Research

Putting Research into Practice: A Comprehensive 12 Week Exercise Protocol for Fibromyalgia

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Abstract

Fibromyalgia is a chronic condition that most often affects young to middle-aged women. According to the American College of Rheumatology, it is diagnosed by the presence of widespread musculoskeletal pain for at least 3 months and excessive tenderness in at least 11 out of 18 defined tender points. Currently there are no definitive diagnostic laboratory tests or imaging for fibromyalgia. Its cause is still unknown. The purpose of this appraisal was to evaluate the effectiveness of aerobic training-based exercise programs compared to other types of physical activity on the symptomatology of fibromyalgia. Searches on PubMed/MEDLINE databases using key words, pool exercise, fibromyalgia, aerobic fitness and home-based exercise, were performed to identify articles comparing different exercise regimens. A treatment protocol was developed based on the articles identified.

Background and Etiology

There is no known cause of fibromyalgia, however, some theories exist. Many sufferers of fibromyalgia have been through physical or emotional trauma, which is thought to be a possible trigger. There is also
thought to be a physiologic cause; the area in the brain that is responsible for pain may not function the same in patients who have fibromyalgia or they may have a decrease in certain neurotransmitters responsible for detection of pain. Some researchers also believe that fibromyalgia patients could have contracted a virus preceding their symptoms and diagnosis of fibromyalgia.

Chronic widespread pain is the hallmark symptom of fibromyalgia. Also, fibromyalgia patients tend to have a lower pain threshold than healthy people. Another typical finding in patients with fibromyalgia is extreme fatigue. About 90% of patients suffer from lack of restorative sleep, especially stage four sleep, which is markedly deficient in fibromyalgia patients. This acts to further exacerbate their pain levels. Another common symptom for these patients is commonly called “fibro fog.” This is where the patients will have trouble with memory and impaired cognition, and will function similarly to subjects nearly twenty years their senior.

Fibromyalgia is a disorder that is characterized by an increased sensitivity to pain. According to the International Association for the Study of Pain, “pain” is described as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” Pain receptors of the body are known as nociceptors, that when stimulated, send signals to multiple regions of the brain through the spinal cord. These regions are the emotional, autonomic, discriminative, and motor/reflex centers. During the pain response, the hypothalamic-pituitary-adrenocortical (HPA) axis and the sympathetic nervous system are also activated. These specific stress responses in patients with chronic pain syndromes, such as fibromyalgia, may be maladaptive. Since the perception of pain travels through the emotional centers of the brain, patients with fibromyalgia should be counseled on certain cognitive aspects due to the constant stressors placed on the system. These negative emotions on the system have been shown to lead to self-sustaining neuroendocrine cascades that can lead to the patient developing flu like symptoms, depression, and fatigue. Serotonin has been associated with fibromyalgia. In patients with fibromyalgia, the levels of serotonin have been shown to be lower than normal. These low levels are thought to be the result of low levels of tryptophan and 5-hydroxyindole acetic acid in the CSF. Substance P, a neurotransmitter located in the nervous system, increases when there is sensitivity of nerves to pain or heightened awareness of pain. In patients with fibromyalgia, Substance P levels have been found to be 2-3 times higher than normal in the CSF.

Clinical Question

In middle aged women with fibromyalgia, does a comprehensive workout designed to increase strength, aerobic capacity, and provide stimulation for the brain have a greater impact on the symptoms of fibromyalgia over a 12 week span than current treatments of cognitive behavioral therapy coupled with aerobic activities and pharmacological therapy?

Methods

The database used was PubMed/MEDLINE. After deciding on our topic of fibromyalgia, we then chose to take a broader stance toward exercise intervention. We chose to research multiple exercise topics including: pool exercises, aerobic exercise and home-based exercise. To obtain articles pertaining to fibromyalgia and our exercise topics, we used the key words: pool exercise, fibromyalgia, aerobic fitness and home-based exercise for fibromyalgia. The results of this search yielded 82 articles and the articles that were selected were: “Pool exercise for patients with fibromyalgia or chronic widespread pain: a
A summary of the three identified articles follows.

**Article 1:** “Pool exercise for patients with fibromyalgia or chronic widespread pain: a randomized controlled trial and subgroup analyses”

In the first article by Mannerkorpi et al., the authors’ aim was to investigate the effects of supervised physical exercise on health status and body functions in patients with fibromyalgia or chronic widespread pain, analyzing whether the level of pain, distress, stress and activity limitations influenced the outcomes. The study compared the effects of a 20-session exercise program (pool exercise) combined with a standardized 6-session education program based on self-efficacy principles with an active control group.

