

# Response to Application of Ice May Help Differentiate Between Gouty Arthritis and Other Inflammatory Arthritides

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**Aim:** The aim is to determine whether response to topical ice versus heat differentiates between patients with gout versus other arthritides.

**Methods:** The first 150 patients seen in our clinic with joint pain from February 2004 onward were asked to fill out questionnaires regarding their response to heat and ice. Patients who responded that topical ice eased their pain and who did not have a diagnosis of crystal-induced arthritis were asked to have a joint aspiration if they had active synovitis on presentation to the clinic.

**Results:** Of 150 completed questionnaires, 26 patients never tried heat or cold as adjuvant treatment for their arthritis. The remaining 124 patients were divided into 6 groups: patients with crystal-proven gout (n = 20), rheumatoid arthritis (RA; n = 32), osteoarthritis (OA; n = 32), other forms of inflammatory arthritis (n = 18), and soft tissue conditions (n = 22). None of the patients with gout benefited from topical heating of their affected joints and all preferred topical ice ( $P < 0.001$ ). Most patients with RA preferred heat (n = 24). Of 4 patients with RA who preferred topical ice, 3 had effusions and arthrocentesis was performed. Intracellular monosodium urate (MSU) crystals were seen in 2 and intracellular calcium pyrophosphate dihydrate (CPPD) crystals were seen in one patient raising questions about coexistence of 2 diseases or previous misdiagnoses. Most patients with OA preferred heat (n = 28). A significantly higher percentage of the patients with gouty arthritis found that topical ice helped relieve their joint pain as compared with patients with RA ( $P = 8 \times 10^{-11}$ ) and other inflammatory arthritides ( $P = 3 \times 10^{-8}$ ).

**Discussion:** Heat and cold are adjuvant treatments for arthritis. In gouty arthritis, cold applications are a useful adjunct to treatment and may help discriminate patients with gout from other forms of inflammatory arthritis.

**Key Words:** ice, gout

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Cooling can have a marked effect on joints. Cooling of the knee for more than 10 minutes reduces the intraarticular temperature by 2° to 3°C for several hours.<sup>1</sup> Oosterveld et al<sup>2</sup> found that intra-articular temperatures of the knee dropped from a mean of 31.9°C to 22.5°C within 30 minutes of ice chip application in healthy subjects. Cooling decreases hyperemia and has also been reported to decrease experimental crystal induced inflammation.<sup>3</sup>

We previously studied the effect of cold therapy on acutely inflamed gouty joints in humans.<sup>4</sup> The patients, most of whom had previous gouty attacks, described symptomatic improvement with ice treatment as compared with previous attacks. Complete resolution at 1 week was seen only in those treated with ice. The response to topical ice was dramatic with significant reduction in pain compared with a control group.

A question that remained unanswered after our previous study was whether response to topical ice or heat can differentiate between patients with gout and other arthritides, predominantly rheumatoid arthritis.

## METHODS

The first 150 patients seen in our clinic with joint pain from February 2004 on were asked to fill out questionnaires regarding their response to heat and ice. Patients who responded that topical ice eased their pain and did not have a diagnosis of crystal-induced arthritis were asked to have a joint aspiration if they had active synovitis on presentation to the clinic.

## Statistical Analysis

Fisher exact test was used to compare the results between groups.  $P$  values of less than 0.05 were considered to indicate statistical significance.

## RESULTS

Of 150 patients who completed questionnaires, 26 patients had never tried heat or cold as adjuvant treatment of their arthritis. The rest of the patients were divided to 6 groups: patients with crystal proven gout (n = 20), rheumatoid arthritis (RA) meeting American College of Rheumatology definition of RA (n = 32), osteoarthritis (OA; n = 32), other inflammatory arthritis (n = 18). In 22 patients, the pain was found to result from soft tissue conditions rather than from joint disease and they were excluded from the study analysis.

The most common ice preparations were frozen gel packs ( $n = 23$ ) and ice chips ( $n = 16$ ). The ice packs were used for a mean of 19 minutes (range, 5–60 minutes). Heat was used for a mean of 22 minutes (range, 7–60 minutes).

Patients with gout had the diagnosis for a mean of 5 years (1 week to 20 years). All patients with gout ( $n = 20$ ) preferred topical ice to heat. This was significantly different compared with patients with RA ( $P < 0.001$ ). Patients with gout used topical ice for a mean of 22 minutes (range, 5–60 minutes). The most common ice preparations were frozen gel packs ( $n = 10$ ), ice packs ( $n = 9$ ), and endothermic chemical reaction packs ( $n = 1$ ).

