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Original Research

Comparisons of Cubed Ice, Crushed Ice, and Wetted Ice on Intramuscular and Surface Temperature Changes

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Abstract

Context: Many researchers have investigated the effectiveness of different types of cold application, including cold whirlpools, ice packs, and chemical packs. However, few have investigated the effectiveness of different types of ice used in ice packs, even though ice is one of the most common forms of cold application.

Objective: To evaluate and compare the cooling effectiveness of ice packs made with cubed, crushed, and wetted ice on intramuscular and skin surface temperatures.

Design: Repeated-measures counterbalanced design.

Setting: Human performance research laboratory.

Patients or Other Participants: Twelve healthy participants (6 men, 6 women) with no history of musculoskeletal disease and no known preexisting inflammatory conditions or recent orthopaedic injuries to the lower extremities.

Intervention(s): Ice packs made with cubed, crushed, or wetted ice were applied to a standardized area on the posterior aspect of the right gastrocnemius for 20 minutes. Each participant was given separate ice pack treatments, with at least 4 days between treatment sessions.

Main Outcome Measure(s): Cutaneous and intramuscular (2 cm plus one-half skinfold measurement) temperatures of the right gastrocnemius were measured every 30 seconds during a 20-minute baseline period, a 20-minute treatment period, and a 120-minute recovery period.

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Results: Differences were observed among all treatments. Compared with the crushed-ice treatment, the cubed-ice and wetted-ice treatments produced lower surface and intramuscular temperatures. Wetted ice produced the greatest overall temperature change during treatment and recovery, and crushed ice produced the smallest change.

Conclusions: As administered in our protocol, wetted ice was superior to cubed or crushed ice at reducing surface temperatures, whereas both cubed ice and wetted ice were superior to crushed ice at reducing intramuscular temperatures.

Keywords: [ice pack](#), [cryotherapy](#), [gastrocnemius muscle](#)

Joseph H. Dykstra, MA, ATC; Holly M. Hill, MA, LAT, ATC; Michael G. Miller, EdD, ATC; Christopher C. Cheatham, PhD; and Timothy J. Michael, PhD, contributed to conception and design; acquisition and analysis and interpretation of the data; and drafting, critical revision, and final approval of the article. Robert J. Baker, MD, PhD, ATC, contributed to conception and design; analysis and interpretation of the data; and drafting, critical revision, and final approval of the article.

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