



# Does physical exercise improve quality of life in patients with fibromyalgia?

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## Abstract

**Background** To compare patients with active and inactive fibromyalgia to better understand the impact of physical inactivity on quality of life and symptoms in these patients.

**Methods** A total of 304 patients were eligible for the study, 20 were excluded for reasons of health, work, or unavailability to perform the collection. Data were collected to assess sociodemographic and clinical characteristics, physical exercise, sleep, and quality of life. Patients were classified as active (performed physical exercise) or inactive (did not perform physical exercise). Sleep was assessed using the Pittsburgh Sleep Quality Index and quality of life was assessed using the Fibromyalgia Impact Questionnaire.

**Results** Of the 284 final participants, 97.9% were women, with a mean age of  $50.39 \pm 10.31$  years. Most did not exercise regularly and did not work, and most used antidepressant drugs and muscle relaxants. Patients who exercised regularly had a better overall quality of life than those who did not; moreover, inactive patients had a 1.77-fold likelihood of a greater impact on quality of life, and those with poor sleep quality had a 10.79-fold likelihood.

**Conclusions** Our results reinforce the understanding that exercise can reduce symptoms of fibromyalgia and suggests that patients who practice physical exercise have a better quality of life, with fewer depressive symptoms and absences from work, and better sense of well-being.

**Keywords** Exercise · General health · Rheumatic diseases · Sleep quality

## Introduction

Fibromyalgia (FM) is one of the most common rheumatic diseases. It is estimated that on average 2.7% of the global population has FM, ranging from 2.1 to 6.4%, depending on the country analyzed [1–3]. The etiology of FM is still unknown and has been the subject of debate and scientific investigation. Some authors found that patients with FM had a low degree of chronic inflammation [4]. However, the most accepted hypothesis is central sensitization, i.e., patients with FM have an exacerbated activation of the pain matrix in the central nervous system, a lower pain threshold, and deficiency in the descending system of pain modulation [5].

The diagnosis of FM is made through careful clinical evaluation, as no blood tests or imaging and histological studies are able to detect significant changes in patients with and without the disease [6]. Thus, in clinical practice, the diagnosis is made using these criteria: presence of symptoms for a minimum of 3 months; diffuse pain index  $\geq 7$  and symptom severity scale score  $\geq 5$ ; or diffuse pain index 3–6 and severity scale score  $\geq 9$  [7]. In addition to pain, the most common symptoms in these patients are sleep disturbances, fatigue, memory failure, depression, and anxiety, which are directly related to poor quality of life (QoL) [6, 8]. Thus, the impact of FM on QoL is a relevant topic for patients and health professionals.

Studies comparing the QoL in FM patients and healthy individuals of the same age show that FM has a negative impact [9, 10], because the symptoms affect daily routine and physical activities, causing patients to enter a vicious cycle [11, 12]. One of the symptoms that appear to be associated with a poorer QoL is sleep disturbance [13]. Sleep disturbance is also associated with a greater number of FM symptoms, reinforcing the existence of a vicious cycle in these patients [14].

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As FM incurable and has a negative impact on QoL, several treatment strategies have been studied, including the use of medications such as amitriptyline and cyclobenzaprine, as recommended by the American Pain Society and the Association of Scientific Medical Societies in Germany, as well as alternative treatments such as physical exercise, hydrotherapy, massage, yoga, and acupuncture [15–17].

Among the proposed treatment alternatives, physical exercise has been recommended for patients with FM [6, 16, 18]. However, many patients have sedentary behavior, and are less likely to exercise than their healthy peers [19, 20]. Current studies demonstrate that women with FM spend 48–71% of awake time in sedentary behaviors, performing activities that do not require an increase in energy consumption [19–21]. Thus, despite recommendations, most patients do not perform physical exercise.

On the other hand, patients who practice physical exercise show improvement in FM symptoms, including better pain modulation [22], lower rates of depression [23], better quality of sleep [24], better QoL [25], and overall better health [26]. In addition, the impact of FM symptoms is greater in patients with a lower physical fitness index when compared with those with a higher index [27]. However, a better understanding is needed of the relationships between physically active and sedentary lifestyles in patients with FM and the overall impact on health and QoL. Thus, the present study aimed to compare the QoL in active and inactive FM patients.

