

Fibromyalgia: Current Concepts for the Strength and Conditioning Professional

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ABSTRACT

FIBROMYALGIA IS A CHRONIC PAIN DISORDER THAT AFFECTS THE JOINTS, MUSCLES, TENDONS, AND SOFT TISSUE OF THE BODY. FIBROMYALGIA IS COMMONLY SEEN BY PRIMARY CARE PHYSICIANS, RHEUMATOLOGISTS, AND REHABILITATION PROFESSIONALS. IT IS ESTIMATED THAT 5 MILLION AMERICANS ARE AFFECTED BY FIBROMYALGIA. THE CONDITION HAS A PREDILECTION FOR WOMEN AGED 35–60 YEARS AND HAS BEEN ASSOCIATED WITH CHRONIC SYMPTOMS. GIVEN THE POTENTIAL FOR CHRONICITY, THERE IS A NEED FOR THE STRENGTH AND CONDITIONING PROFESSIONAL TO FURTHER UNDERSTAND HOW TO MANAGE THIS DISORDER. THIS ARTICLE WILL DISCUSS THE MOST CURRENT EVIDENCE REGARDING THE MANAGEMENT OF FIBROMYALGIA USING DIFFERENT MODES OF PHYSICAL ACTIVITY.

Fibromyalgia is a chronic pain disorder that affects various structures of the body including joints, muscles, tendons, and soft tissue (32). Fibromyalgia is commonly seen by primary care physicians, rheumatologists, and rehabilitation professionals.

The point prevalence of fibromyalgia was estimated to be 5 million among adults in the United States in 2005 and has a higher predilection for women aged 35–60 years of age (26,51). With such prevalence, there is a need to further understand how to manage this disorder. Research has shown the benefits of various modes of exercise in the management of this disorder (23,24). Given the prevalence of fibromyalgia and the research supporting physical activity among this population, it is likely that strength and conditioning (S & C) professionals will encounter these individuals. Thus, S & C professionals need to understand the condition as well as appropriate exercise management strategies and precautions. The services provided by the S & C professional are often part of a multidisciplinary approach that involves other health professionals such as physicians or physical therapists, thus communication will be an essential consideration to ensure the most effective outcomes. The purpose of this article is to describe the clinical characteristics of fibromyalgia as well as the most current evidence regarding management of these individuals using various modes of physical activity.

BACKGROUND

A better understanding of the pathophysiology and related symptoms of fibromyalgia have developed over the past 2 decades. Fibromyalgia has traditionally

been categorized as a rheumatic-like disorder with widespread muscular pain and accompanying psychological factors such as anxiety and depression (32). More current hypotheses suggest that fibromyalgia is caused by neurochemical imbalances in the central nervous system that are associated with a heightened pain perception (13,22). Fibromyalgia can be considered a central processing disorder where the ascending and descending neurological pathways operate abnormally, which create amplified pain sensations. This creates a heightened sensitivity to stimuli, which is called allodynia, and a heightened response to painful stimuli called hyperalgesia (13,22). Thus, S & C professionals need to understand that clients with fibromyalgia may report a heightened pain response with certain activities or exercises.

CLIENT PRESENTATION

According to the American College of Rheumatology 1990 guidelines, the client diagnosed with fibromyalgia will present with the hallmark symptom of bilateral chronic widespread pain above and below the waist with pain in the axial skeleton that has lasted longer than 3 months (50). Eighteen specific points have been identified

KEY WORDS:

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Tender Points of Fibromyalgia

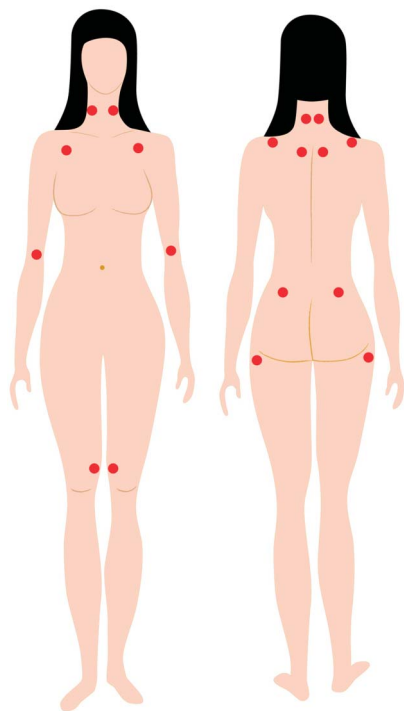


Figure 1. Fibromyalgia tender points.

