



Review Article

Rehabilitation of Patients with Rheumatic Diseases-An Update

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Abstract

Rehabilitation stands to make a person fit again. Rheumatic diseases are a heterogeneous group of disorders that involve joint structures (synovium, cartilage and bone) and their surrounding soft tissues (skin, muscles, tendons and ligaments). This chronic process results in soft tissue and synovial swelling, erosion of cartilage and bone, rupture of tendons, ligaments and joint capsule, reduction in joint space, muscle wasting and osteoporosis. Disease progression can create marked joint instability, muscular weakness and a reduction of general fitness. Rehabilitation of rheumatic patients includes multidisciplinary approach with pharmacotherapy, thermotherapy and cryotherapy, optimal rest, use of orthoses and functional aids, exercises, surgery and patient education. The present article will highlight biomechanical factors in the causation of disability and an approach to rehabilitate this group of patients.

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Introduction

Medical rehabilitation is concerned with the assessment and management of impairments, disabilities, and handicaps that result from trauma or disease¹. It is a goal - oriented, time - limited process aimed at restoration to the fullest physical, medical, emotional, social, economic and vocational potential of which the individual is capable. Rheumatic disease is a prevalent chronic condition.^{2,3} Mainly, four major categories of rheumatological disorders to be considered: degenerative joint diseases, rheumatoid arthritis (RA) and related inflammatory processes, metabolic disorders and soft tissue rheumatism. This disabling condition does not always run a smooth definite course and out come. The prerequisite for optimal rehabilitation of an arthritic patient is complete understanding of factors that may eventually lead to disability. The

long-term progressive disease, constant pain, altered appearance and financial burden attendant on chronic arthritis may cause a disabling psychogenic reaction. This article will highlight an updated status of knowledge relating to rehabilitation of patients with rheumatic diseases.

Objectives

The pre-requisite for optimal rehabilitation of rheumatic patient is complete understanding of factors that may eventually lead to disability. An attempt is made here to discuss the leading factors together with the available therapeutic measures in the process of arthritic patient rehabilitation.

Biomechanical effects and magnitude of the problem

Rheumatic disease may involve joint structures (synovium, cartilage and bone) and their surrounding soft tissues (skin, muscles, tendons

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and ligaments). This chronic process results in soft tissue and synovial swelling, erosion of cartilage and bone, rupture of tendons, ligaments and joint capsule, reduction in joint space, muscle wasting and osteoporosis. If this process is allowed to be continued, it creates reduction of joint mobility, muscular weakness and marked joint instability. Systemic rheumatic diseases are associated with diminished work endurance and fatigue^{1,5,6}.

The nature and extent of soft tissue, joint and systemic involvement varies among the inflammatory rheumatic disease. Although fatigue can be seen in all rheumatic disorders, synovitis is most prominent in RA and juvenile idiopathic arthritis (JIA). Bony ankylosis and motion loss of the spine and large peripheral joints are prominent in spondyloarthropathies but also may be seen in RA and JIA. Soft tissue contracture is most prominent in Progressive systemic sclerosis (PSS), RA and mixed connective tissue disease. Muscle weakness from atrophy, steroids and disuse can be seen in all these chronic disease but is most prominent in RA and Polymyalgia Rheumatica (PM). Weakness from myositis is most common in primary PM but can also be seen in RA, systemic lupus erythematosus (SLE), PSS and Sjogrens Syndrome. Neuropathic muscle weakness is most common with vasculitis, as seen in RA and SLE.^{7,8,9}

Efficient functioning of muscle depends on normal joint and surrounding soft tissues. Effusions in joints directly inhibit contraction of surrounding muscles¹⁰. Myositis often accompanied by rheumatic diseases is associated with muscle atrophy decrease force of contraction and endurance. Because of generalized fatigue and increased disease activity of these patients forcing to reduced activity and bed rest. Local rest (with splint or cast) bed rest and corticosteroids all associated with muscle atrophy¹¹. Muscle strength is known to decline 3% a week in a patient at rest.¹²

Materials and Methods

This review was done using the Texts, Index Medicus, Med-line and Internet search.

Rehabilitation approach

Rehabilitation of rheumatic patients includes multidisciplinary approach with pharmacotherapy, thermotherapy and cryotherapy, optimal rest, use of orthoses and functional aids, exercises and patient education covering children¹³, adolescents and adults.

