

### Indexing Metadata/Description

- › **Title/condition:** Fibromyalgia and Exercise
  - › **Synonyms:** Fibromyalgia disorder and exercise; fibromyalgia syndrome and exercise; primary fibromyalgia and exercise; nonarticular rheumatism and exercise; psychogenic rheumatism and exercise; exercise and fibromyalgia; FM and exercise; fibrositis and exercise; primary fibromyalgia syndrome and exercise; FMS and exercise
  - › **Anatomical location/body part affected:** Central nervous system (CNS); ascending and descending somatosensory pathways/sensory receptors in brain and muscle nociceptors
  - › **Area(s) of specialty:** Neurological rehabilitation, orthopedic rehabilitation
  - › **Description**
    - Fibromyalgia (FM) is a chronic diffuse pain syndrome of uncertain etiology, but likely neurogenic in origin<sup>(1)</sup>
    - The hallmark symptoms are widespread pain, fatigue, and sleep disturbances.<sup>(2)</sup> Depression is also common<sup>(3)</sup>
    - Patients often complain of disability in activities of daily living (ADLs).<sup>(4)</sup> Symptoms and below-average physical fitness levels contribute to reduced physical functioning in ADLs<sup>(5)</sup>
    - Research supports exercise training to improve physical fitness and function, reduce FM symptoms, and improve quality of life.<sup>(6)</sup> It is important, however, that clinicians modify exercise on an individual basis to increase patient compliance<sup>(7)</sup>
    - This Clinical Review examines exercise interventions in FM to improve symptoms and physical functioning. For further discussion on management of FM symptoms, see *Clinical Review...Fibromyalgia*; Item Number: T708490
  - › **ICD-9 codes**
    - 729.1 myalgia and myositis, unspecified fibromyositis NOS
  - › **ICD-10 codes**
    - M79.7 fibromyalgia
- (ICD codes are provided for the reader's reference, not for billing purposes)
- › **G-Codes**
    - **Mobility G-code set**
      - G8978, Mobility: walking & moving around functional limitation, current status, at therapy episode outset and at reporting intervals
      - G8979, Mobility: walking & moving around functional limitation; projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
      - G8980, Mobility: walking & moving around functional limitation, discharge status, at discharge from therapy or to end reporting
    - **Changing & Maintaining Body Position G-code set**
      - G8981, Changing & maintaining body position functional limitation, current status, at therapy episode outset and at reporting intervals

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- G8982, Changing & maintaining body position functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
- G8983, Changing & maintaining body position functional limitation, discharge status, at discharge from therapy or to end reporting
- **Carrying, Moving & Handling Objects G-code set**
  - G8984, Carrying, moving & handling objects functional limitation, current status, at therapy episode outset and at reporting intervals
  - G8985, Carrying, moving & handling objects functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G8986, Carrying, moving & handling objects functional limitation, discharge status, at discharge from therapy or to end reporting
- **Self Care G-code set**
  - G8987, Self care functional limitation, current status, at therapy episode outset and at reporting intervals
  - G8988, Self care functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G8989, Self care functional limitation, discharge status, at discharge from therapy or to end reporting o Short descriptor: Self care D/C status
- **Other PT/OT Primary G-code set**
  - G8990, Other physical or occupational primary functional limitation, current status, at therapy episode outset and at reporting intervals
  - G8991, Other physical or occupational primary functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G8992, Other physical or occupational primary functional limitation, discharge status, at discharge from therapy or to end reporting
- **Other PT/OT Subsequent G-code set**
  - G8993, Other physical or occupational subsequent functional limitation, current status, at therapy episode outset and at reporting intervals
  - G8994, Other physical or occupational subsequent functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G8995, Other physical or occupational subsequent functional limitation, discharge status, at discharge from therapy or to end reporting

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<b>G-code Modifier</b>	<b>Impairment Limitation Restriction</b>
CH	0 percent impaired, limited or restricted
CI	At least 1 percent but less than 20 percent impaired, limited or restricted
CJ	At least 20 percent but less than 40 percent impaired, limited or restricted
CK	At least 40 percent but less than 60 percent impaired, limited or restricted
CL	At least 60 percent but less than 80 percent impaired, limited or restricted
CM	At least 80 percent but less than 100 percent impaired, limited or restricted
CN	100 percent impaired, limited or restricted
Source: <a href="http://www.cms.gov">http://www.cms.gov</a>	