and are often referred to as “tender points.” Individuals must have palpable pain in 11 of 18 tender points to be diagnosed (Figure 1) (50). The pain often is described as a “deep ache” or a “shooting burning” pain, and the client may also suffer from fatigue and sleep disturbances. These symptoms have been coined as the triad of primary symptoms (4,43). Other signs and symptoms may include depression, anxiety, cognitive difficulties (e.g., poor

concentration), balance problems, irritable bowel syndrome, headaches, tenderness, stiffness, tingling and numbness, and restless leg syndrome (Table 1) (5,44). Associated risk factors include a familial predisposition with first relatives having the highest risk, physical trauma or injury, stress, and infections such as hepatitis C (4,43).

For the S & C professional, it is important to recognize that the client’s symptoms may fluctuate in intensity and region day to day and they may report multiple areas of pain that affect their overall function. This will have to be considered when designing an exercise program. These clients will be susceptible to overexercising especially if they have been inconsistent with their exercise program or have not been physically active because of their pain levels.

INTERVENTIONS

Initial management of fibromyalgia may include referral to physical therapy, pharmacological therapy, acupuncture, lifestyle changes (e.g. eliminate stressors, improve sleep routines), dietary changes such as avoiding caffeine, and pain management such as cognitive-behavioral therapy or support groups (4). Exercise has also been shown as an effective intervention in the maintenance of this disorder (17). The effectiveness of various types of exercise has become an emerging topic among researchers to provide the best symptom management. Below, we will discuss the current evidence on commonly prescribed interventions

including aerobic exercise, resistance training, aquatic exercise, multimodal programs, lifestyle physical activity, and pharmacology. Other emerging interventions will be discussed including Pilates, tai chi, yoga and whole body vibration training.

AEROBIC EXERCISE

Aerobic exercise has shown good support in the literature for reducing symptoms, but the long-term efficacy has not been determined (8,45). Gowans and deHueck (19) and Gowans et al. (21) assessed the effects of a 23-week supervised aerobic program (3 times a week for 30 minutes) on physical function and mood in 29 individuals (mean age, 45.8 ± 1.6 years) at 6 and 12 months after the intervention. The outcome measures included the 6-minute walk test, Beck Depression Inventory, State-Trait Anxiety Inventory, patient global assessment score, Arthritis Self-Efficacy Scale, Fibromyalgia Impact Questionnaire, tender point count, and exercise compliance. They found that aerobic exercise was related to improvements in all measures at both follow-up sessions except for the tender points, which were unchanged (19,21). Thus, conventional aerobic exercise may have lasting effects up to 1 year, but further studies are needed to assess the long-term effects.

Another form of aerobic exercise that is gaining popularity is Nordic walking. Nordic walking is walking with poles that incorporates the upper extremity and allows for a faster gait when compared to walking without poles (28). In fact, a 15-week (2 times per week for 20 minutes) moderate- to high-intensity program has been found to improve functional capacity in a group of female individuals with fibromyalgia (28). This preliminary data show promise, but further studies are needed to assess its efficacy.

The primary concern for the S & C professional is the appropriate volume of aerobic exercise. A recent systematic review by Hauser et al. (23) provided further guidelines for aerobic exercise. Based upon their analysis of the literature (28 studies) through 2009, they

Table 1
Signs and symptoms of fibromyalgia

Primary signs and symptoms	Other signs and symptoms
Pain (tender points)	Depression, anxiety
	Cognitive difficulties, headaches
	Balance problems
Fatigue	Irritable bowel syndrome
	Tenderness, stiffness
Disturbed sleep	Tingling and numbness
	Restless leg syndrome

developed the following exercise recommendations: (a) aerobic exercise should consist of land-based or aquatic exercises, (b) exercise should last for 20–30 minutes, (c) intensity should be light to moderate, and (d) the frequency of exercise should be 2–3 times per week for at least 4 weeks (23). These recommendations may provide a starting point when designing an individualized program for the client with fibromyalgia.