Pharmacotherapy

NSAIDs are the most commonly prescribed medications in inflammatory arthritis¹⁴. In non-inflammatory conditions (e.g., osteoarthritis), however, analgesics often suffice, thus eliminating the potential for toxic effects with NSAIDs use. Intra articular injections and intra lesional infiltration of corticosteroids are often prescribed in soft tissue rheumatism and inflammatory or traumatic type of arthritis. Care must be taken to exclude a septic process before such injections. Systemic steroids and disease modifying anti rheumatic drugs (MARDs) (e.g., Methotrexate, Chloroquin, Sulphasalazine, Penicillamine, Gold salts, Azathioprine, Leflunomide etc) have been tried with variable success^{15,16,17,18,19}.

Thermotherapy, electrotherapy and hydrotherapy

Heating (superficial heating and deep heating) and cooling agents are usual adjunct to pharmacotherapy while the disease is being brought under optimal medical control^{20,21,22}. Moist heat often used before stretching in order to decrease pain and ultra sound or other deep heats can increase the elasticity of collagen²³ which facilitate stretching²⁴. Hydrotherapy is an important adjunct and assists in relaxation of muscles.²⁵ Transcutaneous Electrical Nerve Stimulation has been found effective analgesic in patients with rheumatoid arthritis.²⁶

Patient Education (PE)

Patient education is any set of planned educational activities designed to improve patient's health behaviors and through this improvement of their health status and ultimately long-term outcome. When patient develop a potentially disabling chronic disease, they commonly undergo a period of grief or bereavement reaction soon after the

their disease.²⁷ It has been suggested that the greatest reduction in disability may be achieved by intensive intervention at an early stage of the disease, that by learning coping skills early on, patients will be helped for the rest of their lives.²⁸

Rest

Bed rest is the most practical treatment for patients who present with an acute, painful polyarticular condition. It should not be extended beyond about 4 days, particularly in an elderly patient. Once the patient is in the subacute phase, rest for eight hours during the night and one hour twice a day is usually sufficient.²⁹

Functional aids and orthotic devices

Orthoses, such as braces and splints help to immobilize and stabilize acutely inflamed joints, thus decreasing pain.^{30,31} Splints made of thermoplastic material or plaster of Paris provides local rest and stability. The use of canes, walking frames and crutches provides unloading of the weight bearing joints and thereby reducing the risk of further joint damage and improving ambulation. Properly fitted footwear is also of utmost importance in patients with deformed and painful feet. Serial casting is used for soft tissue contracture that is resistant to stretching. Dynamic splints that provide a deadlock mechanism (that advances a few degrees every other day) may also be used.

Therapeutic exercise

There are a variety of exercise programs that can be employed in the treatment of patients with arthritis.^{32, 43} These programs include range of motion and stretching, strengthening, endurance and recreational exercise.^{34,35} The type and degree of exercise use depends on the degree of soft tissue and leg involvement present.

Importance and goals of exercise

1. to increase and maintain strength
2. to increase and maintain joint motion
3. to increase and maintain endurance
4. to increase bone density
5. to improve ADL capacity

6. to improve well-being and social interaction
7. to reduce pain by improving biomechanical integrity
8. to prevent ROM and strength deficit

Passive exercises

This kind of exercise performed by another person or a machine (e.g. CPM, suspension) has been proven effective. Repetitive passive ROM, in acute arthritis is associated with more joint inflammation than isometric exercise.³⁶ Passive ROM exercise has limited use in treating rheumatic patients. In-patients with severely weak and inflamed muscles who are at bed rest, daily passive ROM of joints is indicated to avoid contracture.

Active exercise

This kind of exercise performed by the patient himself or herself. All strengthening exercises are active exercise, when there is some assistance given by another person or machine the exercise is termed as active assistive. Active assistive ROM exercise commonly are used in rheumatic diseases to preserve or increase joint motion when the patient is too weak to move joints fully against gravity or when there is limited joint motion present.

Isometric exercise

Isometric exercise uses a static contraction of muscles in which muscle tension is generated against a fixed object, such as an elastic band, belt or hand of the therapist. In this type of contraction, no lengthening or shortening of the muscle fibers occurs and the joint is not moved. It is thought that an isometric program is associated with the least amount of shear stress across the joint and less intra-articular pressure and juxta-articular bone destruction. This exercise is not associated with muscle or joint inflammation.³⁷ RA patients can tolerate this exercise well.³⁸ Isometric exercise can increase muscle strength and endurance and is safe and easy for arthritis patients to use. A single - six-second isometric contraction daily at 2/3rd of maximum effort is known to increase strength in normal persons.

