Improvement in pain, fatigue, and subjective sleep quality through sleep hygiene tips in patients with fibromyalgia

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ABSTRACT

Objective: To evaluate the effectiveness of sleep hygiene instructions for women with fibromyalgia. **Materials and methods:** Seventy women with fibromyalgia completed the study. The assessment comprised the Fibromyalgia Impact Questionnaire (FIQ), the Pittsburgh Sleep Quality Index (PSQI), and a general questionnaire with personal data and lifestyle information. All patients received information about the disease and a sleep diary, but only the experimental group received the sleep hygiene instructions. Patients were asked to practice sleep hygiene, and, after three months, they were reevaluated by use of the same questionnaires. **Results:** The mean age in the control group was 55.2 ± 7.12 years, and, in the experimental group, 53.5 ± 8.89 years (P = 0.392). The experimental group showed: a decrease in the pain Visual Analogue Scale values (P = 0.028), in fatigue (P = 0.021), and in the PSQI component 1 (P = 0.030); and a significant reduction in the difficulty falling asleep after waking up in the middle of the night (P = 0.031). The experimental group also showed an increase in the reporting percentage of "silent environment" (ranging from 42.9% to 68.6%), a decrease in the reporting percentage of "fairly quiet environment" (ranging from 40% to 22.9%), and a decrease in the reporting percentage of "noisy environment" (ranging from 17.1% to 8.6%). These changes facilitated falling asleep after waking up in the middle of the night. **Conclusion:** The sleep hygiene instructions allowed changing the patients' behavior, which resulted in pain and fatigue improvement, increased subjective quality of sleep, in addition to facilitating falling asleep after waking up in the middle of the night.

Keywords: fibromyalgia, sleep disorders, patient education.

INTRODUCTION

Fibromyalgia (FM) is a rheumatic disease characterized by the presence of musculoskeletal pain and somatic symptoms, such as fatigue, and mood and sleep disorders, which play an important role in well-being. Insomnia is reported by 75% of the patients with FM.[1]

The literature suggests that, for a significant improvement in sleep quality of individuals with chronic insomnia, the initial approach should consist of behavioral modification through sleep hygiene.[2] Behavioral therapies, such as sleep hygiene and cognitive therapy, which emphasize behavioral modification, have been studied and applied aiming at reducing the dose of medicines used to treat chronic insomnia, improving the quality of life of those who depend on hypnotics. Sleep hygiene comprises a set of instructions aimed at modifying the habits that can affect sleep health.[3] However, there is no proof of the efficacy of using that technique to improve the sleep quality of patients with FM. Thus, this study aimed at assessing the effectiveness of the sleep hygiene instructions provided to women with FM.

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MATERIALS AND METHODS

This study included 80 female patients from the Fibromyalgia Outpatient Clinic of the Discipline of Rheumatology of the Faculdade de Medicina, Universidade de São Paulo (FMUSP) and from the Clínica de Fisioterapia, Universidade Cidade de São Paulo (Unicid). The patients from FMUSP were selected while waiting for their medical consultation with the rheumatology team. If asked to return to another consultation within three months, their reassessment would be collected again while they waited for their medical consultation. If the time for a new consultation differed from three months, the patients would be contacted by the authors and another day scheduled for reassessment. Patients from Unicid were on rehabilitation treatment at the Clínica Escola de Fisioterapia.

The inclusion criteria were as follows: women aged 18 to 65 years old, diagnosed with FM according to the 1990 American College of Rheumatology criteria.[4] Women meeting those criteria but working at night shifts were excluded from the study, which was approved by the Committee on Ethics and Research of the Unicid (protocol # 13391640).

The patients underwent a general assessment comprising personal data, personal habits, and anamnesis. Then, the following questionnaires were applied: the Pittsburgh Sleep Quality Index (PSQI),[5] specific for assessing quality of sleep and validated for Brazil,[6] that qualifies the patient's sleep during the previous month; and the Fibromyalgia Impact Questionnaire (FIQ),[7] specific for assessing the impact of FM on the patient's functional capacity and also validated for Brazil.[8] After the assessment, the patients were randomly divided into two groups (control and experimental groups), by using envelopes containing the name of one of the two groups. The control group comprised 41 patients, and the experimental group, 39 patients. All participants provided written informed consent before randomization and after being informed about the inclusion and exclusion criteria.

