Weather conditions and complaints in fibromyalgia

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Abstract

Patients with musculoskeletal disorders, including fibromyalgia, often state that weather conditions modulate their complaints. There have been a few studies concerning this issue, but the results appear to be contradictory. We tried to relate the subjective symptoms of pain, stiffness, sleep and mood in fibromyalgia patients, to objective meteorological factors. Correlation analyses did showed no relation between the subjective complaints and the meteorological factors. The symptoms pain, stiffness and fatigue, however, showed a strong intercorrelation.

Introduction

It is often said by fibromyalgia patients, as well as by patients with rheumatoid arthritis (RA), that certain weather conditions worsen their musculoskeletal complaints.
The effect of weather conditions on rheumatic patients has been studied incidently (1-7), but the results have been contradictory. An objective study for weather influences in fibromyalgia patients has thus far not been reported. We tried to relate the subjective symptoms of pain, stiffness, sleep and mood to objective meteorological factors.

Patients and methods

As part of a larger study conducted at the University Hospital of Groningen on psychosocial factors in fibromyalgia syndrome and the effects of a combined treatment program of psychomotor therapy and marital counselling, fifty patients with fibromyalgia, according to the criteria of Yunus (8), were randomly selected from the outpatient clinic of rheumatology of the University Hospital of Groningen. At the start of our program the 1990 criteria study of Wolfe et al. (10) was not yet published, therefore our patients could not be selected by these latest criteria.
The fifty patients were asked to fill out a diary once a week during the period they participated in the therapy program. Therapy sessions were held with an interval of about one month, 10 times in total. During this time period patients filled out a diary once a week to compare every Wednesday at 12:00 noon. Wednesday was chosen as an average weekday. Patients had to fill out Numerical Rating Scales (NRS), ranging from 0-9, on 4 items: pain, stiffness, fatigue, and mood. In the first three items the score ranged from 0 (no problems) up to 9 (worst possible). For the item "mood" the score was the other way around: 0 for low mood, and 9 for high mood. Once a month the patients had to turn in their diary-forms.
Meteorological factors were sampled from weekly reports of the Royal Dutch Meteo-

rological Institute at Airport Eelde, which covered the living area of the participating patients, and included mean temperature (24 h; 150 cm; in degrees Celsius), mean vapour pressure (24 h; in mbar), mean relative humidity (24 h; in percentages), mean atmospheric pressure (24 h; sealevel; in mbar), mean wind speed(force) (24 h; m/s), mean cloud cover (24 h; in octal system), and rainfall (sum of 24 h; in mm). Meteorological factors from all wednesdays, and 2 preceding and successive weekdays were considered to determine wether there was a correlation between the mean scores of pain, fatigue, stiffness and mood of the total group and meteorological factors in the direct past, the present and the direct future.
The patients in this study were not informed of the aim of the study.
The 50 patients were followed over two different time periods: 25 patients from September, 1989 to April, 1990, and the other 25 patients from September, 1990 to April, 1991. The results of the 89/90 group were compared with the result of the 90/91 group. Thus the second group was a replicate study of the first group.
Analysis of the data was made by SSPS-X Pearson correlation coefficients. Results were considered significant if the correlation was significant in both groups ($p<0.05$), thus yielding an overall significance of (0.05^2)0.0025.

Results

Mean age of the group of 50 patients was 41.9 year (22-59 years). The group consisted of 45 women and 5 men. Before the start of the treatment program, 80% (n=40) of the patients had a history of indicating that weather factors influenced their symptoms of fibromyalgia. In most cases it was rain or dampness, combined with cold that exerted a negative influence. It was also frequently reported that climatic changes from fair to rainy weather negatively influenced pain. Comparing with 25 patients with RA (matched for age and sex), who were asked the same questions, 44% (11 patients with RA) said that there were influences of weather factors.
From 50 patients we obtained 32 diaries (16 of either group), which could be used for analysis.
Seventeen patients dropped out of the study, because they did not finish the combined psychomotor and marital counselling treatment program. Of these dropouts, 7 patients gave reasons that were related to the treatment program, 10 patients gave other reasons, related to their physical condition or to personal circumstances. One patient had not understood the instructions correctly, so his diary was not reliable and was omitted from further analysis. The other 32 patients finished the treatment program and filled out their diaries weekly.
In 27 (mean age 43.2 yr, 24 female, 3 male) out of the remaining 32 patients there was a history of weather influencing their complaints.
The mean painscore, measured on Wednesdays at noon for these 27 patients ranged from 4.1 to 6.1.