STRENGTH TRAINING

The available evidence supporting the efficacy of strength training is comparable to aerobic training. Bircan et al. (6) compared both an 8-week aerobic walking program (e.g., 20–30 minutes at 60–70% maximum heart rate) and a progressive strengthening program for the upper- and lower-body using free weights and machines (4–12 repetitions [reps] for 30 minutes) in 30 female participants. They found that both aerobic walking and strengthening produced similar effects by improving symptoms, tender point count, fitness, mood, and quality of life (6). This is supported by systematic reviews that have shown favorable results of strength training but point out that it has been underevaluated and could only conclude that it may have a favorable influence (8,12).

Kingsley et al. (25) also found improved strength and physical function in a group of women (ages, 18–54 years) who underwent a 12-week training program. The participants exercised 2 times per week and performed 1 set of 8–12 reps at 40–60% of the 1RM and were progressed to 60–80% over the 12-week intervention period (25). In another study, Valkeinen et al. (47) found similar strength and functional gains in a group of older women (mean age, 62.2 years) who underwent a 21-week training program. For the first 4 weeks, participants conducted exercises under a light load (3 sets of 15–20 reps at 40–60% of 1RM). From weeks 4 to 12, the training progressed to more moderate loads (4 sets of 8–12 reps with a load of 60–70%) and from weeks 12 to 21, the participants' strength training intensified (3–5 sets of

5–10 reps with a load of 70–80% of 1RM) (47). Both of these studies have shown favorable outcomes through the use of a progressive resistive program.

These preliminary findings are promising, but there is still a need to further research the specific effects of strength training and to develop exercise guidelines. Future research should focus on developing guidelines that match the client with the appropriate resistance level.

AQUATIC EXERCISE

Research on aquatic exercise has demonstrated favorable outcomes in the treatment of fibromyalgia. Gowans and deHueck (20) conducted a systematic review of aquatic exercise studies (2000–2007) and found that aquatic exercise is an effective intervention for individuals with fibromyalgia. Munguia-Izquierdo and Legaz-Arrese (29) also found favorable results in middle-aged women with fibromyalgia who underwent a 16-week aquatic (pool) program (10 minute warm-up and cooldown, 10–20 minutes of strengthening, 20–30 minutes of aerobic exercise at 50–80% age-predicted maximum heart rate). They concluded that aquatic therapy 3 times per week for 16 weeks was effective in decreasing symptoms in middle-aged women (29). Other authors have found similar results that have lasted 6–24 months after completion of the program (27,46). Based on these results, aquatic exercise may be an effective adjunct activity to conventional aerobic and/or strengthening activity.

MULTIMODAL PROGRAMS

More recently, researchers have used a multimodal approach by combining various types of exercise such as aerobic, strengthening, and flexibility. Sanudo et al. (39) found improvements in self-reported quality of life, physical function, depression, and aerobic capacity in a group of female participants with fibromyalgia over a 3-year period. The authors trained the subjects with a combined exercise program for 6 months and detrained (no activity) them for 6 months over a 3-year period. They found positive effects after the training

periods when compared with a matched control group (39). Carbonell-Baeza et al. (9) found similar effects of a 3-month multimodal program consisting of low- to moderate-intensity pool and land-based activity and psychological sessions 3 times per week. The authors found significant results with the Fibromyalgia Impact Questionnaire and 36-Item Short-Form Health Survey. Reported improvements from these measures included less fatigue, stiffness, anxiety, depression, and pain. Improved social function and vitality were also reported by subjects (9). Other authors have found similar results 6 months to 1 year after a multimodal program (33,37). The comparison of multimodal versus single mode programs has not been investigated. The current evidence suggests that multimodal programs may be beneficial for individuals who begin to lose motivation or require a choice of exercise that will help manage their symptoms. Further research is needed that compares multimodal programs with single mode programs.