## Methods

### Participants

The study sample consisted of patients residing in the region of Florianópolis, state of Santa Catarina, Brazil. The patients were recruited from the Health and Sports Sciences Center of the State University of Santa Catarina and by means of referral from the hospitals in the region. In order to obtain a representative FM population in Florianópolis, the sample size needed was 159 patients. Initially, 304 patients with a diagnosis of FM were eligible to participate in the study. Inclusion criteria were age  $\geq 18$  years and a clinical diagnosis of FM [7, 28]. Of the 304 patients, 20 were excluded for reasons of health, work, or unavailability to perform the collection. Therefore, 284 patients with a clinical diagnosis of FM were included in the final sample, with a mean age of  $50.39 \pm 10.31$  years.

### Procedures

The researchers contacted patients with FM by telephone, explaining the objectives of the study and inviting them to participate. Data collection was scheduled and performed at the Health and Sports Sciences Center. The patients were

informed about the objectives and relevance of the study, and how the data collection would be performed. After signing a consent form, the patients were asked to respond to instruments referring to sociodemographic and clinical characteristics, physical exercise practices, and QoL.

This research was approved by the Research Ethics Committee Involving Human Beings of the State University of Santa Catarina, number 24584213.0.0000.0118.

## Outcome measures

### Sociodemographic and clinical aspects

Self-reported questionnaires were used to collect data on sociodemographic characteristics, including sex, age, educational level, marital status, and occupation, as well as on physical exercise. Participants reported the mode and weekly frequency of physical exercise, similar to the method used by Andrade et al. [25]. The participants were classified as inactive (no exercise) or active (performed physical exercise). The minimum time for the exercise to be considered active was 30 min per session; however, the intensity was not considered.

### Fibromyalgia Impact Questionnaire

The Fibromyalgia Impact Questionnaire (FIQ) is an instrument used to measure the impact of FM on patient health status and QoL, and was developed by Burckhardt et al. [29]. This instrument is divided into 10 items, totaling 19 questions, with scores of 0 to 10; the higher the score, the greater the impact of FM on QoL. The items assessed functional ability: sense of well-being, absence from work, ability to work, pain, fatigue, morning tiredness, and stiffness; and psychological aspects: anxiety and depression during the prior week.

### Pittsburgh Sleep Quality Index

The Pittsburgh Sleep Quality Index (PSQI) for patients with FM was used in a version adapted to the Brazilian population [14, 30]. This questionnaire focuses on aspects related to sleep during the prior week. The sum of the PSQI is based on results in 7 domains of sleep analysis, including latency, duration, subjective quality, efficiency, disorders, use of sleeping medication, and daytime dysfunction. This instrument allows classification of sleep quality as good (0–5 points) or poor (above 5).

### Statistical analysis

Data analysis was performed using the IBM SPSS software (version 20.0), with descriptive statistics (mean, standard deviation, frequency, and percentage) and inferential statistics. Normal distribution of data was determined using the Kolmogorov-Smirnov test. The Mann Whitney *U* test was

used to compare the aspects of QoL in active and inactive patients. The association between the impact on QoL and other variables was verified by a gross and adjusted binary logistic regression showing the odds ratios and respective confidence intervals. Data were adjusted for demographic variables (civil status, employment), physical exercise practice, and sleep quality. For all tests, the *p* value was < 0.05.

### Results

Of 284 patients with a diagnosis of FM, 65.8% did not exercise. Moreover, 71.8% did not work, 52.5% used antidepressant drugs, 52.1% used muscle relaxants, 97.9% were women, and 93.6% had poor sleep quality (Table 1). Most patients who said they were physically active performed aerobic exercise (58%) or hydrotherapy (17.3%), with fewer than 10% performing other modalities (bodybuilding, Pilates, yoga, dancing, or stretching).

Patients who exercised regularly had a better QoL compared with those who did not exercise (*p* = 0.007), and showed better results in well-being (*p* = 0.007), work absences (*p* = 0.048), and depression (*p* = 0.001) (Table 2).

A crude analysis of the binary logistic regression data showed associations between sleep quality and QoL and between exercise practice and QoL in patients with FM. The adjusted analysis showed that inactive patients had a 1.77-fold

likelihood of a greater impact on QoL, and those with poor sleep quality had a 10.79-fold likelihood, as shown in Table 3.

### Discussion

The results confirmed our initial hypothesis, demonstrating the importance of regular physical exercise for patients with FM. It was observed that patients who practiced physical exercise showed improvement in several aspects related to QoL, such as general well-being, lower rates of depression, and fewer work absences.