After the assessment, both groups received a booklet with basic information about the disease. The experimental group was also instructed about sleep hygiene (Chart 1). Those instructions provided to the experimental group were obtained from studies on the treatment of sleep disorders in the elderly[9] and non-pharmacological treatment of chronic insomnia.[3] Such instructions have also been used in a study applying sleep hygiene to patients with FM.[10] In addition to providing the booklets with instructions about sleep hygiene, they were read and explained to each experimental group patient at a single meeting. The importance of the daily application of those instructions for three months was emphasized. In addition, all participants received a "sleep diary" and were instructed to describe, in the last 15 days of treatment, their nights of sleep and the hours preceding bedtime. After three months, the patients returned to the clinic to be reassessed (second meeting). During those three months, patients and authors had no contact. Both assessments were performed on medical consultation days, aiming at minimizing sample loss, which is common in prospective studies.

In the statistical analysis, the Student *t* test was used[11] to compare the initial data of participants' ages. The results from the PSQI, FIQ, and sleep diary were described according to the groups and occasions and were compared between the groups before and after treatment by using the Mann-Whitney test,[11] and in each group before and after treatment by using the paired Wilcoxon test.[11] Habits and characteristics of the sleep environment were described according to the groups by using absolute and relative frequencies, and the existence of an association was assessed with the chi-square test or Fisher exact test or the likelihood ratio test[11] (the last two being used when the sample was insufficient to perform the chi-square test). Changes for each habit and characteristic of the sleep environment were described in each group and compared before and after the treatment by using the McNemar test.[12] Spearman correlation[13] between the variation of the FIQ and the PSQI was calculated to assess the existence of correlation between them.

All data were analyzed with the SPSS for Windows, version 15.0, adopting 5% as the significance level, and illustrated with tables and bar graphs.

Chart 1
Sleep hygiene instructions provided to patients of the experimental group

SLEEP HYGIENE INSTRUCTIONS
Try to go to bed at the same time every day. Your body will be prepared to sleep always at the same time. You will fall asleep faster in the following weeks!
Avoid using your bedroom to work, study or eat. It should be only the place to sleep.
Avoid watching TV before bedtime, because it can make you anxious and interfere with your sleep!
Relax your mind and body for at least one hour before bedtime. Do not get involved with great problems at that time of the night.
Avoid coffee, tea and chocolate after 5 p.m.
Avoid alcohol close to bedtime. Although it helps you relax, it can disrupt sleep later; if possible, take a glass of milk.
If you smoke, refrain from smoking two to three hours before bedtime.
Try to eat light at dinner. Salads and vegetables are a good option. Greasy food, such as fried food, is heavier and can disrupt sleep!

(Continue...)

(Continuation of Chart 1)

SLEEP HYGIENE INSTRUCTIONS
Keep your room's temperature comfortable. A room too hot or cold interferes with quality of sleep. In addition, dress warmly to avoid possible muscle "contractures".
Noise and light can lead to poor sleep. Thus, try to sleep in a silent dark room.
Regular physical activity can improve the quality of your sleep. But, beware, try to exercise in the morning or afternoon. If you exercise too close to bedtime, you might be too energized to fall asleep. The exercise should be pleasing, leaving you happy and cheered up. In addition to increasing the quality of your sleep, you will be fit.
Establish a bedtime routine. For example: lock the doors, brush your teeth... Your body gets used to this routine, and reminds you that bedtime is close, reducing the time you wait to fall asleep.
Warm bath close to bedtime is recommended to fight insomnia, because it relaxes your mind and body.
Do not nap more than twice in the same week. This decreases the need for night sleep.
Make sure you always have a comfortable bed. This is important for you to fully relax and fall asleep.
Avoid "fighting" with the bed. Sleep only the time sufficient for you to feel good. Do not stay in bed longer than necessary.
When you are sleepless, get up and do something boring or repetitive, such as to read an uninteresting book.
Say no to medicines! You should take sleeping pills only under medical supervision!

RESULTS

This study assessed 80 female patients, of whom only 70 concluded the study and were included in the analysis. Of the 10 patients not participating in the statistical analysis, six decided not to return to reassessment and four did not complete correctly the sleep diary. The mean age of the patients in the control group was 55.2 ± 7.12 years, and in the experimental group, 53.5 ± 8.89 years (P = 0.392).

