

The Effect of Repeated Short-Duration Hot and Cold-Water Immersions on Glucose Tolerance and Insulin Response: A Pilot Study

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Purpose: The prevalence of diabetes is increasing annually. Consequently, preventive measures, including thermal stimuli, are gaining significant attention. However, no research has addressed the combined use of cold and hot stimuli as a strategy for metabolic health promotion. Thus, the main aim of this study was to determine if interventions consisting of a brief whole-body immersion in hot water (HWI) and cold water (CWI) on alternating days over a 16-day period can improve glucose tolerance and insulin sensitivity.

Methods: Male ($n = 4$) and female ($n = 3$) non-obese subjects completed sixteen 5-minute daily sessions, consisting of eight whole-body hot immersions in 45°C water and eight whole-body cold immersions in 14°C water, in an alternating order on separate days.

Glucose and insulin release in response to a 2-hour standard (75 g oral glucose load) were assessed before, 48 hours after, and two weeks after the end of the cold and hot interventions. The areas under the curves of glucose and insulin were calculated using the trapezoidal rule during a standardised 2 h oral glucose load test. Additionally, insulin sensitivity was assessed using the Matsuda index.

Results: After repeated short-duration HWI and CWI, the glucose area under the curve (AUC) significantly decreased ($p < 0.05$) and remained lower after two weeks ($p < 0.05$). Meanwhile, no effect on insulin AUC or insulin sensitivity, as indicated by the maintained Matsuda index, was observed.

Conclusion: Repeated short-duration alternating hot and cold-water immersions improved glucose tolerance through insulin-independent mechanisms. These findings suggest that this intervention may serve as a viable alternative for metabolic health promotion in individuals unable to engage in physical activity programmes.

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