

Summary

Although there is a widespread opinion that weather affects arthritis, scientific proof is lacking. The number of studies on this subject is small, which might be explained by the difficulty of monitoring disease activity in RA. Subjective variables like pain can be judged every day, but the daily determination of objective variables in the laboratory would be too expensive, and too much a burden to the patient. About half of the studies did not find any effect of the weather, and the conclusions of studies that did find an effect were rather conflicting.

Three years after RA had become manifest in myself, I started to record my joint pain daily since I was curious about its long-term course. Meanwhile, I became involved in a 1-year study by dr. R.L.F. Nienhuis of possible weather effects on a group of 88 RA patients in The Netherlands (*Chapter 6*). The average daily pain score turned out to be correlated with the outdoor temperature as well as with the vapor pressure. Also the joint pain which I quantified daily on myself (1983-1988) was positively correlated with the air temperature as well as with the water vapor pressure (*Chapters 3, 4, and 5*). Especially, stays in the cool and dry climate at elevated altitude had an alleviating effect on my RA symptoms.

In 1989, I realized that an objective RA variable was needed in addition to the subjective pain score. Since this year, my erythrocyte sedimentation rate (ESR) is being determined about every 14 days. From the data obtained in 1989-1991 it appeared that the ESR was positively correlated with the outdoor temperature as well as the vapor pressure. As described in *Chapter 9*, cross-correlation revealed that changes in ESR were delayed by a few weeks with respect to changes in the temperature/humidity complex. The changes in pain score were even more delayed. The course of the ESR in these 3 years supported my earlier conclusion that warm, humid air worsens the disease activity of my RA. In order to reduce the temperature and humidity of the ambient air, I took some simple measures like staying more outdoors. In general the air outdoors is colder and less humid than indoors. It took some time to get used to it, but its effect was beneficial (*Chapter 7*). Staying outdoors for 2.5 hours or longer daily, reduced my joint complaints and the erythrocyte sedimentation rate. Although the improvement was rather delayed, it appeared to continue as long as I was outdoors for longer time. So, it is a matter of carrying on, a way of living. In summer it is easy, but in autumn and winter it is not always a picnic. Especially the rheumatoid

factor (RF) shows a relationship with the daily time spent outdoors (*Chapter 8*). The RF virtually always decreased during long-outdoors periods, and increased during short-outdoors periods. Although the RF is not a very specific indicator in RA, recent studies show that the RF does roughly reflect the disease activity.

The literature review in *Chapter 2* deals with the conflicting conclusions of studies on effects of weather on RA. For instance, one study reported an increase in joint pain in the course of the summer in The Netherlands (warm and humid) while the pain of RA patients in Australia decreased in summer (even warmer and more humid!). In our analysis of reported effects of weather we took local circumstances into account as well. Thus, the decrease in pain of patients in Australia was less surprising since most people use fans and air conditioning in the hot months, thereby reducing their ambient temperature and humidity. Probably, the humidity near the patients' skins is even lower than in winter, for also in Australia in winter people wear more clothes than in summer. Clothes hamper the ventilation at the skin, which will increase the humidity of the microclimate since the skin itself produces water vapor as well, even if no sweating occurs. Altogether, the conclusions of the studies appear to be less conflicting than seemed at first sight. When a positive relation between the humidity near the skin and disease activity is considered, most reports were in accordance when local circumstances were taken into account. The beneficial effect on my own RA in periods with daily stays outdoors of 3 hours or longer, supports this. Especially cycling without a coat, which is often a chilly experience, enhances the ventilation at the skin, thus lowering the humidity of the microclimate. Therefore, the classic opinion "Cold and wet is bad, warm and dry is good for RA patients" seems to be true only as far as humidity is concerned.

The underlying mechanism of the effect of the time spent outdoors on the disease activity in RA is unclear. If the humidity of the microclimate is a crucial factor, as concluded in *Chapter 2*, there might be a relation with improved fluid evaporation by the skin, whatever the implications may be. The cooling down (by lower air temperature and increased evaporation by the skin) when staying outdoors was often experienced as physical stress. It is well known that cold-stress stimulates the production of cortisol, which has an inhibiting effect on joint inflammation. However, use of alcohol lowers the production of corticosteroids. The above-mentioned assumption is supported by the finding, described in *Chapter 10*, that apart from the short-term analgetic effect, alcohol worsens joint pain in RA.

Finally, a recent experiment revealed that the correlation of the daily joint pain score with the vapor pressure of the microclimate near the skin is stronger than with the meteorological vapor pressure (*Chapter 11*). This supports the conclusion that RA symptoms are influenced by the humidity of the microclimate.

“How common is the beneficial effect of being outdoors in RA?” For the near future a study is planned with the aim to answer this question. Reactions of several RA patients on published interviews about my studies indicate that I am not a unique case. If this will be confirmed in the intended investigation, it would become advisable for RA patients in general to spend more time outdoors.

