Sleep problems in fibromyalgia and rheumatoid arthritis compared with the general population

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Abstract

Objective

Our aim was to evaluate how frequently problems of quality and quantity of sleep and depression occur in patients with fibromyalgia (FM), and compare these findings with those occurring in patients with rheumatoid arthritis (RA) and in the general population.

Materials and methods

The patients were recruited from rehabilitation courses in the Rheumatism Foundation Hospital, Finland. There were 37 patients with FM and 31 patients with RA participating in the study. For comparison, we used the results from a general population study of 1284 adult subjects. The data had been collected earlier in a longitudinal cohort study for the Finnish Social Insurance Institution.

Results

The patients with FM and RA slept fewer hours a day than the population sample. The FM patients reported more insomnia, less contentment with sleep and more lack of deep and restful sleep in comparison to the RA patients and the participants of the population study. The FM patients also reported significantly more depression and pain than the RA patients ($p<0.01$). It was still shown in a logistic regression analysis that insomnia was almost five times more frequent in FM patients than in RA patients, even when depression and pain were adjusted.

Conclusions

The FM patients reported more insomnia-related symptoms than either RA patients or the population sample. The higher prevalence of insomnia-related symptoms among FM patients was not explained by depression or pain. Both patient groups reported somewhat shorter nocturnal sleep than the general population.

Key words

Fibromyalgia, rheumatoid arthritis, population study, depression, sleep disturbances.

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Introduction

Fibromyalgia (FM) is a chronic pain disorder. The ACR (The American College of Rheumatology) diagnosis of FM requires a history of wide spread pain and pain sensitivity to palpation in 11 out of 18 tender points. In addition to pain, also depression, anxiety, somatization and sleep disturbances are typical to FM (1, 2). Insomnia is defined by DSM-IV (Diagnostic and Statistical Manual of Mental Disorders IV) (3) as a syndrome consisting of one or more of four features: difficulty initiating sleep, difficulty maintaining sleep, early morning awakening and nonrestorative sleep. Nonrestorative sleep is the most common of them. Self-reported sleep problems are highly prevalent in the normal population and shown to be comorbid with mental disorders (4, 5). It is estimated that 70-80% of FM patients suffer from sleep disturbances (2, 6). FM patients have poor sleep quality, which is shown in electroencephalograph (EEG) studies, in abnormalities in the sleep cycle organization, in decreased percentages of slow wave sleep (7) and in light stage 1 sleep (8). FM patients are also shown to be super sensitive to the loss of REM sleep (9). There are, however, studies which do not verify the latter findings (10). The characteristics of insomnia in FM patients seem to be the same as in primary insomnia (11).

Sleep disturbances are often linked to depression and pain. It was shown in a general population study that depression and disturbed sleep are independently associated with low pain threshold (12). It has also been shown that a high mutual correlation exists between depression and sleep disturbances (13). Comorbid sleep disturbances and mood disorders are typical symptoms of chronic pain disorders (14). According to Smith *et al*. (15), 70-88% of the patients suffering from chronic pain have at least mild sleep disturbances. However, it has been shown that patients with chronic pain suffer from poor sleep quality more often as a function of depression rather than pain (16).

The subjective appraisal of FM patients is that their quality of sleep is unsatisfactory and the narrative studies indicate that sleep disturbances have a negative effect on the lives of FM patients (17). Self-reported sleeping difficulties exist in rheumatic disease groups of FM, rheumatoid arthritis (RA) and osteoarthritis (OA), of which the FM patients show the most difficulties (18). A recent paper by Pincus *et al*. reports that it is possible to assess the quantity of several aspects of rheumatic diseases, but still routine patient care is conducted mainly according to qualitative clinical impression (19). There are only a few studies on self-reported insomnia and related symptoms comparing FM patients to other chronic pain patients. The aim of this study was to find out if the amount or quality of self-reported sleep differed between the FM and RA patients and the general population sample. In addition, we compared sleep problems between chronic pain patient groups (FM and RA) when depression and pain were accounted for. We hypothesized that FM patients report more insomnia-related symptoms when compared to RA patients.

Materials and methods

Participants

The patients were recruited from consecutive rehabilitation courses (four FM and four RA courses) in the Rheumatism Foundation Hospital (RFH), Heinola, Finland. There were thirty-seven FM patients and thirty-one RA patients participating in the study. The recruitment was successful, with 97% of the desired FM patients and 87% of the RA patients agreeing to participate. Both patient groups participated in their own diagnose-based rehabilitation courses, with the requirement that the diagnosis was made earlier and confirmed by a rheumatologist or specialist of rehabilitation. Demographic and clinical data was collected by the patients filling in questionnaires at the beginning of the rehabilitation courses. The FM patients were a little younger (mean 45.7 yrs, 95% CI 42.9-48.4 yrs) than those with RA (mean 52.1 yrs, 95% CI 49.1-55.0). Gender distribution in both patient groups was skewed so that number of women dominated, as expected, in both FM and RA (Table I). There was no statistical difference

in the patients' marital status. The occupational status seemed to vary even though there was no statistical difference (Table I).