Studies have shown that physical exercise is widely recommended for the treatment of FM [18, 31–33]. Patients who maintain a regular exercise program demonstrate a lower impact of FM on QoL [25, 34]. Gavi et al. [34] submitted patients with FM to interventions with physical exercise, and found that strengthening and stretching improved depression, anxiety, and QoL. A similar result was reported by Assumpção et al. [35], who found that although symptoms improved in both groups, stretching exercise was more effective in improving QoL, especially in domains of physical functioning and pain, while strengthening exercise was more effective in reducing depression. These results corroborate the findings of the present study, in which patients who reported practicing physical exercise had better QoL than inactive patients.

**Table 1** Sociodemographic and clinical characteristics of patients with fibromyalgia

|                                | General<br>( <i>n</i> = 284) | Active<br>( <i>n</i> = 97) | Inactive<br>( <i>n</i> = 187) | <i>p</i> value |
|--------------------------------|------------------------------|----------------------------|-------------------------------|----------------|
| Age, mean ± SD (years)         | 50.39 ± 10.31                | 51.63 ± 9.17               | 49.75 ± 10.82                 |                |
| Sex, <i>n</i> (%)              |                              |                            |                               |                |
| Female                         | 278 (97.9)                   | 94 (96.9)                  | 184 (98.4)                    | 0.40           |
| Male                           | 6 (2.1)                      | 3 (3.1)                    | 3 (1.6)                       |                |
| Quality of sleep, <i>n</i> (%) |                              |                            |                               |                |
| Good quality                   | 18 (6.4)                     | 8 (25.8)                   | 10 (29.4)                     | 0.36           |
| Poor sleep quality             | 262 (93.6)                   | 89 (74.2)                  | 173 (70.6)                    |                |
| Marital status, <i>n</i> (%)   |                              |                            |                               |                |
| With partner                   | 165 (58.1)                   | 65 (67.0)                  | 100 (53.5)                    | 0.028          |
| Without partner                | 119 (41.9)                   | 32 (33.0)                  | 87 (46.5)                     |                |
| Work, <i>n</i> (%)             |                              |                            |                               |                |
| Yes                            | 80 (28.2)                    | 25 (25.8)                  | 55 (29.4)                     | 0.51           |
| No                             | 204 (71.8)                   | 72 (74.2)                  | 132 (70.6)                    |                |
| Use of medicines, <i>n</i> (%) |                              |                            |                               |                |
| Antidepressant                 | 149 (52.5)                   | 49 (50.5)                  | 100 (53.5)                    | 0.63           |
| Muscle relaxants               | 148 (52.1)                   | 59 (60.8)                  | 89 (47.6)                     | 0.034          |
| Somniferous                    | 59 (22.0)                    | 14 (15.7)                  | 45 (25.1)                     | 0.80           |
| Analgesic                      | 141 (49.8)                   | 47 (48.5)                  | 94 (50.5)                     | 0.73           |

For the missing data, the total number of patients evaluated does not result in the total *n*

**Table 2** Comparison of FM impact on the quality of life of active and inactive patients

| FIQ                | General<br><i>n</i> = 284 ( $\bar{x} \pm SD$ ) | Active<br><i>n</i> = 97 ( $\bar{x} \pm SD$ ) | Inactive<br><i>n</i> = 187 ( $\bar{x} \pm SD$ ) |
|--------------------|--|--|---|
| Physical function  | 4.38 ± 2.53                                    | 4.14 ± 2.60                                  | 4.50 ± 2.50                                     |
| Well-being         | 6.94 ± 3.00                                    | 6.37 ± 2.94*                                 | 7.25 ± 3.00                                     |
| Work absences      | 3.41 ± 3.53                                    | 2.86 ± 3.45*                                 | 3.69 ± 3.55                                     |
| Difficulty at work | 7.57 ± 6.09                                    | 6.98 ± 2.93                                  | 7.87 ± 7.20                                     |
| Pain               | 7.84 ± 2.30                                    | 7.54 ± 2.41                                  | 7.99 ± 2.32                                     |
| Fatigue            | 7.93 ± 6.11                                    | 7.33 ± 2.66                                  | 8.24 ± 7.28                                     |
| Morning tiredness  | 7.46 ± 2.67                                    | 7.32 ± 2.51                                  | 7.53 ± 2.75                                     |
| Stiffness          | 7.49 ± 2.71                                    | 7.03 ± 3.04                                  | 7.73 ± 2.51                                     |
| Anxiety            | 7.29 ± 2.99                                    | 6.94 ± 2.99                                  | 7.47 ± 3.00                                     |
| Depression         | 6.53 ± 3.26                                    | 5.77 ± 3.21*                                 | 6.92 ± 3.23                                     |
| Total FIQ          | 65.58 ± 19.08                                  | 62.19 ± 19.20*                               | 67.33 ± 18.82                                   |