> **Reimbursement:** Reimbursement for therapy will depend on insurance contract coverage; no specific issues or information regarding reimbursement have been identified. Inquire about any ongoing legal claims

### › Presentation/signs and symptoms <sup>(2)</sup>

- Chronic pain on both sides of the body, above and below the waist, and in the axial torso, of long duration ( $\geq 3$  months) as the primary symptom
- Fatigue (associated with nonrestorative or unrefreshing sleep)
- Mood/anxiety disorder
- Reduced physical functioning
- Increased muscle soreness or tenderness after exercise<sup>(7)</sup>

## Causes, Pathogenesis, & Risk Factors

### › Causes

- Etiology unknown; appears related to triggers such as viral infection, trauma, stress, and anxiety<sup>(2)</sup>
- Allodynia (i.e., increased pain perception of normally innocuous stimuli such as pressure, cold, or heat) suggests a neuropathic origin<sup>(1)</sup>
- Possibly a familial disorder with many predisposing genetic associations<sup>(1)</sup>

### › Pathogenesis

- No pathophysiological mechanism for FM has been established<sup>(29)</sup>
- Reduced pressure-pain thresholds (i.e., hyperalgesia) and allodynia indicate impaired endogenous analgesic systems<sup>(1)</sup>
- Deficient inhibition of pain signals secondary to decreased serotonin, norepinephrine, and dopamine neurotransmission and production of endorphins in FM may be responsible for abnormal brain and spinal cord afferent processing (central sensitization) of pain.<sup>(1,8)</sup> Decreased mu-opioid receptor binding in some brain regions associated with pain perception has been reported in FM patients, thus making them less responsive to endogenous opioid secretion or opioid medications<sup>(9)</sup>
- Consequently, patients with FM may experience greater discomfort during exercise because of reduced pain inhibition<sup>(4,10,11)</sup>
- Cardiovascular fitness and functional capacity in ADLs are reduced in FM patients. This is likely due in part to below-average lifestyle physical activity<sup>(5)</sup>
- Dysautonomia (i.e., malfunction of the autonomic nervous system), as indicated by postural orthostatic tachycardia syndrome (POTS), neurally mediated hypotension, and overwhelming fatigue in response to general physical stress, has been reported in FM.<sup>(8,12)</sup> However, acute leg resistance exercise did not affect resting systolic blood pressure, heart rate (HR), or aortic wave reflection measured 20 minutes after exercise in 9 women with FM<sup>(13)</sup>

### › Risk factors

- Female sex<sup>(2)</sup>
- Nonrestorative sleep<sup>(2)</sup>
- Chronic fatigue<sup>(2)</sup>
- Overweight or obesity: Women with body mass index (BMI)  $\geq 25.0$  kg/m<sup>2</sup> had 60% to 70% higher risk for FM than women with normal BMI (18.5 to 24.9 kg/m<sup>2</sup>)<sup>(14)</sup>
- Physical inactivity (< 1 hour per week of exercise)<sup>(14)</sup>

## Overall Contraindications/Precautions

- › Monitor patient for coexisting conditions, such as headache, irritable bowel syndrome, chronic fatigue syndrome, anxiety, and depression, that may reduce motivation and adherence to therapeutic intervention
- › Perturbations/discomfort associated with exercise may reduce exercise tolerance and compliance in patients with FM. For example, in a 2007 systematic review, the average attrition rate for 34 exercise trials was 27%<sup>(6)</sup>
- › Pain and fatigue may fluctuate on a daily basis. Symptoms should be monitored during each treatment session and interventions modified as necessary to accommodate patient's tolerance
- › Most patients, especially those with dysautonomia, require a graduated or “as tolerated” approach to exercise therapy
- › See specific **Contraindications/precautions** under **Assessment/Plan of Care**

# Examination

## › History

### • History of present illness/injury

#### –Mechanism of injury or etiology of illness

- Patients typically report widespread pain, with “aches all over,” soreness/tenderness, and intense fatigue
- When did symptoms start and what has been the general progression of the disease?
- What is the reason for referral?