**Results.** The results of this study showed that the primary outcome measures tested, FIQ and 6MWT, had different improvements. There was a significantly greater improvement (p=0.040, z=-2.049) for change in the FIQ Total in the exercise-education program (-4.8, SD 13.2) compared to the control group (-0.7, SD 12.2), while there was no significant change in the 6WMT for the exercise-education program (7.5, SD 53.5) compared to the control group (-2.0, SD 63.2). As for the secondary outcome measures, there was significant improvement (p=0.018, z=-2.370) in the FIQ pain in the exercise-education group (-7.8, SD 22.6) compared to the control group (1.7, SD 19.5). For the exploratory outcomes, there was significant change in the MFI-20 (0.3, SD 3.2) and the Activity-related Relaxation (0.2, SD 1.4).

**Conclusions.** Based on the results, an exercise-education program improved health status in fibromyalgia patients and chronic widespread pain patients, which was similarly found across the board in other studies.

**Article 2:** “A randomized clinical trial of an individualized home-based exercise program for women with fibromyalgia”

For the second article by Da Costa et al., the authors aimed to evaluate the efficacy of a 12-week individualized home-based exercise program on physical functioning, pain severity and psychological distress for women with fibromyalgia. The authors hypothesized that subjects who engaged in the home-based exercise protocol would show significant improvements in physical and psychological health outcomes compared to the control group.

**Results.** Results of this study showed that for the FIQ, the mean changes in the control group was very close to zero, in contrast to a significant decrease for the exercise group. Also, the mean decrease from the baseline FIQ in the exercise group is marginally larger than in the control group at the end of the 12-week program and 3 months later (0.05 < P < 0.10 for two tailed t-test) and the difference is significant at 9 months post-treatment (P<0.01). The decrease in psychological distress at 3 and 9 months post-
treatment were significant only in the exercise group, but the difference between the two groups was not significant. For the FIQ and upper body pain, the between-groups differences are statistically significant and clinically important, corresponding to about 20% of the baseline mean values. The study also suggests that due to the statistically significant interactions for the FIQ, the impact of the intervention should be assessed separately for subjects with low and high initial FIQ score.

Conclusions. From this information, the authors found that a 12-week individualized home-based exercise program targeting moderate intensity to be effective in significantly improving health status. Their results also show that it may take up to 3 months to achieve improvements in overall health status with exercise, but improvements in upper body pain can be demonstrated 12 weeks after initiation of exercise. Although this study’s results are similar to other exercise studies in improvements of overall health, this is not seen as a consensus in all the literature involving exercise.

Article 3: “Aerobic Fitness Effects in Fibromyalgia”

For our third article by Valim V et al, the purpose of this study was to compare two exercise modalities and their effects on various issues of fibromyalgia.

Results. The results concluded that stretching should not be considered a placebo intervention because the patients that were a part of this group showed benefits. However, the stretching group did not show significant benefits in the emotional and psychological aspects. They showed that aerobic exercises can benefit chronic painful conditions through several mechanisms.

Conclusions. This study illustrates the effectiveness of an aerobic program on a patient with fibromyalgia. In the aerobic group, 66% percent of patients gained more than 15% of VO2max improvement.

A Comprehensive 12 Week Exercise Protocol for Fibromyalgia

After summarizing each article, we decided to put clinical research into practice by developing an evidence-based exercise protocol for patients presenting with fibromyalgia.

In an effort to help treat fibromyalgia, it is important to note the chronic fatigue that most clients with fibromyalgia deal with on a daily basis. With that said, the overall intensity has a limiting factor. Over a 12-week exercise program for clients with fibromyalgia, low to moderate intensities will be utilized with one high-intensity week. Exercise methods will include walking/jogging or biking, light resistance training that can be done at their home, yoga classes administered by an instructor, and water aerobics classes.

The purpose of this program is to increase the overall quality of life for those with fibromyalgia. Increasing resting fatigue levels can help improve the ease of everyday tasks, and can enhance one’s overall mental health. The yoga sessions can help improve mental health and have physiological benefits as a result of the stretches and various poses that will build core strength. The light-to-moderate aerobic and resistance training will help improve resting fatigue levels by the end of the 12-week program. Measures to test the progression of fatigue will be to implement a 1.5 mile walk test at the beginning of week 1 and at the end of week 12 and recording resting heart rate and blood pressure before and after the 1.5 mile walk in each of the 2 tests. Other physiologic factors expected to improve are blood

measures.
pressure, VO2max and insulin growth-factor 1. Blood tests focused on levels of IGF-1 will be taken before week 1 and after week 12 as well. Studies have shown minimal results regarding improvements in IGF-1, however the specific study researched merely implemented a Nordic Walking protocol that resulted in an overall decrease in daily pain for the subjects with fibromyalgia. The increases to our revised program should indicate increases in IGF-1 due to the resistance training as well as the other variables implemented within the 12-week program.