The general population sample was collected in Finland, in 1992-1995 for a longitudinal cohort study that evaluated the quality of sleep. The participants were randomly selected from the city of Turku and the areas surrounding it. We included the participants 30-66 years of age into the study in order to roughly age match the general population sample to the patient groups. Thus, there were 1284 participants, of whom 728 were female and 556 male (20). Their mean age was 49.8 years and 95% CI 49.3-50.3.

The FM patients had the highest level of education, which is possibly explained by the slightly younger age of the group. University or college level education was most frequent in the FM group (FM=44%, RA=32%, Population=27%). Vocational education or apprenticeship training dominated in the groups of RA and general population (FM=33%, RA=52%, Population=55%). In each group, only a minority lacked a vocational education or had only attended some vocational courses (FM=22%, RA=16%, Population=19%). The difference in education level was not statistically significant between the FM and RA groups (p=0.319) and between the RA group and the general population (p=0.773), but the FM group differed from the general population (p=0.026).

Table I. Age, duration of disease and occupational situation of the patient groups (FM and RA).

	FM n=37 (2 men)	RA n=31(8 men)	p-value FM *vs*. RA
Mean age (years)	45.7	52.1	
SD; range	8.2; 27-58	8.0, 25-64	p=0.002
Mean duration of the disease (years)	10.2	6.5	
SD; range	10.5, 1-50	8.1, 0.5-38	p=0.121
Working, n. (%)	23 (62.2)	23 (74.2)	
On sick leave, n. (%)	6 (16.2)	2 (6.5)	
On disability pension, n. (%)	0 (0)	1 (3.2)	p=0.056
Unemployed, n. (%)	5 (13.5)	1 (3.2)	
Other occupational status, n. (%)	3 8.1)	1 (3.2)	

Procedure and measures

The data of the patient groups (FM and RA) was collected from the RFH during the summer of 2005. The participants filled in a set of questionnaires for background information and self-reporting on sleep disturbances, depression and pain (see below). The data on the general population included only that of the sleep disturbance questionnaire and the background information.

Sleep disturbances

Sleep disturbances were measured by a self-report questionnaire based on the Sleep Habit Questionnaire (SHQ) of the Social Insurance Institution (20). The SHQ has been proved to have good reliability, test-retest stability, and concurrent and construct validity (21-23).

Depression

The participants of the patient groups (FM and RA) rated their degree of depression completing the Beck Depression Inventory II (BDI II). The self-report questionnaire assesses the severity of depression: 1) minimal (0-13), 2) mild (14-19), 3) moderate (20-28) and 4) severe (29-63). The BDI II questionnaire has been validated (24).

Pain

The participants of the patient groups (FM and RA) were also asked to rate the intensity of pain during the last 7 days on a 0-10 Visual Analogous Scale (VAS), with 0 = 'no pain' and 10 ='pain as intense as you could imagine'.

Data analysis

For data analysis, we used The Statistical Package for the Social Sciences (SPSS) 12.01 for Windows. Descriptive statistics were used to calculate the frequencies, means, standard deviations and ranges. The parameters of age, duration of symptoms, duration of sleep and intensity of pain were tested with an independent samples t-test. All other analyses were performed with non-parametric tests because of the use of nominal and ordinal scale parameters. Pearson's Chi-Square Test was computed to analyse the associations of qualitative sleeping problems with the study groups (FM, RA and population sample) and with depression. The Mann-Whitney U-test was used to analyse the association of depression with the disease groups. In order to calculate the risk of insomnia (adjusted for depression and pain) relative to the disease groups, we performed a multivariable logistic regression model predicting FM (RA as a reference) by insomnia, depression and pain.

The ethical aspect

Permission for this study was received from the Paijat-Hame Ethical Committee of Lahti, Finland.