Table 1 shows that, regarding the sleep diary, only the answers to question 3 in the experimental group differed significantly from those in the control group (P = 0.031). That question regards the number of days the patient woke up during the night and had no difficulty to fall asleep again ("Sleep 3"). The other questions of the sleep diary showed no significant difference between the groups. In those questions, participants answered the number of days in which: it took them more than 30 minutes to fall asleep, "Sleep 1"; it took them a long time to fall asleep again after waking up in the middle of the night, "Sleep 2"; they drank alcoholic beverages, "Sleep 4"; they ate inadequately, "Sleep 5"; they exercised at least three hours from bedtime, "Sleep 6"; they took sleeping pills, "Sleep 7"; and they had non-repairing sleep, "Sleep 8". In addition, the following means were calculated for both groups: mean fatigue during the day and during the night ("day mean" and "night mean"); mean bedtime ("bedtime mean"); and mean wake-up time ("wake-up mean"). None showed statistical differences, indicating that patients were equally tired, and went to bed and got up at similar times.

Table 1
Description of the sleep diary and comparison between the control and experimental groups

Variable	Group (n = 35)	Mean	SD	P
Sleep 1 (More than 30 minutes to fall asleep)	Control	7.06	5.95	0.805
	Experimental	7.49	6.35	
Sleep 2 (Slept again with difficulty)	Control	5.00	6.34	0.132
	Experimental	6.60	6.12	
Sleep 3 (Slept again easily)	Control	5.71	6.19	0.031
	Experimental	2.91	4.35	
Sleep 4 (Alcohol intake)	Control	0.00	0.00	1.000
	Experimental	0.00	0.00	
Sleep 5 (Inadequate food)	Control	0.26	0.70	0.630
	Experimental	0.60	1.56	
Sleep 6 (Physical activity)	Control	0.51	1.92	0.636
	Experimental	0.26	1.12	
Sleep 7 (Took medicines)	Control	4.63	6.70	0.317
	Experimental	6.00	6.90	
Sleep 8 (Non-repairing sleep)	Control	7.14	5.41	0.763
	Experimental	7.51	5.17	
Day mean (Fatigue 0-4)	Control	2.14	0.82	0.273
	Experimental	2.31	0.92	
Night mean (Fatigue 0-4)	Control	2.71	0.78	0.804
	Experimental	2.70	0.84	
Mean "I went to bed" (Bed time)	Control	23.56	1.17	0.760
	Experimental	23.51	1.35	
Mean "I got up" (Getting-up time)	Control	6.90	1.24	0.828
	Experimental	6.90	1.51	

Results of the Mann-Whitney test. Significance: P < 0.05.

In the experimental group, in which patients received information on both the disease and sleep hygiene, reductions in the following measures were observed: pain Visual Analogue Scale (VAS) (P = 0.028); fatigue (P = 0.021); and PSQI component 1 (P = 0.030), which relates to the subjective quality of sleep. Table 2 shows the variables assessed and the PSQI and FIQ scores before and after the treatment in both groups.

Figure 1 shows the reduction in the median VAS values only in the experimental group after treatment. Figure 2 shows a reduction in the median PSQI component 1 value in the experimental group after treatment, with an improvement in the subjective quality of sleep.

The ingestion of coffee, tea, and chocolate (P > 0.999) did not significantly differ between the groups at both the beginning

Table 2
Description of the sleep quality measures in fibromyalgia and patient's assessment according to the groups, before and after treatment, and result of the comparisons

Variable	Group (n = 35)	Initial			3 months			P
		Mean	SD	Median	Mean	SD	Median	
Disease duration (years)	Control	5.45	4.72	5.0	5.47	4.72	5.0	0.317
	Experimental	5.80	4.32	5.0	5.75	4.33	5.0	0.317
VAS (pain)	Control	7.11	2.63	8	6.09	3.53	8	0.131
	Experimental	7.66	1.95	8	6.49	2.75	7	0.028
Fatigue on the occasion (0:4)	Control	2.86	1.22	3	2.71	1.23	3	0.369
	Experimental	3.11	0.87	3	2.63	1.09	3	0.021
Sleep satisfaction (0–5)	Control	3.03	1.82	4	3.23	1.72	4	0.456
	Experimental	3.43	1.70	4	3.06	1.43	3	0.162
Component 1 (Subjective quality of sleep)	Control	1.54	0.74	2	1.66	0.76	2	0.499
	Experimental	1.86	0.81	2	1.51	0.89	1	0.030
Component 2 (Sleep latency)	Control	1.89	1.13	2	1.83	1.36	3	0.908
	Experimental	2.06	1.06	2	1.91	1.25	3	0.429
Component 3 (Sleep duration)	Control	1.11	0.90	1	1.03	1.04	1	0.700
	Experimental	1.20	1.11	1	0.94	1.19	0	0.271
Component 4 (Sleep efficiency)	Control	0.17	0.57	0	0.20	0.63	0	0.915
	Experimental	0.23	0.55	0	0.20	0.47	0	0.792
Component 5 (Sleep disorders)	Control	2.17	0.57	2	1.94	0.59	2	0.074
	Experimental	2.20	0.53	2	2.09	0.51	2	0.285
Component 6 (Use of sleeping pills)	Control	0.94	1.35	0	1.23	1.46	0	0.164
	Experimental	1.54	1.48	2	1.60	1.46	2	0.928
Component 7 (Sleep-related daily dysfunctions)	Control	2.14	1.00	2	1.86	1.00	2	0.147
	Experimental	1.89	1.02	2	1.74	0.85	2	0.525
PSQI	Control	9.97	3.04	10	10.97	3.52	11	0.664
	Experimental	9.74	3.09	10	10.00	3.96	10	0.065
FIQ (global score)	Control	54.59	16.77	55.8	52.75	18.75	56.7	0.768
	Experimental	59.53	17.98	63.7	54.26	17.86	56.7	0.149

