



CLINICAL EXERCISE SPECIALIST MANUAL

A Fitness Professional's Guide
to Training People with
CHRONIC DISEASE

J. DANIEL MIKESKA DHSc

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**A FITNESS PROFESSIONAL'S GUIDE TO
EXERCISE AND CHRONIC DISEASE**

BY J. DANIEL MIKESKA, DHSC

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CHAPTER 23

ARTHRITIS

By the end of this chapter you will understand:

- Type and epidemiology
 - Osteoarthritis
 - Rheumatoid arthritis
- Diagnostic criteria/presentation
- Treatment options
 - Nutrition
 - Pharmacological
 - Exercise
- Exercise guidelines

Background

Arthritis is a family of more than 100 diseases including osteoarthritis (OA), rheumatoid arthritis (RA), gout, fibromyalgia, lupus, and scleroderma. Arthritis is the leading disability in the United States, affecting almost 55 million adults, and costing over \$30 billion annually in health care costs, lost wages, and lost productivity. By conservative estimates, close to 60% of individuals over the age of 60 have some form of arthritis, as do 1/3 of individuals age 18-64 (Arthritis Foundation, n.d.). Primary risk factors include female sex, age, race, and structural malalignment. Secondary risk factors include prior trauma, physically demanding job, muscle weakness, and metabolic disease (Sharp, 2018). Comorbidities include obesity,

diabetes, anxiety and depression, and heart disease. The good news is exercise and physical activity can improve physical function by about 40%.

Osteoarthritis

OA is the most prevalent joint disease in the United States affecting close to 30 million adults (Arthritis Foundation, n.d.). OA is degenerative and characterized by pain, swelling, joint stiffness, and decreased strength, flexibility, and cardiorespiratory capacity (American College of Sports Medicine [ACSM], 2018). OA occurs when the cartilage and synovial fluid that cushions and lubricates bones and joints are lost. As cartilage breaks down, the connecting bone also wears down due to constant rubbing, which can lead to bone spurs. As cartilage and bone wear away, small pieces can chip off and get caught in the joint, creating more wear and tear, inflammation, swelling, and pain (Arthritis Foundation, n.d.). OA mostly affects large, weight bearing joints (knees, hips, and spine) but can also occur in the fingers and toes. The American College of Rheumatology suggests the presence of persistent knee pain, limited morning stiffness, and reduced function, coupled with crepitus, restricted movement, and bony enlargement predicts with 99% accuracy a correct diagnosis of OA (Heidari, 2011). Table 23.1 provides more detail for the American College of Rheumatology criteria for a diagnosis of knee OA.

Table 23.1

American College of Rheumatology criteria for the diagnosis of knee OA

Clinical process	Criteria	Symptoms
Using history and clinical examination	Pain in the knee and three of the following symptoms:	Age >50 years Morning stiffness <30 minutes Crepitus on active motions Bony tenderness Bony enlargement No palpable warmth of synovium
Using history and clinical examination and radiographic findings	Pain in the knee and one of the following symptoms:	Age >50 years Morning stiffness < 30 minutes Crepitus on active motions and osteophyte
Using history and clinical examination and laboratory findings	Pain in the knee and 5 of the following symptoms:	Age >50 years Morning stiffness <30 minutes Crepitus on active motions Bony enlargement No palpable warmth of synovium ESR <40 mm/h Rheumatoid Factor <1/40 Synovial fluid signs of osteoarthritis

Aronen & Lorenz, 2015; Heidari, 2011

Pharmacology

OA has no cure, so management of pain, inflammation, and joint stiffness, as well as slowing progression are the goals of pharmacological treatment. Over the counter (OTC) non-steroidal anti-inflammatories (NSAIDs) and acetaminophen products can reduce pain and swelling; however side effects can include gastrointestinal problems or cardiovascular events (Aronen & Lorenz, 2015; Sharp, 2018). Topical pain relievers such as menthol and capsaicin can provide nominal pain relief with minimal side effects. Prescription NSAIDs reduce inflammation and pain to a greater degree than OTC products, but increase the risk of heart attack or stroke. Corticosteroids are usually prescribed when NSAIDs and other oral pain relievers are ineffective. Corticosteroids are injected directly into the joint to reduce inflammation, but over the long term, in large doses, can cause osteoporosis via inhibition of osteoblast activity. Viscosupplements are injected directly into the joint to replace lost fluids and increase lubrication and can be injected as needed. Narcotics are only used when the pain becomes unbearable, but caution should be used to avoid dependency, and increasing tolerance (Sharp, 2018). Drugs used for OA treatment, their actions, and side effects are presented in Table 23.2.

