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ABSTRACT SUBMISSION FORM

14th International Congress of the World Confederation for Physical Therapy

WATER FLOW EFFECTS ON CARDIOVASCULAR AND RESPIRATORY RESPONSES TO IMMERSION.

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PURPOSE: During water immersion (WI) differential regulatory mechanisms adapt human cardiovascular and respiratory (CVR) systems to variable environmental conditions. The aim of this study was to elucidate the combined effects of WI and different water flow conditions in females visiting a swimming pool used for recreation and therapy. RELEVANCE: Even though WI has been largely introduced and recommended for both rehabilitation and recreation, the mechanisms and effects of WI on CVR are still widely unknown. This study provides relevant information about the consequences of different water flow conditions to healthy human CVR function during WI to the neck. SUBJECTS: Twelve females volunteered to serve as subjects. Their age, height and weight were (mean ± SD) 27.3 ± 4.7 years, 164.9 ± 5.0 cm and 60.7 ± 6.4 kg, respectively. They all were healthy and habitually active. METHODS: The subjects were instructed to adopt a sequence of five sitting conditions for 10 min each: sitting on a chair in dry land (D1), and immersed to the neck in still water (SW), whirl water (WW), jet water (JW) and sitting on dry land (D2). Room and water temperatures were 26°C and 32°C. CVR function and gas exchange parameters were continuously measured breath-by-breath (BxB) by a telemetric portable gas analyser (K4 b^2, Cosmed, Italy). An integrated telemetric monitor (Polar Vantage, Finland) was used for the measurement of heart rate (HR) simultaneously. Systolic and diastolic blood pressure (BP) was measured at start, middle and at the end of each 10-min period. Questionnaires were used to record special sensations during the experiments. ANALYSES: The differences between conditions were studied by regression analysis and one-way ANOVA for repeated measures. RESULTS AND DISCUSSION: WI significantly decreased HR (13.4%) and increased oxygen pulse (13.6%) showing an effect of redistribution of blood flow towards central circulation (cephalad shift). HR remained low during D2 after the WI suggesting some parasympathetic effects. WI increased diastolic BP significantly between D1 and JW (3.5%) demonstrating some influence of hydrostatic pressure on vascular bed. Movement of water especially during WW increased pulmonary ventilation (11.1%), respiratory frequency (6.1%), tidal volume (9.4%), oxygen consumption (8.9%) and energy expenditure (9.5%) demonstrating increased physical strain on the CVR. CONCLUSIONS: We conclude that differential regulatory mechanisms adapt human CVR systems to WI under the influence of hydrostatic pressure and movement of water in near to thermo-neutral WI conditions.

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