Results

The demographic data of the patients is shown in Table I. There was no significant difference (p=0.545) in the mean sleep duration per night between FM 6.9 (SD 1.4) and RA 7.1 (SD 1.0), but both groups reported significantly (p<0.1) shorter nocturnal sleep than the general population (Mean 7.6, SD 1.0). The FM and RA patients had the same regularity in falling asleep and awakening. There was no difference in the amount of naps and both groups reported that their sleep was fragmentary. Both patient groups differed from the population sample in the experience of tiredness, but the FM patients were even more tired (Table II). The FM patients reported significantly poorer sleep quality in many ways in comparison to the RA patients and to the population sample (Table II): The FM patients reported more insomnia, less sound sleep and more lack of deep and restful sleep. In the experience of nightmares, the FM group differed from the RA group, but there was no statistical difference between the FM group and

Table II. Subjective appraisal of the quantity and quality of sleep among the FM, RA groups and the population sample (Pop).

	FM	RA	Pop 30-65 years	*p*-values
Do you suffer from insomnia?				FM *vs*. RA
Never	5.6%	16.1%	25.2%	*p*=0.008
Sometimes	47.2%	74.2%	64.5%	FM *vs*. Pop *p*<0.001
Often	44.4%	9.7%	8.3%	RA *vs*. Pop
Always or most of the time	2.8%	0.0%	2.1%	*p*=0.54
Total no.	**36**	**31**	**1280**	
Do you sleep well?				FM vs. RA
Rarely	27.0%	12.9%	5.0%	*p*=0.010
Unusually	40.5%	16.1%	13.8%	FM *vs*. Pop *p*<0.001
Usually	27.0%	67.7%	65.8%	RA *vs*. Pop
Always or most of the time	5.4%	3.2%	15.5%	*p*=0.083
Total no.	**37**	**31**	**1110**	
Is the sleep deep enough?				FM *vs*. RA
No	65.7%	34.5%	28.3%	*p*=0.013
Yes	34.3%	65.5%	71.7%	FM *vs*. Pop *p*<0.001
Total no.	**35**	**29**	**1271**	RA *vs*. Pop
				p=0.47
Is the sleep restful enough?				FM *vs*. RA
No	62.9%	30.0%	24.4%	*p*=0.008
Yes	37.1%	70.0%	75.6%	FM *vs*. Pop *p*<0.001
Total no.	**35**	**30**	**1267**	RA *vs*. Pop
				p=0.48
Have you taken sleeping medicine during the last year?				FM *vs*. RA *p*=0.007
No	38.9%	71.0%	80.3%	FM *vs*. Pop *p*<0.001
Sometimes	25.0%	25.8%	13.6%	RA *vs*. Pop
Often	19.4%	0.0%	3.3%	*p*=0.20
Every or almost every night	16.7%	3.2%	2.8%	
Total no.	**36**	**31**	**1280**	
Do you have nightmares?				FM *vs*. RA
Never	5.4%	25.8%	19.3%	*p*=0.023
Sometimes	89.2%	61.3%	75.7%	FM *vs*. Pop *p*=0.10
Often	5.4%	12.9%	4.9%	RA *vs*. Pop
Total no.	**37**	**31**	**1277**	*p*=0.072
Are you tired during the day?				FM *vs*. RA
No	0.0%	12.9%	18.0%	*p*=0.019
I cannot say	0.0%	3.2%	1.3%	FM *vs*. Pop
Sometimes	21.6%	38.7%	61.2%	*p*<0.001
Often	54.1%	38.7%	16.7%	RA vs. Pop
Always or most of the time	24.3%	6.5%	2.8%	*p*=0.0083
Total no.	**37**	**31**	**1283**	

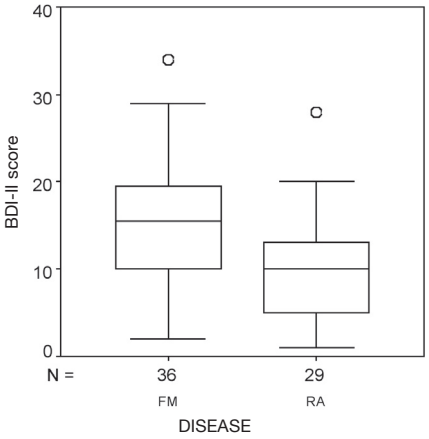

Fig. 1. BDI-II scores in the disease groups (FM and RA). The boxes show the interquartile ranges of the perceived BDI-II values in both patient groups. The median scores are illustrated as horizontal lines inside the boxes and the vertical lines outside the boxes indicate the whole range. The outliers are marked with circles.