Table 23.2

Pharmacology used for the treatment of OA

Drug/Type	Action	Side effects
OTC NSAIDs and acetaminophen	Reduce pain and swelling	gastrointestinal problems or cardiovascular events
Topical pain relievers such as menthol and capsaicin	Pain relief	Minimal
Prescription NSAIDs	Reduce inflammation and pain	increase the risk of heart attack or stroke
Corticosteroids	Reduce inflammation	but over the long term, in large doses, can cause osteoporosis
Viscosupplements	Replace lost fluids and increase lubrication	Temporary
Narcotics	Pain relief	Addiction

Aronen & Lorenz, 2015; Sharp, 2018

Nutritional supplements

Many nutritional supplements can also be purchased OTC. Glucosamine and chondroitin can alleviate inflammation and may stimulate cartilage production. Omega-3 fatty acids are known to reduce joint swelling, pain, and the duration of morning joint stiffness by inhibiting the expression and production of inflammatory processes, and increasing anti-inflammatory mechanisms (Calder, 2012). While Omega-3 fatty acids provide an anti-inflammatory response, Omega-6 fatty acids are considered pro-inflammatory and should be avoided or moderated (Aronen & Lorenz, 2015; Calder, 2012). Other nutrients that may minimize the inflammatory effects of OA are antioxidants, methylsulfonylmethane (MSM) may decrease swelling and pain by replacing lost sulfur in the joints, hyaluronan may help prevent soft-tissue damage by restoring water into the extracellular matrix, and pro- and pre-biotics can increase the immune response by supplying the gut with healthy bacteria and yeast (Aronen & Lorenz, 2015). Please keep in mind it is beyond the scope of practice for a CXS to prescribe supplements or pharmacological agents to any client. Nutritional supplements used for the treatment of OA and their actions are found in Table 23.3.

Table 23.3

Nutritional supplements used for the treatment of OA

Supplement	Action
Glucosamine and chondroitin	Alleviates inflammation Stimulates cartilage production
Omega-3 fatty acids	Anti-inflammatory properties reduce joint swelling
Antioxidants	Anti-inflammatory properties reduce joint swelling
Methylsulfonylmethane (MSM)	Decreases swelling and pain by replacing lost sulfur
Hyaluronan	Restores water into the extracellular matrix
Pro- and pre-biotics	Increases the immune response

Aronen & Lorenz, 2015; Calder, 2012

Exercise intervention

Quality of life is the objective of exercise therapy for clients with OA as exercise can reduce joint pain, improve physical functioning, and alleviate systemic inflammation often found with comorbidities such as obesity, cardiovascular disease (CVD), and Type II diabetes (Dressendorfer, 2017). Unfortunately, there is no consensus on exercise recommendations for OA; however, some elements are consistent in the literature. Exercise for cardiovascular conditioning, strength development, flexibility, and neuromuscular control such as Tai Chi or yoga should be incorporated into an OA exercise program (ACSM, 2018; Aronen & Lorenz, 2015; Dressendorfer, 2017; Sharp, 2018). The low to moderate intensity of Tai Chi and yoga, coupled with the cardiovascular and strength benefits, as well as improvements in balance, pain, fatigue, stiffness, and reduced stress, suggest neuromuscular training may be particularly beneficial for deconditioned clients (Field, 2016; Lan, Chen, & Lai, 2008; Larson-Meyer, 2016). Table 23.5 combines the recommendations of a number of organizations. Additionally, the following contraindications and precautions should be considered before an exercise program (Aronen & Lorenz, 2015; Dressendorfer, 2017):

- All comorbidities should be evaluated separately and considered for any exercise contraindications and recommendations.
- Activities that increase or exacerbate pain should be avoided.
- During acute flare-ups, intense exercise should be avoided, but mild activity such as range of motion exercises are encouraged.
- Assure clients that some pain while exercising is normal.
- Balance and gait can be affected by OA in the lower extremities placing clients at an increased risk for falling.
- An adequate warm-up should be performed to increase joint lubrication and tissue elasticity.
- Aerobic exercise to increase endurance and cardiovascular capacity should be suggested prior to a combined program of aerobic and resistance exercise.
- Exercising in a warm pool, 86-88 degrees °F, will relax muscles and reduce pain.