The means and ranges of the meteorological data are given in table 1 .
Correlation analyses of these 27 patients showed no significant relation between meteorological factors and the mean pain scores (table 2 and table 3). The correlation analysis between meteorological factors and the mean scores on stiffness, fatigue and mood also showed no significant relation. Comparison between the mean scores on pain, stiffness and fatigue yielded strong intercorrelations between these variables (table 4 and table 5).

Table 1
MEANS AND RANGES OF THE METEOROLOGICAL FACTORS (89/90 AND 90/91)

	ranges	means
windspeed (m/s)	1-24	9.6
mean temperature (°C)	-9-15	6.2
relative humidity (%)	69-99	89.8
rainfall (mm)	0-22	2.1
atmospheric pressure (mbar)	983-1041	1014.2
cloud cover (0-8)	0-8	5.5

Table 2
CORRELATIONS BETWEEN MEAN PAINSCORES AND METEOROLOGICAL FACTORS IN 89/90

	ws-1	ws0	ws+1	mt-1	mt0	mt+1	rh-1	rh0	rh+1	rf-1	rf0	rf+1	ap-1	ap0	ap+1	cc-1	cc0	cc+1
pain	0.36	0.51	0.67	-0.14	0.08	0.06	-0.04	0.16	0.05	0.21	0.33	0.34	-0.25	-0.26	-0.20	0.34	0.42	0.12
p<..	0.04	0.01	0.00	0.27	0.35	0.39	0.43	0.22	0.41	0.17	0.06	0.05	0.12	0.11	0.17	0.05	0.02	0.29

ws = windspeed, mt = mean temperature, rh = relative humidity, rf = rainfall, ap = atmospheric pressure, cc = cloud cover. -1 = 1 day before day of painscore, 0 = day of painscore, +1 = day after day of painscore.

Table 3
CORRELATION BETWEEN MEAN PAINSCORES AND METEOROLOGICAL FACTORS IN 90/91

	ws-1	ws0	ws+1	mt-1	mt0	mt+1	rh-1	rh0	rh+1	rf-1	rf0	rf+1	ap-1	ap0	ap+1	cc-1	cc0	cc+1
pain	-0.03	-0.06	-0.01	-0.18	-0.29	-0.28	-0.08	-0.19	0.00	0.09	-0.06	-0.04	0.15	0.08	-0.10	-0.16	-0.26	0.06
p<..	0.44	0.38	0.48	0.17	0.06	0.07	0.33	0.15	0.49	0.32	0.37	0.41	0.21	0.34	0.30	0.19	0.08	0.39

ws = windspeed, mt = mean temperature, rh = relative humidity, rf = rainfall, ap = atmospheric pressure, cc = cloud cover. -1 = 1 day before day of painscore, 0 = day of painscore, +1 = day after day of painscore.

Table 4
CORRELATION ANALYSIS BETWEEN SUBJECTIVE SYMPTOMS YEAR 89/90

Group 89/90	Pain	Mood	Stiffness	Fatigue
Pain (mean NRS)		0.22 p=0.15	0.85* p<0.01	0.74* p<0.01
Mood (mean NRS)			0.08 p=0.35	0.18 p=0.20
Stiffness (mean NRS)				0.77* p<0.01
Fatigue (mean NRS)				

* = p<0.05

Table 5
CORRELATION ANALYSIS BETWEEN SUBJECTIVE SYMPTOMS YEAR 90/91

Group 90/91	Pain	Mood	Stiffness	Fatigue
Pain (mean NRS)		-0.17 p=0.18	0.70* p<0.01	0.35* p=0.03
Mood (mean NRS)			0.15 p=0.22	-0.63* p<0.01
Stiffness (mean NRS)				0.26 p=0.08
Fatigue (mean NRS)				

* = p<0.05

Discussion

There have been few studies concerning the influence of weather factors on joint complaints. They did not agree on all points, and study-designs differed. Edstrom (1) showed that arthritic patients improved by staying in a climate chamber with constant warm temperature and moderate humidity. In this study no variations in temperature or humidity were studied. Hollander (2), however, designed a controlled climate chamber where the effects of climatic variations on rheumatic patients could be studied objectively. Especially the simultaneous variations of humidity and barometric pressure. From the results it appeared that rising the humidity combined with a fall of barometric pressure, gave a significant subjective and objective worsening of arthritis.

