



## Arthritis News

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### **BAROMETRIC CHANGE AND COOLER TEMPERATURES DO AFFECT JOINT PAIN**

SAN ANTONIO, TEXAS—By comparing two sets of independently collected data, experts finally have been able to substantiate that changes in barometric pressure and temperature really do cause aches and pains for arthritis sufferers, according to research presented this week at the American College of Rheumatology Annual Scientific Meeting in San Antonio, Texas.

To date, studies of weather influences on rheumatic symptoms have generated widely inconsistent results. However, by merging data collected from an Online Glucosamine Trial (a large scale study of an over-the-counter arthritis treatment) with National Oceanic and Atmospheric Administration data, researchers were able to utilize the two unbiased information banks to compare the influence of changes in barometric pressure and surrounding air temperature on patients with knee arthritis.

The Online Glucosamine Trial, conducted across 41 U.S. states between 2000 and 2002, tracked 205 arthritis patients, average age 60.2 years, in three-month online randomized controlled trials. Only after completion of the two-year OGT study did researchers begin to consider weather as an issue. To determine if the weather really does affect joint pain, researchers first identified the nearest weather station by zip code for each of the OGT participants. They then merged daily weather parameters from the National Oceanic and Atmospheric Administration on temperature, barometric pressure, precipitation and dew point specific to each participant's location for the three months participants logged. Average values were computed over one, three and seven days prior to each participant's report of pain as well as change in each measure in the 24 hours prior to pain reports. The results showed changes in barometric pressure have a very strong association with increases in knee pain. Cooler temperatures were also consistently, albeit weakly associated with increased pain. No significant associations were found with dew point or precipitation.

"People have such strong convictions about influences of the weather on arthritis that studies of this question can suffer from biases on either side," said Timothy E. McAlindon, MD, Tufts–New England Medical Center, Boston, Massachusetts, and the lead investigator in the study. "By merging two datasets that were obtained completely independently on each subject, we were able to conduct a robust study that really does suggest an association of weather with aches and pains."

The American College of Rheumatology is the professional organization for rheumatologists and health professionals who share a dedication to healing, preventing disability and curing arthritis and related rheumatic and musculoskeletal diseases. For more information on the ACR's annual meeting, see [www.rheumatology.org/annual](http://www.rheumatology.org/annual).

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*Editor's Notes: Dr. McAlindon will present this research during a scientific session at the ACR Annual Scientific Meeting from 4:30–4:45 PM CT (5:30–5:45 PM ET) on Monday, October 18, in Room 214 A–B of the Henry B. González Convention Center. He will be available for media questions during a briefing at 8:30 AM CT (9:30 AM ET) on Monday, October 18, in the on-site Press Conference Room, Room 218.*

## **Barometric Pressure and Ambient Temperature Influence Osteoarthritis (OA) Pain. Results of A National Web-Based Prospective Study**

Timothy E. McAlindon, Margaret K. Formica, Jeremiah Fletcher, Chris Schmid. Tufts–New England Medical Center, Boston, MA

**PURPOSE:** Most people with arthritis believe that weather influences their rheumatic symptoms. However, studies of this have been flawed by methodologic problems such as lack of blinding and limited exposure variability, and have generated widely inconsistent results.

**METHODS:** Data from the Online Glucosamine Trial (OGT) provide an opportunity to evaluate in a robust fashion the influence of independently-ascertained meteorologic parameters on fluctuation in pain severity reports among geographically dispersed individuals with knee OA. This 3-month online RCT was performed between March 2000–May 2003 among 205 participants distributed in 41 States across the U.S.(1). It included 2-weekly WOMAC pain questionnaire assessments and found no treatment effect.

We located the most proximate weather station to each individual participant by ZIP code. We then obtained data from the NOAA registry for each day of the 3-month participation on ambient temperature (min, max, mean); barometric pressure (daily average); precipitation; and dewpoint (daily average). For each of these we computed the average values over 1,3 and 7 day periods before each pain report as well as change in each measure in the prior 24-hours. We used mixed random/fixed effects regression models with a first-order autoregressive error structure to adjust for internal correlations and confounders. We adjusted for regression to the mean using a time-decaying covariate function.

**RESULTS:** Participants had mean age 60.2 yrs (range 44–96), 64% were women, 90% Caucasian, 35% retired, mean BMI 32.57 kg/m<sup>2</sup> (s.d. 8.46), mean baseline WOMAC pain score 9.0, s.d. 17.0, and were represented by 141 weather stations. Over the course of the trial, the average within subject range for the weather variables were 40.2 deg F (s.d. 17.0) for average daily temperature, 42.7 (s.d. 14.5) for maximum daily temperature, 39.0 (s.d. 14.8) for minimum daily temperature, 1.4 in (s.d. 1.0) for precipitation, 0.7 in Hg (s.d. 0.3) for barometric pressure, and 40.5 deg F (s.d. 13.9) for average daily dewpoint. Pain severity was associated with BMI ( $\beta=0.09$ ,  $p=0.001$ ), opiate-use ( $n=7$ ;  $\beta=3.9$ ,  $p=0.001$ ) but not treatment assignment ( $\beta=0.3$ ,  $p=0.5$ ). There was a weak but consistent inverse association of temperature with pain (e.g. average max. temp over prior 7 days  $\beta=-0.015$ /deg F,  $p=0.05$ ) and positive association with change in barometric pressure ( $\beta=0.87$ /in Hg,  $p=0.05$ ). In the multiply adjusted models the over-riding effect was a strong positive association with increase in barometric pressure ( $\beta=1.50$ ,  $p=0.005$ ). We found no significant associations with dewpoint or precipitation.

**CONCLUSIONS:** Concordant with patients' assertions, these preliminary results from prospectively and independently-collected data suggest that change in barometric pressure, and cooler ambient temperature, are indeed associated with increases in arthritis pain.

(1) McAlindon BMJ 2003

**Disclosure:** T.E. McAlindon, None; M.K. Formica, None; J. Fletcher, None; C. Schmid, None.