- Higher intensity is not necessarily more effective than low intensity to reduce pain and improve physical function.
- Obese clients should be encouraged to perform low-intensity exercise with more repetitions.
- The protocols and exercises for clients with similar orthopedic dysfunctions (Chapters 17-22) should be considered.

Rheumatoid Arthritis

RA is the most common autoimmune disorder causing chronic joint inflammation, pain, stiffness, and warmth in an affected area (Melrose, Dawes, Kesterson, & Reuter, 2018). The immune system mistakenly attacks joint tissue, synovial lining, and cartilage, causing the joint lining to thicken. RA is most common in the wrists, fingers, and hands, but may progress to the elbows, knees, and ankles (Arthritis Foundation, n.d.). Diagnostic criteria for RA include the number of affected joints, the extent of swelling, the presence of RA antibodies, and duration of symptoms. RA is considered a systemic disease as it may also affect other systems of the body including the cardiovascular, respiratory, and renal (Melrose, et al., 2018).

It is estimated RA affects up to 1.5 million people, with an associated annual cost of \$39.2 billion. RA affects women at twice the rate of men, and mortality hazards are 60-70% higher in patients with RA compared with people in the general population (Arthritis Foundation, n.d.). Risk factors include a genetic history, age, smoking, stress, obesity, previous infections, and diet. Comorbidities are similar to those associated with OA, but also include asthma, malignancies, and chronic obstructive pulmonary disorder (Dougados et al., 2014). Additionally, it is suggested the incidence of CVD for an individual with RA is similar to individuals with Type II diabetes, and CVD may account for the increased mortality rate and be considered an independent risk factor for inflammatory arthritis. Equally, smoking is the single most preventable risk factor and accounts for up to as much as 25% the burden of RA. Suggestions for the management of CVD in patients with RA include:

- RA should be regarded as a condition associated with higher risk for CVD. The increased risk appears to be due to both an increased prevalence of traditional risk factors and the inflammatory burden
- Adequate control of disease activity is necessary to lower the CVD risk
- A CVD risk assessment is recommended for all patients with RA
- RA patients should consider quitting smoking (Peters et al., 2010)

Pharmacology

Pharmacological therapy for RA is similar to that for OA with the addition of disease-modifying antirheumatic drugs (DMARDs). DMARDs can be taken alone, or with NSAIDs, corticosteroids, or biologic response modifiers. DMARDs are immunosuppressants and place a client at an increased risk for infections, whereas biologic response modifiers increase the body's response to infection (Melrose et al., 2018). It is important to speak with a client's physician to be aware of any adverse side effects or contraindications to exercise because of pharmacological therapy.

Nutrition

The reduction of unhealthy gut microbiota is a main goal of dietary intervention for RA. Various diets, as well as individual foods and supplements can reduce inflammation, conversely, other foods may aggravate the condition and should be avoided. The following are some examples of beneficial diets (Khanna, Jaiswal, & Gupta, 2017):

- Fasting for 7 days followed by a vegan diet for a year may reduce joint swelling and tenderness.
- A vegan diet that eliminates any animal product or by product, has been shown to eliminate antigens that instigate immune reactive responses.
- A Mediterranean diet, high in Omega-3 fatty acids, fruits, vegetables, legumes, and low in red meat, has been shown to reduce inflammation, and improve quality of life.
- An elimination diet focuses on reducing foods that aggravate symptoms.

Because the details of specific diets are beyond the scope of this text, a client's physician and/or registered dietician should be consulted prior to making dietary changes. See Table 23.4 for a list of foods that may help with or exacerbate RA symptoms.

Table 23.4

Foods that may help with, exacerbate RA symptoms

Food	Characteristic	Benefit	Detriment
Whole grains	Dietary fiber antioxidants, phytic acid, vitamin E, selenium	Aids in digestion and the formation of beneficial microflora Anti-inflammatory	
Fruits	Bioactive components and phytochemicals	Antioxidant Anti-inflammatory	
Ginger	Phenolic acids	Reduces nausea, pain, and inflammation.	
Turmeric/Curcumin	Phenolic acids	Antioxidant Anti-inflammatory	
Cinnamon bark	Polyphenolic fraction	Aids in reducing GI distress Aids in reducing infections caused by bacteria and parasitic worms Appetite stimulant	
Omega-3		Immunosuppressant and anti-inflammatory	
Probiotics/Prebiotics	Bifidobacterium and Lactobacillus	Antioxidant	