#### –Course of treatment

- **Medications for current illness/injury:** Document the prescribed medications, whether they are being taken as prescribed, and whether or not the patient feels they are effective. Medications commonly prescribed for FM include:<sup>(26)</sup>

- Low-dose tricyclic antidepressants (e.g., amitriptyline, imipramine) for sleep disturbance
- Selective serotonin reuptake inhibitors (SSRIs) (e.g., sertraline, fluoxetine)
  - There is weak evidence to support the use of SSRIs to treat FM<sup>(26)</sup>
- Serotonin-norepinephrine reuptake inhibitors (SNRIs) (e.g., duloxetine)
  - There is weak evidence to support the use of SNRIs to treat FM<sup>(26)</sup>
- Over-the-counter analgesics and NSAIDs for pain/myalgias
  - Evidence is lacking for efficacy of NSAIDs or corticosteroids for treatment of FM<sup>(30)</sup>
- Pregabalin
  - There is weak evidence to support the use of pregabalin to treat FM<sup>(26)</sup>
- Gabapentinoids (e.g., gabapentin, pregabalin)<sup>(30)</sup>
- Tramadol (opioid analgesic)<sup>(30)</sup>

#### - Diagnostic tests completed

- There are no diagnostic tests for FM. Lab tests that may be clinically indicated to evaluate other potential diagnoses, including conditions that may be comorbid with FM, include complete blood count (CBC), erythrocyte sedimentation rate (ESR), rheumatoid factor, antinuclear antibody, creatine kinase, and thyroid hormone panel<sup>(6,27)</sup>

- **Home remedies/alternative therapies:** Document any use of home remedies (e.g., ice or heating pack) or alternative therapies (e.g., acupuncture) and whether or not they help

- Complementary and alternative therapies, including tai chi, yoga, acupuncture, and myofascial release, are commonly used as adjunctive treatment for FM<sup>(31)</sup>

- There is minimal evidence available to support their use

- **Previous therapy:** Document whether patient has had occupational or physical therapy for this or other conditions and, if so, what specific treatments were helpful or not helpful

–**Aggravating/easing factors** (and length of time each item is performed before the symptoms come on or are eased)

- Symptoms are generally worse with emotional stress; cold, damp weather; moderate or excessive exercise; poor or nonrestorative sleep; inactivity; or exacerbation of underlying condition<sup>(2)</sup>

- Symptoms are generally better with warmth, gentle exercise, massage, relief of stress, hot showers or baths, and restful sleep<sup>(2)</sup>

- Does the patient exercise? Which parameters seem to decrease or increase symptoms?

–**Body chart:** Use body chart to document location and nature of symptoms

#### –Nature of symptoms

- Widespread pain and tenderness
- Fatigue
- Sleep disturbance
- Weakness
- Decrements in physical functioning
- Mood disturbances
- Problems with cognition, such as
  - memory problems
  - concentration difficulties