LIFESTYLE PHYSICAL ACTIVITY

Another intervention that has been recently studied is the effects of lifestyle physical activity. Lifestyle physical activity is a self-selected form of physical activity for individuals who cannot participate or have difficulty participating in conventional exercise. The goal is to work toward meeting the US Surgeon General's 1996 recommendations for physical activity of accumulating at least 30 minutes of moderate-intensity physical activity 5–7 days a week (17). This is accomplished by integrating short bouts of activity such as walking or gardening throughout the day that is above the individual's usual activity.

Fontaine et al. (17) did an initial study on the effects of accumulating 30 minutes of self-selected activity on pain, fatigue, perceived physical function, body mass index, depression, tenderness, and the 6-minute walk test in a group of 73 minimally active adults (mean age, 47.7 years) over a 12-week period. At the conclusion of the study, they found that accumulating 30 minutes throughout the

day over a 12-week period produced clinically relevant changes in perceived physical function and pain (17). Fontaine et al. (18) conducted a follow-up study at 6 and 12 months after the 12-week trial period. They found that at both 6 and 12 months, participants reported greater improvements, but the beneficial effects of lifestyle physical activity on physical activity, function, and pain were not sustained (18). The authors did state that the trial may have had longer lasting effects if it was combined with other motivational tools such as group interactions, self-monitoring on Web sites, and social networking.

Other authors have found positive results such as less fatigue, depression, and improved pain and physical function scores on the 36-Item Short-Form Health Survey when exercise is combined with self- and Internet-enhanced programs (37,49). Lifestyle physical activity programs may offer an effective alternative for clients who suffer from more severe symptoms and cannot participate in conventional exercise.

PILATES

Altan et al. (3) conducted the first pilot study that investigated the effects of a 12-week (3× per week for 60 minutes) Pilates program on pain, functional status, and quality of life in women with fibromyalgia and compared them with a matched control group. The authors assessed the effects at 12 and 24 weeks after the trial period. The Pilates program consisted of 9 modules: postural education, finding the neutral position, stretching exercise, sitting exercise, antalgic exercise, proprioceptive exercise, and breathing education. The authors also used resistance bands and Pilates balls (26 cm). The authors found that the Pilates group had superior outcomes in pain and function than the control group at the 12-week follow-up but no differences between groups at the final 24-week follow-up (3). The authors concluded that the superior results at 12 weeks may be because of the immediate supervision of the participants during their weekly program and that exercise compliance may have

diminished at the 24-week follow-up because of lack of supervision. Despite these results, the outcomes of this preliminary investigation are promising; however, further research is needed to assess the effectiveness of Pilates as a long-term intervention.

TAI CHI AND YOGA

Researchers have also looked at the effects of tai chi on the pain, function, and quality of life in individuals with fibromyalgia. Authors have found improved function and quality of life after a 12-week period (2 times a week for 60–90 minutes) in both men and women, improved lower body flexibility in men after a 4-month program (3 times a week for 60 minutes), and improvements in pain, function, and symptoms in women after a 7-month program (3 times per week for 60 minutes) (10,36,48). The interventions described in these studies consisted of a general warm-up, cool-down, and an 8- or 10-form classical Yang tai chi sequence that contained minor modification for individuals with fibromyalgia.

The effects of yoga have also been studied in individuals with fibromyalgia. Authors have found significant improvements in symptoms after an 8-week mindfulness-based yoga program (average 2 times a week for 75 minutes) (15,42). The interventions in these studies used the Hatha form of yoga, which included various postures (Asana), breathing exercises (Pranayama), brief meditation (Dhyana), and yoga philosophy teachings. Modifications were made with the various postures and sequencing to accommodate those individuals with functional deficits. Hatha appears to be an effective form of yoga because of the focus on relaxation techniques and gentle postures that can be tailored to specific populations.

The preliminary research on these complimentary interventions shows promise for individuals with fibromyalgia. These interventions may fit well into a multidisciplinary program that encompasses the conventional aerobic and strengthening activity.