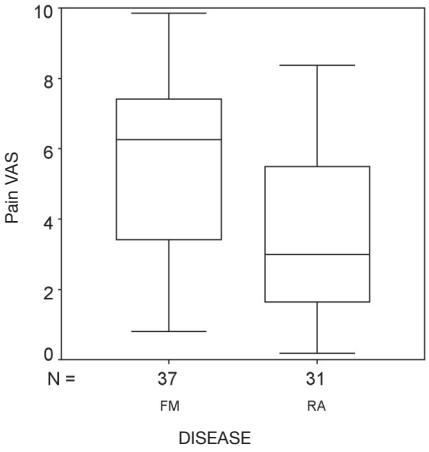

Fig. 2. The intensity of pain in the disease groups (FM and RA). The boxes show the interquartile ranges of the perceived pain intensity values in both patient groups. The median scores are illustrated as horizontal lines inside the boxes and the vertical lines outside the boxes indicate the whole range.

the population sample and between the RA group and the population sample. The FM patients reported significantly more use of sleeping medicine than the RA group or the population sample (Table II). In addition, because women dominated the patient groups, we compared the results of the groups only to the female participants of the general population. The results stayed the same by interpretation.

The FM patients also reported more pain (FM = 5.45 *vs*. RA = 3.69, *p*<0.01) and more depressive symptoms (FM median = 15.5 *vs*. RA median = 10, *p*<0.01) than the RA patients (Figs. 1 and 2). The variables of depression and sleeping problems were dichotomised (yes vs. no). Depression classes (from 1 to 4) were divided into minimal or mild (from 1 to 2) and moderate or severe (from 3 to 4). Equally, the sleeping problem variables were divided into two classes. In the FM group, there was no statistically significant connection between depression and sleeping problems. In the RA group, the depressed patients reported more daytime tiredness (not depressed 39% *vs*. depressed 100%, *p*=0.01) and use of sleeping medicine (not depressed 0% *vs*. depressed 20%, *p*=0.03) than the non-depressed patients. When the patient groups (FM and RA) were combined, there was a statistically significant difference between the depressed and not depressed patients in most of the sleeping-related questions: the depressed patients reported good sleep less frequently (27% *vs*. 61%, *p*=0.01), more insomnia (50% *vs*. 19%, *p*=0.01), more daytime tiredness (91% *vs*. 52%, *p*<0.01), more lack of

deep (73% *vs*. 42%, p=0.02) and restful sleep (68% *vs*. 38%, p=0.02) and more use of sleeping medicine (36% *vs*. 14%, p=0.04) than the non-depressed ones. Only the experience of nightmares did not differ between the depressed and not depressed patients.

When the RA and FM groups were compared to each other using a logistic regression analysis, it was shown that insomnia was almost 5 times more frequent in the FM group than in the RA group, even after adjustment for depression and pain (Table III).

Table III. Logistic regression models predicting disease group FM (RA as a reference) by dichotomised insomnia, dichotomised depression and pain VAS as predictor variables.

Predictor variable	Disease group (RA as a reference)	Unadjusted OR estimates (95% CI)	Adjusted (all predictors in the model) OR estimates (95% CI)
Insomnia (yes *vs*. no)	FM	7.30 (1.86- 28.65) p=0.004	4.94 (1.16-21.01) p=0.030
Depression (yes *vs*. no)	FM	4.53 (1.41-14.60) p=0.011	2.56 (0.70-9.28) p=0.154
Pain (VAS 1-10)	FM	1.35 (1.09-1.68) p=0.007	1.26 (0.99-1.61) p=0.063

Discussion

This study revealed that the FM patients suffer from poorer quality of sleep than the general population and the RA patients, another group with a rheumatic disease and chronic pain. FM patients have a risk of insomnia almost five times higher than patients with RA, when the effects of depression and pain are adjusted for. The FM patients differed from the RA patients and the general population in self-reported aspects of 1) experienced insomnia, 2) soundness of sleep, 3) depth of sleep and 4) restfulness of sleep. Earlier, there have been only few studies comparing the self-reported sleep problems of FM patients to those of another chronic pain group and the normal population. The results of Callahan *et al*. 2000 are similar to our findings: in their study, the FM patients reported more sleeping difficulties than the RA and OA patients, but the study did not include a normal population sample (18). The poor quality of sleep among FM patients compared to normal population was previously shown in a study of Osorio *et al*.: The FM patients had higher scores in all sleep quality questions, and the total scores were three times higher for the FM patients compared to the healthy controls (25).