VAS = Visual Analogue Scale; PSQI = Pittsburg Sleep Quality Index; FIQ = Fibromyalgia Impact Questionnaire.

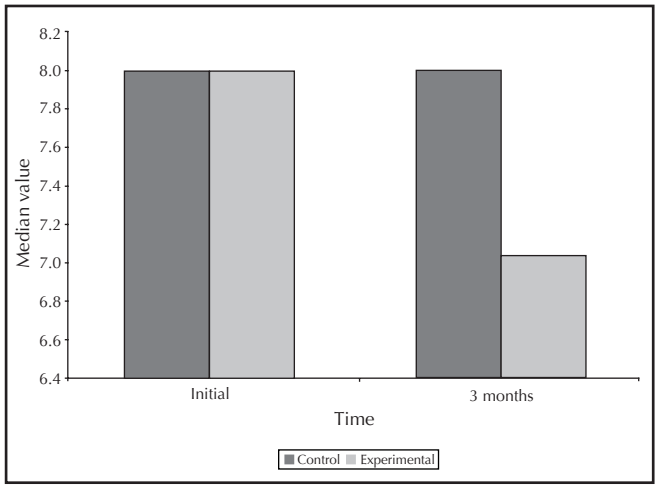

Figure 1
Median Visual Analogue Scale values according to the groups, before and after treatment.

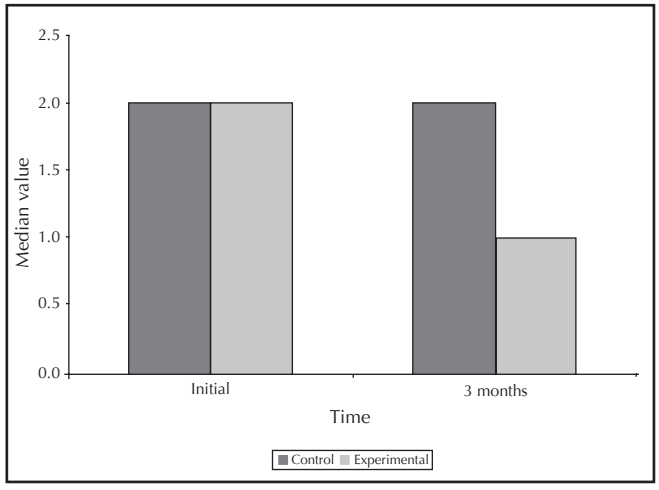

Figure 2
Median PSQI component 1 values according to the groups, before and after treatment.

of study and after three months of treatment. Those results were obtained by use of Fisher exact test.

After receiving treatment for three months, the experimental group showed an increase in the percentage of reports of "silent environment" (range, 42.9%–68.6%), a reduction in the percentage of reports of "fairly quiet environment" (range, 40%–22.9%), and a reduction in the percentage of reports of "noisy environment" (range, 17.1%–8.6%). The control group, however, showed an increase in the percentage of reports of "noisy environment" (range, 11.4%–17.1%) after three months of treatment. Those values, however, showed no statistically significant differences ($P > 0.05$), assessed by use of the likelihood ratio test.

After three months of treatment, the experimental group showed an increase in the percentage of reports of "dark environment" (range, 34.3%–82.9%) and a decrease in the percentage of "poorly lighted environment" (range, 37.1%–5.7%), and in the percentage of "well lighted environment" (range, 28.6%–11.4%).