Patients with RA had the diagnosis for a mean of 7 years (range, 5 months to 35 years). Most patients with RA preferred heat ( $n = 24$ ). Four patients believed to have RA preferred topical ice. Three of the 4 had synovitis of the knee when seen in the clinic. Synovial fluid was inflammatory in all 3. Intracellular MSU crystals were seen in 2 and intracellular CPPD crystals were seen in one patient.

Patients with OA had the diagnosis for a mean of 9 years (range, 2 months to 35 years). The majority of the patients with OA preferred heat ( $n = 28$ ). Heat was used for a mean of 16 minutes (range, 5–40 minutes). Only 4 patients did not like heat and preferred ice. All 4 of these patients had lumbosacral spinal OA.

Patients with other inflammatory arthritides had psoriatic arthritis ( $n = 3$ ), Crohn peripheral arthritis ( $n = 4$ ), polymyalgia rheumatica ( $n = 2$ ), monoarthritis posttrauma ( $n = 3$ ), paraneoplastic ( $n = 1$ ), and spondyloarthropathy ( $n = 5$ ). All patients with inflammatory arthritis of the peripheral joints ( $n = 10$ ) preferred topical heat to topical ice.

Patients with monoarthritis resulting from trauma preferred topical ice to heat ( $n = 3$ ). The patient with a paraneoplastic syndrome of palmar fasciitis and peripheral arthritis did not find either topical heat or ice to be beneficial. Patients with a spondyloarthropathy ( $n = 5$ ) as well as patients with lumbosacral spinal OA ( $n = 4$ ) used treatment with topical ice as well as topical heat to relieve their back pain.

A much higher percentage of patients with gouty arthritis found topical ice to help relieve their joint pain as compared with patients with RA ( $P = 8 \times 10^{-11}$ , Fisher exact test) and other inflammatory arthritides ( $P = 3 \times 10^{-8}$ , Fisher exact test). These statistical differences were highly significant.

## DISCUSSION

Controversy exists whether deep heating agents that increase intraarticular temperature are beneficial<sup>5</sup> or detrimental. Weinberger et al showed that heating the joint with a hot pack significantly increases the articular temperature. Because elevation of joint temperature is liable to enhance the inflammatory process, the use of superficial heating has to be carefully reconsidered in acute and chronic inflammatory joint diseases.<sup>6</sup>

Cooling the joint, on the other hand, is known to have an anesthetic effect.<sup>7</sup> In animals, synovitis induced by intra-articular injection of zymosan in rabbits<sup>8</sup> and MSU injected into dog knees<sup>3</sup> were less inflamed when they were treated with ice. They were found to have less cellular infiltration and

less synovial cell hyperplasia in the joints treated with ice compared with controls. Thus, synovitis and inflammation were suppressed by lowering intraarticular temperature in animal models of gouty arthritis. We<sup>4</sup> studied the effect of cold therapy on acutely inflamed gouty joints in humans. When compared with the control group, the group treated with ice had a significant reduction in pain and tended to have less severe attacks than the control group.

In the present study, reported responses to treatment with topical ice discriminated between gout and other forms of inflammatory arthritis. The patients with gouty arthritis found topical ice helped relieve their joint pain as compared with patients with RA ( $P = 8 \times 10^{-11}$ ) and other inflammatory arthritides ( $P = 3 \times 10^{-8}$ ). This was highly significant.

McMaster et al<sup>7</sup> used adult canine thighs to evaluate the effectiveness of various cooling devices to lower deep muscle temperatures and found that ice packs and frozen gel packs were the most effective modalities. These were the 2 modalities preferred by the patients with gouty arthritis in this study.

Three patients diagnosed with RA who preferred topical ice were found to have crystal-induced arthropathy. They may have had both diagnoses or had been previously misdiagnosed as having RA. Patients with OA, RA, and other inflammatory arthritides preferred heat. When a patient with RA claims to have relief from topical ice, an alternative diagnosis of crystal-induced arthropathy should be suspected. Arthrocentesis and a careful search for crystals may be indicated in such patients.

In addition to cold applications being a useful adjuvant to treatment of acute gouty arthritis,<sup>4</sup> it is proposed as a noninvasive way to aid in the diagnosis of this form of arthritis. Application of topical ice to inflamed joints is a noninvasive way to help discriminate patients with gout from other forms of inflammatory arthritis. Patients with inflammatory arthritis should be questioned routinely about their response to local application of heat and ice.

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