WHOLE BODY VIBRATION

Several authors have found that whole body vibration with traditional strengthening is effective in improving pain, fatigue, and balance in women after a 6-week program (2-day strengthening, 3 days of whole body vibration) and a 12-week program (1,2,40). The whole body vibration interventions used in these studies consisted of bilateral and unilateral static and dynamic lower extremity exercises (range, 15–45 seconds, repeated 3–6 times, 3-minute rest period in between bouts) using a vibration frequency range of 12.5–30 Hz with a 2- to 3-mm amplitude.

Previous studies have found that a 30-Hz vibration frequency induces maximum muscular electrical activity and higher frequencies such as 50 Hz may induce postexercise soreness in untrained individuals (11,35). The range of frequencies and amplitudes varied, which may be because of the lack of consensus among researchers due to the novelty of this intervention for this population. Further research is needed to assess the effectiveness of whole body vibration on male participants and to establish more specific exercise guidelines for individuals with fibromyalgia.

The interventions discussed above cover the most current research on each topic. Many of the interventions need further study, but their preliminary outcomes are promising. Table 2 provides suggested exercise guidelines for each of the interventions and are based on what was recommended or used during the investigations. The S & C professional may want to use these guidelines as a starting point when designing an exercise program for individuals with fibromyalgia.

PHARMACOLOGICAL INTERVENTIONS

It is important for the S & C professional to understand which medications the client is taking and how they will influence physical activity. Pharmacological treatment is primarily used to address the client's symptoms with a goal of decreasing pain and improving function. Common medications used in the treatment

Table 2
Exercise guidelines for individuals with fibromyalgia

Intervention	Suggested guidelines
Aerobic training	Frequency: 2–3 times per week
	Intensity: light to moderate
	Time: 20–30 min
	Duration: at least 4 wks
Strength training	Frequency: 2–3 times per week
	Intensity: 40–80% of 1RM
	Reps: 1–3 sets of 5–20 reps
	Duration: 12–21 wks
Aquatic exercise	Frequency: 3 times per week
	Intensity: 50–80% of age-predicted maximum heart rate
	Time: 30–60 min
	Duration: 16 wks
Lifestyle physical activity	Frequency: 5–7 days a week
	Intensity: moderate intensity
	Time: at least 30 minutes a day
	Duration: 12 wks
Pilates	Frequency: 3 times per week
	Intensity: determined by client's functional level
	Time: 60 min
	Duration: 12 wks
Tai chi	Frequency: 2 times per week
	Intensity: determined by client's functional level
	Time: 60–90 min
	Duration: 12 wks
Yoga	Frequency: 2 times per week
	Intensity: determined by client's functional level
	Time: 60–90 min
	Duration: 8 wks
Whole body vibration	Frequency: 3 times per week
	Intensity: determined by client's functional level
	Time: 45- to 60-s bouts
	Reps: 6 bouts
	Duration: 6–12 wks
Reps = repetitions; 1RM = 1 repetition maximum.	

of fibromyalgia include pain relievers, opioids, antidepressants, sedatives, and muscle relaxants (41). The interaction of the client's medication and physical activity will have to be considered when designing his/her exercise program. Certain medications could affect the client's muscle performance (e.g., muscle relaxants), mask the client's pain level (e.g., pain relievers), or make them drowsy (e.g., sedative). Table 3 lists common medications and their adverse reactions (34). The client's level of pain and fatigue should be carefully monitored during and after exercise because the medications may mask symptoms and increase the risk of overexercising and worsening of symptoms.

Communicating with the client's physician may be beneficial in finding out how the medication may interact with certain forms of physical activity, especially if the medication has certain side effects. Common side effects among the fibromyalgia medications include dizziness, drowsiness, dry mouth, headaches, constipation, and fatigue (34). This section provides a brief overview of common medications and their side effects. The S & C professional is encouraged to further study this topic to have a more complete understanding of how medications influence physical activity in this population.