- diminished mental clarity
- **Rating of symptoms:** Use a visual analog scale (VAS) or 0-10 scale to assess symptoms at their best, at their worst, and at the moment (specifically address if pain is present now and how much)
- **Pattern of symptoms:** Document changes in symptoms throughout the day and night, if any (A.M., mid-day, P.M., night); also document changes in symptoms due to weather or other external variables. The pain and symptoms of FM commonly wax and wane, and vary in location and intensity day to day<sup>(30)</sup>
- **Sleep disturbance:** Poor sleep quality is a major problem in FM. Document nature of sleep disturbance and number of wakings/night. Does patient report daytime tiredness?
- **Other symptoms:** Document other symptoms patient may be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician (e.g., dizziness, bowel/bladder dysfunction, sexual problems [e.g., vulvodynia])
- **Barriers to learning**
  - Are there any barriers to learning? Yes \_\_ No \_\_
  - If Yes, describe \_\_\_\_\_
- **Medical history**
  - **Past medical history**
    - **Family history:** Document whether family history is positive for alcoholism, depression, migraine, panic attacks, rheumatoid arthritis, systemic lupus erythematosus (SLE), autoimmune thyroid disease, multiple sclerosis, or myasthenia gravis
    - **Comorbid diagnoses:** Ask patient about other medical problems, including diabetes, cancer, rheumatoid disorders, heart disease, psychiatric disorders, orthopedic disorders, etc. FM often occurs in patients with other conditions such as inflammatory arthritis and osteoarthritis<sup>(29)</sup>
    - **Medications previously prescribed:** Document all medications prescribed, as well as over-the-counter agents being taken
    - **Other symptoms:** Ask patient about other symptoms that affect ADLs
- **Social/occupational history**
  - **Patient's goals:** Document what the patient hopes therapy will improve
  - **Vocation/avocation and associated repetitive behaviors, if any:** Does the patient participate in sports? Is the patient able to work? Is his or her workstation ergonomically correct? FM often adversely affects a patient's ability to work.<sup>(15,40)</sup> How much daily physical activity does the patient typically perform?
  - **Functional limitations/assistance with ADLs/adaptive equipment:** Is the patient able to perform ADLs? Does the patient have other disabilities? Approximately half of patients with FM have difficulty performing ADLs<sup>(15)</sup>
  - **Living environment:** Stairs, number of floors in home. Does patient have the support and assistance needed? Identify if there are barriers to independence in the home and whether any modifications are necessary
- **Relevant tests and measures: Complete a general assessment as indicated, with a focus on the items listed below.** With the exception of diffuse/multifocal tenderness, findings on general physical examination are usually within normal limits<sup>(16)</sup>
- **Anthropomorphic data:** Determine height, weight, and BMI. Adults with FM are more likely to be overweight or obese based on BMI for age and gender as compared to adults without FM<sup>(35)</sup>
- **Balance:** Assess static and dynamic balance in standing. A recent study found that dynamic balance assessed with the Balance Evaluation Systems Test (BESTest) was reduced in 34 FM patients compared to 32 age-matched controls<sup>(17)</sup>
- **Body mechanics/ergonomics:** Assess patient's body mechanics with functional activities and perform a workstation evaluation as indicated
- **Cardiorespiratory function and endurance:** Assess aerobic endurance fitness using the 6-minute walk for distance test (6MWT) and/or administer a graded exercise (cycle ergometer or treadmill) test, according to standard exercise testing medical guidelines;<sup>(18)</sup> assess perceived exertion with Borg Rating of Perceived Exertion (RPE) Scale
  - The 6MWT and related cardiorespiratory (e.g., HR, VO#, and RPE) and gait measurements (e.g., velocity, distance) are useful for differentiating patients with and without FM<sup>(34)</sup>
- **Joint integrity and mobility:** Assess joint mobility, as indicated
- **Muscle strength:** Assess strength in upper and lower extremities and trunk using manual muscle testing (MMT) or weight machines
- **Palpation:** 100% of patients have multiple tender points<sup>(2,16)</sup>

- Multiple small, firm, very tender areas of muscle
- Tenderness may not correspond to areas of subjective pain
- Tender points may be missed if insufficient pressure is applied, patient is obese, or patient is wearing heavy clothing
- Tender points can be falsely positive if excessive pressure is used
- 18 bilateral tender points at 9 sites
  - Occiput – at suboccipital muscle insertions
  - Low cervical – at anterior aspect of intertransverse spaces at C5-C7
  - Trapezius – at midpoint of upper trapezius border
  - Supraspinatus – at origin, above scapula spine near medial border
  - Second rib – at second costochondral junction, just lateral to junctions of upper surface
  - Elbow – 2 cm distal to lateral epicondyles
  - Gluteal – at upper outer quadrants of buttocks in anterior fold of muscle
  - Greater trochanter – posterior to trochanteric prominence
  - Knees – at medial fat pad proximal to joint line
- Nontender control points – mid-forehead, anterior thigh
- **Posture:** Assess overall posture, including neck and trunk, in standing and sitting and with functional activities. Note any asymmetry or deformity. Assess for tightened musculature or muscle atrophy that may be contributing to poor posture or muscular pain
- **Range of motion:** Scan functional ROM/flexibility in upper and lower extremities and torso (usually within normal limits)
- **Self-care/ADL performance:** Use objective measure such as Barthel Index
- **Sensory testing:** Scan all dermatomes for sensation to light touch and temperature (FM patients may report hypersensitivity to cold and heat)
- **Special tests specific to diagnosis**
  - Physical performance testing for components of fitness (e.g., speed, endurance, strength, agility, dynamic balance) will likely reveal deficits in functional capacity compared to the active healthy population<sup>(5)</sup>
  - Fibromyalgia Impact Questionnaire (FIQ), McGill Pain Questionnaire, Beck Depression Inventory (BDI), Short Form-36 (SF-36) Health Survey, and Health Status Questionnaire (HSQ)

