes remains limited.

Objective: This ongoing study examines whether bioimpedance-derived phase angle provides additional explanatory value for time to exhaustion and allometrically scaled VO_2 peak beyond age, body height, and DEXA-derived skeletal muscle proportion.

Subjects and methods: Preliminary analyses included 94 female and 130 male elite handball players aged 13–25 years. Female recruitment is ongoing, while male data collection is complete. Participants completed a stepwise incremental treadmill protocol to maximal voluntary exhaustion. VO_2 peak was calculated from a 30-second moving average of breath-by-breath data and allometrically scaled to body mass. Bioimpedance was assessed using an InBody 770 device. Phase angle was the main explanatory bioimpedance variable; device-generated resistance and reactance Z-scores were retained for potential vector-based bioimpedance interpretation. Skeletal muscle proportion was assessed by DXA. Sex-stratified multiple regression models examined the explanatory value of skeletal muscle proportion and phase angle beyond age and body height.

Results: Preliminary sex-stratified regression analyses suggested that DEXA-derived skeletal muscle proportion accounted for additional variance in time to exhaustion and allometrically scaled VO_2 peak compared with models containing age and body height only. Phase angle showed a small but significant additional contribution, mainly for time to exhaustion. The overall pattern was similar in both sexes, despite limited explanatory value of the age- and height-only models in males.

Conclusions: Bioimpedance-derived phase angle may provide complementary information for interpreting treadmill spiroergometric performance in young elite athletes, especially time to exhaustion.

Keywords: Bioimpedance-derived phase angle; Spiroergometry; DEXA; Sport diagnostics; Youth handball.