Regarding ventilation, after three months of treatment, the experimental group showed an increase in the percentage of "non-ventilated environment" (range, 20% - 48.6%), stability in the percentage of "poorly ventilated environment" (20%), and a reduction in the percentage of "well ventilated environment" (range, 60% - 31.4%).

Table 3 shows that, when using Spearman correlation for the changes in the FIQ (final-initial) and the PSQI components (final-initial), the result observed is a modification in FIQ directly proportional to that of the PSQI component 2 ($r = 0.311$ and $P = 0.009$), corresponding to sleep latency in both groups.

Table 3
Spearman correlation between the changes in FIQ (final–initial) and the changes in the PSQI components (final–initial)

PSQI sleep component (n = 70)	Correlation	P
Component 1 (Subjective quality of sleep)	0.116	0.339
Component 2 (Sleep latency)	0.311	0.009
Component 3 (Sleep duration)	0.104	0.391
Component 4 (Sleep efficiency)	0.188	0.119
Component 5 (Sleep disorders)	0.059	0.629
Component 6 (Use of sleeping pills)	0.071	0.561
Component 7 (Sleep-related daily dysfunctions)	0.159	0.189

Spearman correlation test.

DISCUSSION

The results of this study have shown an improvement in the subjective sleep quality and in the results of the pain VAS in patients with FM receiving sleep hygiene instructions.

Question 3 of the sleep diary, regarding the number of days in which the patient woke up in the middle of the night and had no difficulty falling asleep again, showed a statistically significant difference, probably due to the instructions regarding environmental noise and lighting (performed by most patients).

Thus, sleep hygiene provided benefit in the subjective quality of sleep, with an improvement in the PSQI component 1 (subjective quality of sleep). When the sleep quality is benefited, there is also an improvement in pain and fatigue,[14] explaining the reduction in the VAS and fatigue in that group. In another study, patients receiving sleep hygiene instructions also had favorable results regarding pain and well-being as compared with a control group.[10] Those findings are in accordance with those of a recent study[15] suggesting a decrease in pain in patients with FM obtained through an improvement in sleep quality, as in the present study.

Other findings in this study correlated PSQI and FIQ: the greater the change in the PSQI component 2, the greater the change in FIQ. This means that, when the score of PSQI component 2 (sleep latency) increases, the total FIQ score also increases. This confirms the importance of assessing sleep quality by use of PSQI, when the impact of disease on the quality of life of patients with FM is high. In addition, that finding translates the importance of global assessment, associated with a treatment involving the different factors affected in the life of those patients.

Studies have applied the cognitive-behavioral therapy (CBT) to sleep[10] and pain[16,17] in patients with FM. In their study, Edinger et al.[10] have concluded that CBT applied to sleep is more effective than sleep hygiene instructions, and those two interventions are more effective than the medicamentous intervention usually performed in patients with FM. However, sleep hygiene has provided favorable results regarding pain and mental well-being, as in our study.

The changes in habits in both groups were not controlled. Some variables, such as coffee ingestion, type of food, and characteristics of the sleep environment were assessed before and after treatment. A statistically significant change was observed only in the sleep environment. Nevertheless, a reduction in the pain VAS and fatigue values was observed after treatment

in the experimental group. Thus, it is believed that if other sleep hygiene recommendations are followed, the benefit regarding sleep will be even greater, thus improving the quality of life and mental health of patients with FM.

CONCLUSION

A booklet with sleep hygiene instructions allowed changing the behavior of patients, whose pain and fatigue improved, increasing the subjective quality of sleep, and facilitating falling asleep after waking up in the middle of the night.

This study shows that sleep hygiene can benefit the quality of sleep of patients with FM. Further studies should be conducted, more effectively controlling the changes in the life habits of patients practicing sleep hygiene.

The sleep hygiene instructions handed to patients of the experimental group were obtained from articles about the non-medicamentous treatment of chronic insomnia and treatment of sleep disorders in the elderly. There are few studies using those instructions for patients with FM. Thus, there is no consensus in the literature about evidence-based instructions and those more indicated for that type of patient, limiting the results and conclusions.

Neither the medicines used by the patients at the beginning of the study nor the medicamentous changes asked by the doctors during the three months of study were controlled, limiting the results and the conclusion. In addition, there was no control of the baseline characteristics regarding sedentary lifestyle and body mass index. This study had no blind examiner, which also limited the results and the conclusion.

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