We examined in detail how the patient groups differed in their quantity of sleep and whether depression and pain were linked to the sleeping problems. The poor quality of sleep was not connected to the quantity of sleep. The amount of sleep (length of nocturnal sleep and daytime naps), the time of falling asleep and awakening and the fragmentariness of night time sleep were approximately the same in the FM and RA groups. Both patient groups had somewhat shorter nocturnal sleep than the normal population. We confirmed the previous findings that tiredness is common in both of these chronic pain patient groups, FM and RA, although the intensity and manifestation differ in the two groups (26). In our study, the FM patients reported even more tiredness than the RA patients. The RA patients did not differ from the normal population in the qualitative aspects of sleep. The tiredness may result from shortened nocturnal sleep or from disease-based fatigue. Fatigue is highly common in rheumatic diseases and has been shown to be linked to pain, sleep disorders and depression in groups of FM, RA and OA. However, FM patients have clinically important fatigue more commonly than RA and OA patients and pain is found to be the strongest factor for fatigue only in FM (27).

Although all separate symptoms of depression, pain and sleep problems were more frequent among the FM than RA group, only sleep problems were significantly higher in FM, when the mutual association of depression, pain and sleep problems was controlled. The depressive symptoms were related to sleep problems in the combined patient group (FM and RA), except for the frequency of nightmares. However, when the relationship between depression and sleep problems was separately tested in both patient groups, the connection was not shown. In the RA group, the experience of daytime tiredness and use of sleeping medicine were more usual in the depressed group than in the non-depressed patients. In the FM group, there was not any statistically significant connection between depression and sleeping problems, although there was a weak tendency to that direction. The tendency might have been significant with a larger patient sample, considering that our results are somewhat incompatible with the study of Korszun *et al*., studying the relationship between FM, depression and sleep disturbances. The patients with FM alone had more disturbed sleep than the healthy controls. The depressed patients also had more sleep disturbances than the healthy controls. The patients with both FM and depression showed the most severe impairment: reduced daytime activity, increased daytime sleepiness, and the most sleep interruptions as well as the most movement during the night (28).

There is a need for studies exploring the treatment outcomes of depression and sleeping problems among FM patients. According to our study, FM patients already use more sleeping medicine than RA patients or the participants of the population sample, which may indicate that the current medical treatment practice is not always sufficient. According to O'Malley *et al*., the effect of antidepressants is superior to that of placebo in the treatment of FM: there is a moderate effect on sleep, pain and over-all wellbeing, and a mild effect on fatigue and number of trigger points (29). The most studied antidepressants in the treatment of FM are the low-dose tricyclic antidepressants and selective serotonin reuptake blockers (SSRI). SSRI antidepressants seem to improve the depressed mood the best but tricyclic agents have a broader effect on sleep quality (30, 31). Unfortunately, tricyclic agents are effective only in 25%-40% of FM patients (30,

32). There are also prominent results of Cognitive-behavioral (CB) therapy for insomnia among FM patients (33). The high frequency of depression, sleeping problems and pain among FM patients might have a connection to traumatization and it needs to be considered in the treatment of FM. A recent study of Näring *et al*. (34) reveals that traumatization experiences are frequent in FM patients but only a small subgroup of them (10%) shows the combination of traumatization and somatoform dissociation, which is seen as one possible etiological cause for FM. The prevalence is, however, moderately higher than in the groups of RA, bipolar mood disorder or in the non-patient sample. This subgroup of FM patients is likely to benefit from the help of psychologists or psychiatrists as regards their sleeping problems.

There are some limitations in our study. First, the relatively small size of our patient groups makes the results mainly indicative. The mean age in the general population sample and the RA group was slightly older than in the FM group. However, because insomnia-related symptoms are more prevalent in older than in younger subjects, it is unlikely that the age difference would explain the frequent sleep problems reported in the FM group, which was the youngest in our study. Secondly, the gender distribution in the patient groups was dominated by females, which made the comparison to the general population less reliable. Therefore, we compared the patient groups also with only the female participants of the general population. The results remained the same by interpretation, which means the sleeping problems in FM cannot be explained by the high frequency of female gender. Thirdly, the education level was not matched in the studied groups. The FM patients had the highest and the participants of the population sample the lowest level of education. This may have had an effect on the results, but probably again to the direction of diminishing the differences in sleep problems between the FM group and those with lower education. Fourthly, we found that the pain reported in the patient groups did not explain the high insomnia among FM patients in comparison to RA. There was, however, a tendency to that direction, which means, the interaction of pain, depression and self-reported sleep problems should be further studied.

We conclude that the patients in both chronic pain groups of FM and RA showed somewhat reduced sleep duration when compared to the general population. The quality of sleep is impaired only in FM, and the self-reported sleep problems typical to FM are not fully explained by depression and pain. The severity of experienced sleep problems among the FM patients shows the need for further studies. Increasing knowledge will probably help improve the multidisciplinary treatment and thus the quality of life of patients with FM.

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