Research Letter from: … Norway

Joint Pain and Bad Weather

By our corresponding author, Stein Austad

Here, in Norway, we are proud of our rugged coastline with its sweeping fjords providing shelter from the mighty North Sea. However, with a cold damp climate, many of our older citizens often grumble about how the humidity affects their aches and pains. But is there really a link between painful joints and bad weather?

Our scientists have decided to look more closely at the truth behind this common observation. In his report, “Does the Weather Really Matter? A Cohort Study of Influences of Weather and Solar Conditions on Daily Variations of Joint Pain in Patients With Rheumatoid Arthritis” (Arthritis & Rheumatism, vol. 61: 1243-47), Dr Geir Smedslund has performed a statistical matching of changes in relative pain perception with variations in multiple weather variables over several months.

Smedslund, from the Diakonhjemmet Hospital in Oslo, cites previous affirmations for a painful weather association “since the time of Hippocrates” (i.e. around 400 B.C.), also noting that in Chinese, rheumatism is called the “wind wet disease”. He claims that it should be possible, with a statistically well-designed experiment, to find such a correlation. But is Smedslund’s study sufficiently “well-designed”?

He compared data on 36 Oslo patients with rheumatoid arthritis, the chronic inflammatory disorder that principally attacks the joints between bones with painful consequences. For 84 successive days, the patients (average age 50.4, 69% women, with a mean disease duration of 15 years) were asked to assess and record their joint pain on a “100-mm visual analog scale” every morning after waking. Smedslund stresses that these patients were not aware that he was looking at the relationship between their pain reports and variations in the weather.

Data holes no problem? Come again!

He then matched each day’s relative pain levels to the corresponding same-day weather variables collected from the Norwegian Meteorological Institute situated in the middle of Oslo at “59° 46’ N and 10° 43’ E at 94 meters above sea level”. This gave Smedslund a total of 53 weather variables to compare but he only looked at 13 continuous variables about mean daily values, while significant associations with 3 or more weather variables were found for 6 patients (17%).

Sure enough, Smedslund found a correlation. “For 16 patients (44%), pain was significantly associated with one or 2 variables, while significant associations with 3 or more weather variables were found for 6 patients (17%).” Three of the weather variables – amount of precipitation, solar radio flux, and UV dose – had significant associations for five or more patients.

Overall, “between 12% and 61% of the pain variation could be explained by one of the meteorological and solar factors”. Nevertheless, Smedslund notes that everyone reacts slightly differently; “patients differed in the variables they responded to and in which direction”. However, “12 of the 13 variables showed significant effects in at least one patient”. Only atmospheric pressure did not seem to have any effect on pain at all.

In his discussion, Smedslund claims that his experimental design is superior to previous studies, “Many researchers have used simple correlation analyses and not a time-series approach,” but then he admits to two striking weaknesses in his own study. Firstly, he doesn’t know whether the patients actually stayed in Oslo during the study; “some of the patients may have travelled to the south of Europe to receive climate therapy during the study period”. Doesn’t this pose a problem if all his weather data is for Central Oslo while, in fact, an unknown proportion of his patients may have been suffering in Spain or Italy?

His second admission is that “patients might have taken pain medication on painful days, and this was not recorded during the study”. However, Smedslund claims that this isn’t really a problem because “both these potential sources of bias would decrease the observed association between pain and weather”. Come again? You mean it doesn’t matter that there are gaps in this data because these holes would only reduce any correlation that might exist?

Suddenly, Smedslund’s claims for a well-designed statistical study seem to be rather “under the weather”. Why didn’t he simply include additional questions on travel and painkillers in his 84-day study period?

The answer is that, despite Smedslund’s clever presentation, a closer reading of the Methods reveals that he didn’t collect the patient data. In fact, the original study dates back to 2004 and was first published in Arthritis & Rheumatism by Heiberg (without any sign of Smedslund) in 2007 (54: 454-60). In this report, we learn that the whole point of the original study was to compare two methods for recording pain – the patients were asked to use “a paper-and-pencil (PP) form” for 42 days and “a personal digital assistant (PDA)” for recording their varying pain levels on the other 42 days. Their conclusion was that PDAs were not only as accurate as the traditional PP, but that the patients preferred a neat electronic box to scraps of paper and blunt pencils.

Naturally, at the time, the patients had no idea that the experimenters were interested in correlating their pain to the weather – because they weren’t!

Study “under the weather”

As tends to happen all too often, Smedslund has simply recycled old data to generate a new research paper, carefully papering over cracks that emerge when the original experimental design turns out to be fundamentally different to the new one that it’s meant to support.

No doubt a statistical correlation could also be derived between the incidence of experimental design error and the degree of reliance on recycled data. Irrespective of prevailing weather conditions!