## Assessment/Plan of Care

### › **Contraindications/precautions**

- **Follow facility protocols for fall prevention and post fall prevention instructions at bedside, if inpatient. Ensure that patient and family/caregivers are aware of the potential for falls and educated about fall prevention strategies. Discharge criteria should include independence with fall prevention strategies**
- Contraindications/precautions applicable to this diagnosis are mentioned below, including with regard to modalities. Rehabilitation professionals should always use their professional judgment in clinical decision making
- Tailor the exercise prescription to fit the patient's functional ability and tolerance for exertional symptoms
- Closely supervise and provide instruction throughout exercise therapy and functional training sessions
- Provide the patient with a thorough orientation to use of therapeutic exercise equipment and with adequate warm-up time to help reduce apprehension about exercise
- Modify exercise as tolerance changes and for prevention of exercise-related pain or postexercise muscle soreness in either aerobic or resistance training. This often means reducing or minimizing exercises with a large eccentric action such as jumping
- Select exercises that avoid aggravation of peripheral pain generators (e.g., use elliptical trainer rather than stationary ergometer for a patient with gluteal/trochanteric trigger points)<sup>(7)</sup>
- Minimize eccentric exercises to reduce tenderness/soreness secondary to muscle microtrauma<sup>(7)</sup>
- Emphasize low-intensity, nonrepetitive exercises to avoid muscle overuse and the risk of postexercise pain (e.g., use a variety of nonfatiguing, discontinuous physical activities)<sup>(7)</sup>
- Schedule exercise during patient's optimal hours of function rather than times of peak fatigue (e.g., in mid-afternoon vs. early morning or evening)<sup>(7)</sup>
- For patients with POTS, avoid exercises that require quick transfers (from lie or sit to stand), fast turns/pivots, or prolonged standing<sup>(7)</sup>