The exercise protocol will begin with aerobic training and yoga in week 1. The intensity, relative to the subject’s max heart rate (maxHR) for week 1 will be 40%, week 2 @ 50%, week 3 @ 60%, weeks 4 and 5 @ 55%, week 6 @ 65%, weeks 7, 8 and 9 @ 70%, week 10 @ 75%, week 11 @ 80% and week 12 @ 60%. A yoga class will be taken two times per week, and the classes will last one hour each. Breathing, stretching, meditation and varieties of poses will be implemented by the yoga instructor. Water aerobics will be implemented in week 2 and will take place once per week throughout the remainder of the exercise protocol.

Every week during the 12-week program will include aerobic work on cardio devices such as the treadmill, stationary bike/cycle and elliptical while using the aforementioned intensities of the client’s maxHR. Week 1 will also involve two yoga sessions. Week 2 will add a water aerobics class in addition to the yoga/aerobic exercise. The water aerobics class will last 45 minutes per session and involve the use of floatation devices, kickboards, and aquatic resistive dumbbells. Moving on, week 3 will begin to establish the light resistance training at home by implementing step-up exercises with dumbbells, body weight squats, pushups, and a series of rowing exercises to strengthen the back and shoulders. Weeks 7-12 will implement all existing variables at different frequencies and intensities, as listed above. In addition to aerobic intensities, adding weight, increasing the height of the step-up device and decreasing the amount of rest between sets will serve as measures to promote muscular overload.

The ultimate goal of this 12-week exercise program is to help treat subjects with fibromyalgia by training to increase their overall quality of life. The yoga classes will serve to help build strength and improve flexibility, while introducing a calming affect for the subject. Attention will be paid to proper breathing and relaxation techniques during yoga sessions, which should help decrease stress and help with sleep. If the brain can be stressed in a manner that promotes cognitive thinking and clarity, a reduction in stress and depression and an increase in energy and daily function are expected at the conclusion of this 12-week protocol. Resistance training methods utilizing dumbbells and Therabands will serve as a variable within the program to increase lean body mass and thus reduce percent body fat while increasing serum levels of IGF-1 in the blood. Water aerobics should help with strength and stability, improve aerobic respiration, and will be a form of social interaction. Overload can be achieved in the resistance exercises by gradually increasing the weight of the dumbbells or the thickness of the Therabands. An outline of this protocol with the progression is outlined below.
## Exercise Progression

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
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<tbody>
<tr>
<td>Aerobic@40% 5 times Yoga 2 times</td>
<td>Aerobic@50% 4 times Yoga 2 times Aqua Therapy 1 time</td>
<td>Aerobic@60% 3 times Yoga 2 times Aqua Therapy 1 time Aerobic/RT 3 times</td>
<td>Aerobic@55% 3 times Yoga 2 times Aqua Therapy 1 time Aerobic/RT 3 times Art Class 1 time</td>
<td>Aerobic@55% 3 times Yoga 2 times Aqua Therapy 2 times Aerobic/RT 3 times Art Class 1 time Music Class 1 time</td>
<td>Aerobic@65% 3 times Yoga 2 times Aqua Therapy 2 times Aerobic/RT 3 times Art Class 1 time Music Class 1 time</td>
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<table>
<thead>
<tr>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
<th>Week 11</th>
<th>Week 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic@70% 3 times Yoga 2 times Aqua Therapy 3 times Aerobic/RT 2 times Art Class 1 time Music Class 1 time</td>
<td>Aerobic@70% 3 times Yoga 2 times Aqua Therapy 3 times Aerobic/RT 2 times Art Class 1 time Music Class 2 times</td>
<td>Aerobic@70% 3 times Yoga 2 times Aqua Therapy 3 times Aerobic/RT 2 times Art Class 1 time Music Class 2 times</td>
<td>Aerobic@75% 3 times Yoga 2 times Aqua Therapy 3 times Aerobic/RT 2 times Art Class 1 time Music Class 2 times</td>
<td>Aerobic@80% 2 times Yoga 2 times Aqua Therapy 3 times Aerobic/RT 2 times Art Class 1 time Music Class 1 time</td>
<td>Aerobic@60% 4 times Yoga 2 times Aqua Therapy 1 time Aerobic/RT 3 times Art Class 2 times Music Class 1 time</td>
</tr>
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RT: Resistance Training

## Conclusion

Through the evaluation of these randomized controlled trials, we determined a combination of aqua aerobics, aerobic exercises, and at home resistance exercises over the course of a 12-week program would target specific needs of the patients. Additionally, we determined that because studies have shown that stretching “placebo” groups have experienced decreases in pain, yoga should be added to the protocol. Many sufferers of fibromyalgia have trouble sleeping and are in a constant state of stress, so the stretches along with the breathing and relaxation techniques could offer many benefits. Further study is warranted for individuals that suffer from fibromyalgia because the disease is complex and often misunderstood, due to the many manifestations. A comprehensive approach such as we have
outlined above to help these patients with their chronic pain, fatigue, and cognitive disturbances could prove to be what is necessary to treat this disease with its widespread symptomatology.

References