Rose (3) found slightly, but significantly higher incidence of rheumatic exacerbations after rain, and also before high humidity in patients with rheumatic complaints in Kent, Great Britain.

A prospective study was performed by Nyberg and Nyberg (4) in 1984. They asked 25 patients with rheumatic complaints (including 6 patients with joint or muscular pain unaccompanied by objective findings), who complained that their symptoms varied in relation to forthcoming weather changes, enabling them to forecast the weather. The predictions made by the patients were in fact not better than chance.

Patberg et al. (5) found that pain in patients with RA associates positively with temperature and with vapour pressure, negatively with relative humidity, whereas no relation was found with the solar irradiation, atmospheric pressure, and wind speed. In the report of Sibley (6) no significant correlations were found between symptoms of any patient group or individual and any included weather variable examined. In this study patients with RA and patients with osteoarthritis (OA) were included.

As has been indicated by several authors, fibromyalgia patients tend to say that a change of weather conditions does aggravate their pain (8-10). In fact this has been one of the minor criteria of Yunus et al. (8). Of 50 consecutive patients diagnosed as having primary fibromyalgia, 92% reported aggravation of their symptoms with cold or humid weather (8). In an evaluation of symptom frequency in 291 rheumatic patients and 58 healthy individuals, Wolfe et al. (9) found a history of weather influence on pain in 57% (of 155) fibromyalgia patients, in 43% (of 51) patients with RA, in 54% (of 37) patients with OA, in 38% (of 48) patients with low back pain, and in 3% (of 58) healthy controls there was a positive history of weather conditions influencing pain complaints. In the 1990 criteria study of Wolfe et al. (10) the sensitivity of the symptom pain influenced by weather change was 66.1% and the specificity 53.8%, with an accuracy of 60.3%.

Guedj et al. (7) wanted to re-evaluate the effect of weather conditions on patients with various rheumatic diseases including fibromyalgia. They conducted a prospective study in patients with RA, with other forms of inflammatory arthritis, with osteo-arthritis and with fibromyalgia. The authors did not state the selected patients were aware of the aim of the study, which may well have an influence on study-outcome. Eight of 11 fibromyalgia patients reported that a change in one or more of the weather conditions changed their pain-score. When the association between pain and meteorological variable was examined with discriminant analysis it appeared that pain in fibromyalgia was associated with barometric pressure only. Until now no study has been reported which described the effect of weather conditions in the fibromyalgia syndrome. In our study, where we examined subjective complaints compared with objective meteorological factors, we were not able to confirm the hypothesis that weather influences pain and other complaints in fibromyalgia patients. However 80% of our fibromyalgia patients stated that there was such an influence.

An explanation for this discrepancy can be found in the attribution theories (11). As

suggested by Nyberg (4) patients with pain may feel less helpless if they can relate their pain to some external condition, i.e., the weather, thus justifying it.
We must also bear in mind that this patient-group was treated during the observation period, which may have influenced the study-outcome. However, no positive effect was found on the level of pain, as measured with visual analogue scales before and after treatment.
Another complicating factor is that our study was carried out in a marine climate, where ranges in meteorological factors are small (e.g. temperature). The study was carried out in the winter-spring period, so the range of the meteorological factors is smaller than when a complete year had been used as a time period. These two factors may have led to a restriction of range, which may have lowered the correlations (12).
We found a strong intercorrelation between the symptoms pain, stiffness and fatigue. In the fibromyalgia syndrome these subjective complaints are indeed related to each other, and it may be difficult for the patient to discriminate between the different symptoms.

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