EXERCISE PRECAUTIONS

It is important for the S & C professional to consider program modification in the presence of pain or exacerbated symptoms such as fatigue. Monitoring for changes during exercise is important for the client's safety. For example, pain can be effectively monitored with the use of an 11-point numerical pain rating scale with 0 (no pain) to 10 (worst pain imaginable) or fatigue can be monitored using the Borg's Scale of Perceived Exertion with these individuals (16,30). Alternative or modified activity may be necessary to reduce postexercise soreness. A graded exercise program will be necessary for clients of all levels to ensure a safe progression. These clients will be susceptible to overexercising especially if they have been inconsistent with their exercise program or have not been physically

Table 3
Common medications for fibromyalgia

Drug category	Drug name	Common adverse reactions
Antidepressants	Cymbalta (duloxetine HCL)	Nausea, dry mouth, constipation, diarrhea, decreased appetite, fatigue, dizziness, drowsiness, hyperhidrosis, headache, insomnia, and abdominal pain
	Effexor XR (venlafaxine HCL)	Asthenia, sweating, headache, constipation, anorexia, dry mouth, dizziness, insomnia, nervousness, drowsiness, abnormal dreams, and pharyngitis
	Zoloft (sertraline HCL)	Dry mouth, increased sweating, drowsiness, tremor, anorexia, dizziness, headache, diarrhea, dyspepsia, agitation, insomnia, nervousness, and abnormal vision
Pain reliever	Lyrica (pregabalin)	Dizziness, drowsiness, ataxia, peripheral edema, weight gain, blurred vision, diplopia, tremor, dry mouth, abnormal thinking, infection, headache, fatigue, constipation, and euphoric mood
	Ultracet (tramadol HCL)	Constipation, drowsiness, increased sweating, diarrhea, nausea, anorexia, dizziness, acute liver failure, headache, asthenia, dyspepsia, dry mouth, pruritus, and flushing
Sleep medication (sedatives)	Ambien (zolpidem)	Drowsiness, dizziness, headache, diarrhea, drugged feeling, lethargy, dry mouth, back pain, pharyngitis, sinusitis, and allergic reactions
	Lunesta (eszopiclone)	Headache, unpleasant taste, drowsiness, dry mouth, dizziness, infection, rash, chest pain, peripheral edema, and migraine headaches
Muscle relaxants	Flexeril (cyclobenzaprine)	Drowsiness, dry mouth, headache, and fatigue

active because of their pain levels. This idea is supported by other authors who believe in the importance of assigning a workload that does not exacerbate the individual's postexercise pain (12).

PROGRAMMING STRATEGIES

Successful exercise programming requires effective communication between the client and the S & C professional. Poor exercise adherence is common among individuals with fibromyalgia. One key area to assess is how the client's symptoms, such as pain, affect their function. Rutledge et al. (38) investigated various predictors that determine high physical function in individuals with fibromyalgia. They found that men, younger age groups, higher education, nonuse of pain medication, lower intensity fatigue and spasticity, fewer balance problems, and participating in aerobic and strengthening exercise were all predictors of high function in individuals with fibromyalgia (38). Predictors such as these should be considered when designing an exercise program.

Also, understanding the client's overall perception toward physical activity is

important. More specifically, determining how the client learns, stays motivated, and his/her level of self-efficacy (e.g., ability to complete a task and reach goals) are important to a successful program. In fact, Oliver and Cronan (31) investigated predictors of exercise behaviors among individuals with fibromyalgia. They found that exercise self-efficacy and continued participation in regular exercise most strongly predicted present and future exercise behaviors (31). Other authors have found similar findings regarding the importance of self-efficacy for the success of the client's exercise program (7,14).

CONCLUSIONS

Evidenced-based exercise strategies are available to guide S & C professionals in designing programs for individuals with fibromyalgia. The exercise prescription for the client with fibromyalgia is very individualized and should always consider the "whole" person. In general, physical activity should be systematically progressed to avoid any increases in pain or

symptoms. The interventions and current evidence discussed in this article show how far the research has progressed over the past 2 decades. S & C professionals now have some strategies to help guide them with safe and effective program design for the client with fibromyalgia.

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