- For patients with reduced dynamic balance, select exercises to reduce risk of falling<sup>(7)</sup>
  - Modify exercises and increase access to restroom for comorbidities such as irritable bowel syndrome or overactive bladder. Reduce pounding (e.g., jumping jacks) for patients with pelvic pain<sup>(7)</sup>
  - Educate overweight/obese patients regarding the benefits of weight loss in private. Avoid discussion of body image during group classes (e.g., hold exercise class away from mirrors, or cover mirrors)<sup>(7)</sup>
  - Encourage patients to conserve energy in daily activities for physical conditioning exercises<sup>(7)</sup>
  - Progress exercise intensity, duration, and frequency gradually according to patient tolerance<sup>(7)</sup>
  - Clinicians should follow the exercise guidelines of their clinic/hospital and what is ordered by the patient's physician
  - Rehabilitation professionals should always use their professional judgment regarding the use of modalities
- › **Diagnosis/need for treatment:** FM with characteristic widespread pain and tenderness, fatigue, myalgia, and associated symptoms that impair ADLs/trial of exercise training to reduce symptoms and improve physical functioning
- › **Rule out**
- Psychogenic rheumatism (conversion reaction with tenderness present virtually everywhere)
  - Localized myofascial pain, rheumatoid arthritis, osteoarthritis, Lyme disease, sleep apnea, polymyalgia rheumatica, polymyositis, rheumatoid diseases, hypothyroidism, hyperthyroidism, hypoparathyroidism, hyperparathyroidism, depression, metastatic carcinoma, chronic fatigue syndrome, Parkinson's disease, hepatitis C and other viral infections, medication reaction
    - Presence of any of the disorders listed above does not necessarily rule out a diagnosis of FM because FM can occur with many conditions <sup>(29,30)</sup>
  - "Secondary fibrositis" can be associated with rheumatoid disease (about 25% patients with SLE have FM)<sup>(2)</sup>
- › **Prognosis:** There is no cure for FM. Symptom severity and reduced physical functioning can be controlled with pain management strategies and exercise training. The benefits of an aerobic exercise program may persist with continued participation
- › **Referral to other disciplines**
- Physician for recalcitrant pain
  - Neuropsychologist for cognitive behavioral therapy (CBT)
  - Psychologist/psychiatrist, as indicated
  - Physiatrist for trigger-point injections
  - Acupuncturist for alternative pain management
  - Nutritionist for weight-loss dietary counseling
  - Occupational therapist (OT) for deficits in ADLs
- › **Other considerations**
- CBT may improve symptoms of FM<sup>(27)</sup>
  - Whole-body vibration (WBV) combined with an exercise program may improve balance in women with FM<sup>(19)</sup>
    - Based on a randomized controlled trial (RCT) in Spain involving 30 women with FM who participated in an exercise program in addition to WBV or an exercise program only
    - The exercise program consisted of aerobic and strengthening exercises twice a week for approximately 1 hour per session
    - The women in the WBV group participated in 3 days of WBV in addition to the exercise program
    - The women in the WBV group had a greater improvement in balance than the control group
  - Based on an RCT in the United States, tai chi (a Chinese technique of mind-focused movements) shows promise as an alternative form of exercise for improving FM symptoms<sup>(20)</sup>
    - 66 patients were randomized to the tai chi (TC) group that practiced 12 weeks (twice a week for 60 minutes per session) or a control group
    - FIQ scores decreased significantly more in the TC group (18.4 points) compared to the control group (9.4 points) at 12 weeks
    - Physical and mental domains of the SF-36 improved significantly more in the TC group vs. controls
    - Improvements were maintained at 24-week follow-up
    - No adverse events were observed
  - Based on an RCT in Turkey, the hypothalamic-pituitary-adrenal (HPA) axis dysfunction may contribute to symptoms of FM which may improve with exercise<sup>(36)</sup>

- Subjects included 50 patients with FM and were randomized into Group 1 (stretching and flexibility exercises at home) or Group 2 (aerobic exercise in addition to the Group 1 protocol)
- Exercises were performed for a duration of 6 weeks
- Serum levels of cortisol, insulin-like growth factor-1, growth hormone and adrenocorticotrophic hormone were analyzed at baseline, 1 hour after an exercise stress test and at the end of the 6 week protocol
- Subjects were assessed for pain, tender points, fatigue, morning stiffness, functional disability, cardiovascular fitness, and health related quality of life
- Group 2 showed greater improvement in morning stiffness and pain. A significant increase in growth hormone levels was found after intervention. A significant decrease in cortisol levels was found in both groups. No significant difference was found in adrenocorticotrophic hormone and insulin-like growth factor-1
- Data from an RCT in the United States suggest that there is a linear relationship between steps taken per day and health outcomes in patients with FM. Walking an additional 1,000 steps per day was associated with improved physical function. No adverse effects with respect to pain were noted<sup>(37)</sup>