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Alcohol	No evidence to support the benefits or detriments	
Tea (Green)	Phytochemicals	Antioxidant Anti-inflammatory
Hydrogenated Oils	Omega-6 fatty acid (non-GFLA)	Pro-inflammatory
Saturated fats	No double bonded molecules, saturated with hydrogen	Raises cholesterol Triggers adipose or fat tissue inflammation
Trans Fats	Hydrogenated oil	Triggers systemic inflammation
Red and Processed Meats	Contains hormones and fats	Triggers systemic inflammation
Refined sugars	Cytokines	Can cause inflammation by triggering an immune response
Gluten	Allergen	Can cause inflammation by triggering an immune response

Duckworth, 2018; Khanna, Jaiswal, & Gupta, 2017

Exercise intervention

In addition to reducing the effects of a sedentary lifestyle, exercise can reduce pain, joint stiffness, and fatigue in RA patients (ACSM, 2018). Reducing muscle atrophy via resistance training can hinder osteoporosis, and reduce the risk of falls, while aerobic training can reduce the risk of CVD, diabetes, and obesity, and stretching can alleviate joint pain and stiffness. Although performing activity can be painful, exercise can help with activities of daily living, improve sleep, fight fatigue, boost immunity, and improve emotional well-being. A combination of aerobic and resistance training has been proven to be the most beneficial. In addition to the benefits of neuromuscular training experienced by OA clients, including improvements in cardiovascular conditioning, strength, balance, reduced pain, fatigue, stiffness, and stress, RA clients can also realize reductions in cholesterol and inflammatory cytokines (Field, 2016; Lan, et al., 2008; Larson-Meyer, 2016). FITT recommendations for RA are similar to recommendations for OA, and are in Tables 23.5 and 23.6.

Table 23.5

FITT recommendations for OA

Condition	Frequency	Intensity	Time	Type
Aerobic	3-5 days/week	55-75% VO ₂ max 30-60% HRR RPE 9-13 The talk test may be best for deconditioned clients	Start with 5-15 min and progress to 30 minutes for a total of 150 min/week Multiple shorter sessions / day should be considered	Swimming Cycling Walking Rowing Arm ergometer
Resistance training	2-3 sessions/week of light to moderate intensity	40-60% 1RM Pain tolerance may have to be used as a guide	2-3 sets 6-8 reps 2-3 min of rest	Balance & Functional • Isometrics • Body weight • Bands • Dumbbells
Flexibility	3-7 days/week	Held to mild discomfort	3 sets 1-5 stretches/muscle group 5-30 sec. hold	Dynamic flexibility Static flexibility
Neuromuscular training	3-7 days/week	Up to 55% HRR	15 min progressing to 60 min	Pilates, yoga, tai chi,

ACSM, 2018; Aronen & Lorenz, 2015; Dressendorfer, 2017; Field, 2016; Lan, et al., 2008; Larson-Meyer, 2016; Melrose et al., 2018

Table 23.6

FITT recommendations for RA

Condition	Frequency	Intensity	Time	Type
Aerobic	Most days of the week	60-80% MHR 30-60% HRR	Start with short bouts, as tolerated, and progress to 150 min/week	Low impact Pool based exercise Biking Switch modes on consecutive days Can be combined with intermittent resistance training
Resistance	2-3 sessions/week of light to moderate intensity based on symptoms and tolerance	40-60% 1RM	8-12 full body movements Slowly progress to 3 sets of 10-15 reps	Body weight Bands Manual resistance (if qualified) Dumbbells
Flexibility	3-7 days/week	Held to mild discomfort	Static stretching hold for up to 30 sec. 3 reps each stretch	Dynamic flexibility Static flexibility

Neuromuscular training	3-7/days/week	Up to 55% HRR	15 min progressing to 60 min	Pilates, yoga, tai chi,
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ACSM, 2018; Aronen & Lorenz, 2015; Dressendorfer, 2017; Field, 2016; Lan, et al., 2008; Larson-Meyer, 2016; Melrose et al., 2018

Discussion and application

1. Discuss the types of arthritis and the diagnostic criteria for each.
2. What are the recommended exercise guidelines for someone with arthritis, and what are some contraindications?

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