Values are expressed as mean ± standard deviation

\*Significant difference with  $p < 0.05$

FIQ Fibromyalgia Impact Questionnaire

In the present study, active patients had lower scores in the well-being and depression domains of the FIQ, indicating lower impact of FM symptoms. This result is consistent with studies indicating that psychological symptoms are related to QoL [36, 37]. Garcia-Martinez et al. [38] reported that improvement in QoL was attributed to the psychological benefits of exercise. Our study also found that inactive patients were more likely to have severe impairment of QoL than patients who practice some physical exercise. Thus, the practice of physical exercise can be considered a protective factor for the QoL in these patients.

Although pain is the main symptom of FM, studies show that these patients have high rates of sleep disorders and that these variables are correlated [24]. Other studies have shown that sleep disturbances are associated with the presence of cognitive symptoms, such as difficulty concentrating and

memory failure [14, 39]. Moreover, our results reveal that patients with poor sleep quality were 10 times more likely to experience a negative impact on quality of life, similar to the findings reported by Liedberg et al. [40]. The authors found that patients with poor sleep quality had impaired QoL in the physical, emotional, and social domains.

Due to chronic pain, patients with FM often use medications to relieve symptoms [18, 41]. Of the patients in our sample, 52.5% used antidepressants, 52.1% used muscle relaxants, and 49.8% used analgesics. Only 22% reported using sleeping pills, although 93.6% of participants had poor sleep quality. The study by Bennet et al. [41] showed similar results, in which 63% used antidepressants and 66% used analgesics. However, 52% of the patients in their study reported using sedatives.

Although drug treatment is recommended to alleviate symptoms, recurrent use increases costs to the patient and

**Table 3** Binary logistic regression analysis between the impact on quality of life and sociodemographic variables of patients with FM

|                    | Crude OR          | <i>p</i> value | Adjusted OR        | <i>p</i> value |
|--------------------|-------------------|----------------|--------------------|----------------|
| Marital status     |                   |                |                    |                |
| With partner       | 1                 |                | –                  | –              |
| Without partner    | 1.17 (0.70–1.96)  | 0.53           | –                  | –              |
| Work               |                   |                |                    |                |
| Yes                | 1                 |                | 1                  |                |
| No                 | 1.38 (0.80–2.41)  | 0.24           | 1.69 (0.94–3.03)   | 0.076          |
| Quality of sleep   |                   |                |                    |                |
| Good quality       | 1                 |                | 1                  |                |
| Poor sleep quality | 9.60 (3.05–30.14) | < 0.001*       | 10.79 (3.36–34.61) | < 0.001*       |
| Exercise practice  |                   |                |                    |                |
| Yes                | 1                 |                | 1                  |                |
| No                 | 1.78 (1.05–3.01)  | 0.030*         | 1.77 (1.02–3.08)   | 0.041*         |

\*Hosmer-Lemeshow Fit Quality (0.95)

the public health system [42]. Lacasse et al. [43] evaluated patients with FM and estimated expenditures for medication of \$950.00 for the prior 3 months, and \$3084.00 per year. These data reinforce the importance of seeking effective treatment alternatives for this population, since physical exercise has been shown to be effective in reducing depression, pain, and sleep disorders, as well as improving the QoL of patients with FM [18, 44, 45], thus reducing the need for pharmacological treatment.

As FM mainly affects adults and reduces functional capabilities, absence from work is common, decreasing productivity in this population by 65% [46, 47]; it is estimated that patients with FM miss work on average 5.59 days per month [43]. In our sample, active patients not only had a better QoL but also were less likely to miss work.

Although 82% of FM patients are aware of its importance and benefits in the treatment of FM [48], physical exercise is still not a common habit in most [20, 49]. Thus, it is important to create strategies to reduce sedentary lifestyles in these patients.

Our study has limitations. Physical exercise may be a protective factor, reducing the negative impact of FM on the QoL in these patients. However, cross-sectional studies do not demonstrate a cause and effect association; therefore, experimental studies are needed to verify the effect of physical exercise on reducing the impact of FM on the QoL in these patients. In addition, it was not possible to compare the effects of different exercise modalities, making it difficult to determine the most appropriate exercise intensity for treatment of symptoms.

## Conclusion

Our results suggest that physically active patients with FM have less impairment of QoL, fewer depressive symptoms, better perception of well-being, and less absence from work. In addition, patients with poor sleep quality are more likely to experience a severe impact on QoL.

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## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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