#### › **Treatment summary**

- Physical therapy treatment for patients with FM includes the following:<sup>(27)</sup>
  - Patient education regarding self-management and energy conservation
  - An exercise program that includes cardiovascular, strengthening, and stretching components
  - High drop-out rate: only 72 (53%) patients attended more than one-third of classes
  - Comparing exercise vs. control
    - 35% vs. 18% rated symptoms and function as much or very much better at 3 months
    - 38% vs. 22% rated symptoms and function as much or very much better at 1 year
    - 45% vs. 66% met diagnostic criteria for FM at 1 year
- Supervised aerobic exercise training may improve global well-being and physical function in patients with FM<sup>(6)</sup>
  - Based on a Cochrane systematic review of 34 randomized trials with a total of 2,276 patients
  - Aerobic exercise training at recommended intensity levels was associated with:
    - Improved global well-being (4 trials with 269 patients)
    - Improved physical function (4 trials with 225 patients)
    - Reduced depression (4 trials with 233 patients)
    - Nonsignificant trend towards reduced pain (3 trials with 183 patients)
    - Nonsignificant trend towards reduced tender points (5 trials with 293 patients)
- Results of a 2010 systematic review and meta-analysis analyzing the efficacy of different types of aerobic exercise in FM showed that aerobic exercise reduces pain, fatigue, and depressed mood and improves health-related quality of life (HRQOL) and physical fitness, and that there is no evidence for superiority of water-based over land-based exercise<sup>(32)</sup>
  - 28 RCTs comparing aerobic exercise with controls and 7 RCTs comparing different types of aerobic exercise, with a total of 2,494 patients, were included
  - Subgroup analyses of different types of exercise were limited because few studies reported a detailed exercise protocol
  - Males were included in very few of the studies
  - Combining aerobic exercise with stretching or strengthening is no more effective than aerobic exercise alone
  - Aerobic exercise has no positive effect on sleep
  - Continuing exercise is necessary to maintain positive effects on pain
- Based on a 2015 systematic review, muscle strengthening activity can be a safe and effective mode of exercise for patients with FM<sup>(42)</sup>
  - 11 comparative controlled trials were selected for review
  - Studies selected included a strength training component as part of the intervention and reported strength and/or pain outcomes
  - The majority of studies reported decreased pain and increased strength as a result of the strength training intervention
  - Muscle strengthening activities were most effective when progressed gradually from low intensities
- Aquatic therapy appears as effective as land exercise for improving function in patients with FM<sup>(25)</sup>
  - Based on a systematic review of 8 RCTs
  - The authors of the systematic review concluded that aquatic therapy improves function in patients with FM



- Aquatic aerobic exercise is more effective than gym-based aerobic exercise and home-based strengthening and stretching for women with FM<sup>(39)</sup>
  - Based on a Turkish study of 75 females with FM
  - Subjects were divided into 3 groups: a gym-based aerobic exercise program, a pool-based aquatic aerobic exercise program or a home-based stretching and isometric strengthening program
  - All exercise programs were performed for 3 months
  - Outcome measures included the VAS, tender point count, FIQ, 6MWT, SF-36, and BDI
  - Significant improvements in all variables were found in all 3 groups when comparing pre- and post-test, except the mean values of VAS and BDI in the home-based strengthening and stretching program. Aquatic aerobic exercise resulted in better outcomes compared to the other groups
- Combining aerobic, strength, and flexibility exercise training appears safe and well-tolerated based on a long-term (24 weeks) supervised RCT in a community setting in Spain<sup>(21)</sup>
  - 42 women with FM were randomized to a combined exercise (CE) group or usual-care control group
  - Exercise sessions were performed twice weekly (45 to 60 minutes per session) for 24 weeks
  - After the intervention, FIQ and SF-36 (especially vitality) scores improved significantly more in the CE group
- The above-cited CE program provided additional health benefits compared to aerobic exercise (AE) training only, based on an RCT in Spain<sup>(22)</sup>
  - 64 women with FM were randomized to 1 of 3 groups: supervised CE, supervised AE, or usual-care groups
  - Exercise sessions were performed twice weekly (45 to 60 minutes per session) for 24 weeks; women in both groups attended more than 85% of sessions
  - Total FIQ scores increased significantly (about 15%) and BDI scores decreased significantly in both exercise groups
  - SF-36 physical functioning and bodily pain domains improved more in the CE group than the AE group, with both CE and AE improving more than the controls
  - SF-36 vitality and mental health domains, shoulder and hip ROM, and handgrip strength improved significantly more in the CE group than the AE group
- CE is associated with improvements in self-esteem, self-concept, and quality of life in women with FM based on an RCT conducted in Spain<sup>(23)</sup>
  - 28 women were randomized to either a 12-week program of 3 weekly sessions of aerobic, strengthening, and flexibility exercises (CE group) or to a usual-care group
  - After 12 weeks, scores for self-esteem, self-concept, FIQ, SF-36 physical functioning, role-physical, bodily pain, vitality, role-emotional, social functioning, and mental health and fitness levels for isometric strength, muscular endurance, and flexibility improved significantly more in the CE group compared to the control group
- An RCT in Brazil found that strengthening exercises improve symptoms and quality of life but do not change autonomic modulation in patients with FM<sup>(38)</sup>
  - 80 subjects were randomly assigned to participate in strength or flexibility exercises. The intensity of the strength group was set at 45% of the estimated 1 repetition max in 12 different strength exercises. 3 sets of 12 repetitions were performed
  - Outcome measures included the VAS for pain, treadmill test, sit and reach test, maximal repetition test, handgrip dynamometry, FIQ, and SF-36. Analysis of autonomic regulation included data from HR variability and autonomic FM symptoms
  - The strength group had significantly more strength gain and pain control after 4 and 16 weeks compared to the flexibility group. The flexibility group showed significantly greater improvements in anxiety compared to the strength group. Both groups showed improvements in quality of life. No change in autonomic modulation was found in either group

