Effects of Warm-up on Sprint Swimming Performance: A Systematic Review and Meta-Analysis

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Abstract

Warm-up precedes physical exertion and has been shown to have positive and negative effects on performance. Positive effects include elevating body temperature and increasing VO_2. Negative effects include fatigue and decreased performance. The most effective warm-up format is still unknown, particularly in competitive swimming. The purpose of this systematic review and meta-analysis was to determine the most beneficial warm-up for maximal performance in sprint swimming events. A structured search was carried out following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines in the PubMed, SportDiscus, and Google Scholar databases until March 2021. Studies with a double-blind and randomized design in which different types of warm-up were compared to each other or an identical placebo condition (no warm-up) were considered. 14 published studies were included. The effects of warm-up on sprint swimming performance, rating of perceived exertion (RPE) and blood lactate concentration (La^-) were investigated. A meta-analysis was performed using effect sizes. According to half the studies, swimmers performed significantly better after a regular warm-up; however, the effect of warm-up on performance was small. Warm-up had a medium to large effect on RPE and a small to medium effect on La^-. The findings of this meta-analysis suggest that warm-up does influence performance, though the magnitude is small. Future studies are needed in larger populations to clarify whether warm up improves swim performance, to what extent, and the potential role of variables related to participant characteristics and swimming competitions.