Problem	Goal	Intervention	Expected Progression	Home Program
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<p>Pain, tenderness, fatigue, reduced physical functioning; impaired ability to perform ADLs</p>	<p>Reduce symptoms, improve function and ADL performance</p>	<p><b><u>Therapeutic exercise</u></b></p> <p>Individually prescribed physical activities that may include aerobic, resistance, and/or flexibility training<sup>(21,22,38)</sup>; aquatic exercise<sup>(25,39)</sup>; or tai chi<sup>(20)</sup></p> <p>Implement strategies during daily activities to conserve energy for exercise</p> <p><b><u>Electrotherapeutic modalities</u></b></p> <p>High-frequency transcutaneous electrical nerve stimulation (TENS) in association with aerobic and stretching exercises has been reported to be an effective adjuvant therapy to relieve symptoms of FM<sup>(33)</sup></p>	<p>Progress each patient as indicated and tolerated with gradual increases in exercise, intensity, duration, and frequency. Encourage compliance</p>	<p>Recommend therapeutic exercise strategies for home. Provide handouts as able</p>
<p>Decreased or impaired balance</p>	<p>Improve balance</p>	<p><b><u>Functional training</u></b></p> <p>Balance and proprioceptive training, as indicated. Tilt vibratory exercise and WBV were found to improve dynamic balance in FM<sup>(24,28)</sup></p> <p><b><u>Patient education</u></b></p> <p>To maintain condition and prevent relapse/loss of function</p>	<p>Progress as indicated</p> <p>Use the Balance Evaluation Systems Test (BESTest) to document improvements in balance</p>	<p>Recommend safe balance exercises for home. Provide handouts as able</p>

## Desired Outcomes/Outcome Measures

- › Desired outcomes
  - Reduced pain/tenderness
  - Reduced fatigue

- Improved balance
- Improved aerobic endurance
- Improved strength
- Improved balance
- Improved physical functioning in ADLs
- Reduced depression

› Outcome measures

- VAS, McGill Pain Questionnaire
- BESTest for balance (if available)
- 6MWT or graded exercise test
- MMT
- Barthel Index
- FIQ, SF-36 Health Survey, HSQ
- BDI
- According to a study in Spain, the chair sit and reach, handgrip strength, arm curl, chair stand, 8 feet up and go, and 6MWT were all found to be reliable and feasible for female patients with FM<sup>(41)</sup>

## Maintenance or Prevention

- › A lifelong multidisciplinary treatment program involving education, exercise, and medication (as prescribed) is indicated to reduce symptoms and increase function and quality of life

## Patient Education

- › National Fibromyalgia Association, <http://www.fmaware.org/>

## Coding Matrix

References are rated using the following codes, listed in order of strength:

<b>M</b> Published meta-analysis	<b>RV</b> Published review of the literature	<b>PP</b> Policies, procedures, protocols
<b>SR</b> Published systematic or integrative literature review	<b>RU</b> Published research utilization report	<b>X</b> Practice exemplars, stories, opinions
<b>RCT</b> Published research (randomized controlled trial)	<b>QI</b> Published quality improvement report	<b>GI</b> General or background information/texts/reports
<b>R</b> Published research (not randomized controlled trial)	<b>L</b> Legislation	<b>U</b> Unpublished research, reviews, poster presentations or other such materials
<b>C</b> Case histories, case studies	<b>PGR</b> Published government report	<b>CP</b> Conference proceedings, abstracts, presentation
<b>G</b> Published guidelines	<b>PFR</b> Published funded report	

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