Intense isometric programs that require maximal muscle contractions (contractions held for 20 seconds) are known to be associated with significant diastolic blood pressure rises³⁹. On the other hand, brief isometric exercise (contractions held for 3-6 seconds) can increase muscle strength and endurance without significant blood pressure rise. This program can increase strength as rapidly as an isometric program and are very suitable for arthritis patients. Carrying a shopping bag or brief case is an example of isometric exercise.

Isotonic exercise

In this type of muscle contraction there is either lengthening (eccentric) or shortening (concentric) contractions of muscle fibers and adjoining joints move through full ROM. Some degree of force is placed across the joints by the muscle and joint movement. More force and tension are generated in the muscle with eccentric contractions. Going downstairs require eccentric contractions.

There are two main types of isotonic exercise programs

1. De Lorme Method: This is high resistance, low repetition method. It employs lifting progressively heavier weights for a set number of repetitions for each weight category, until the maximum weight possible is lifted. This method increases strength and causes muscle hypertrophy but places large forces across joints.⁴⁰
2. DeLateur Method: This is a constant low weight program with repetitions just to the point of muscle fatigue. This program is recommended for arthritis patients because it places less stress across the joint than the DeLorme method.^{41,42}

Swimming also produces isotonic exercise but gravity eliminated, when reduces stress across joints. The warm water also relaxes muscles around joints. So, it is very suitable for arthritis patients. Our daily activities require both isometric and isotonic muscle contractions; for instance, picking up a suitcase is isotonic and carrying it is isometric exercise. It is if we can train both isometric and isotonic exercises for ADL activities.

Isokinetic exercise

This is performed on an isokinetic machine that controls the velocity of muscle contraction by means of a rate-limiting device⁴³. These machines are represented by the Cybex - II, Kim-Com, Lodo and Biodex. The force of torque of the contraction is controlled by the rate. At high speeds (180°/sec), lower force is generated by the muscle, where as at low speeds (30-60°/sec), a large force is generated. The Cybex II allows only concentric contractions, other machines, use both concentric and eccentric contractions. Isometric exercise programs can be done on these machines also. In most cases, isokinetic exercise has not been recommended for patients with inflammatory arthritis, because greater joint stress may be produced. However, isokinetics can be used in low torque's (30-60°/sec) especially for strengthening the quadriceps muscles.

Endurance exercise

Exercise for endurance or aerobic conditioning can occur in many forms:

1. High impact and low impact aerobic dance programs
2. Running
3. Jogging
4. Fast walking
5. Swimming
6. Ergometry
7. Cycling

The intensity of these programs vary according to the person's state of conditioning and cardiovascular disease status. Programs may vary in intensity from 60-90 % of maximal heart rate. Persons who are deconditioned are begun on low-level programs geared toward 60% of the maximal heart rate (maximal heart rate = $220 - \text{age}$ of the person). For example, in a 30 year old, the maximum heart rate would be $220 - 30 = 190$. The training heart rate in a program at a 60% ($\text{VO}_2 \text{ MAX}$) level would be 60% (maximal heart rate - resting heart rate) plus resting heart rate. The upper training level at 60% for a person with a resting heart rate of 70 would be $0.6x(190 - 70) + 70 = 142$.

Suitable aerobic activities for increasing endurance in patients with inflammatory arthritis include low impact aerobics, swimming and bicycle ergometry.

Prescribing aerobic programs to arthritis patients depends on their cardiovascular status and the stage of the joint inflammation. Patients with RA, SLE, and OA have been shown significantly reduced aerobic capacities when compared to normal and are able to increase their capacity substantially in endurance training programs without precipitating acute joint flares.

Low level ergometry programs at 70% of maximal heart rate done three times a week (starting in progressive intervals as low as 5 to 15 minutes for a 12 week period) has been successful in significantly increasing aerobic capacity and reducing mean joint counts in RA. High impacts aerobics, running, and fast walking (useful for FMS patients) all places more impact forces across joints and are not recommended in inflammatory arthritis.

Range of Motion (ROM) Exercise

Maintaining a degree of joint motion that allows for performance of daily activities and maintenance of mobility is a critical goal for the arthritis patients.

Active ROM programs are used to maintain or increase joint motion. They are done as a 5-minute to 10 minute warm up session before strengthening exercises. The Arthritis Foundation has a number of ROM programs, e.g. The ROM dance, Joint efforts and Pace and Aquatic programs. Patients with arthritis should do these ROM exercises daily. In-patients, whose joints have limited motion because of tight tendons, muscles, and capsular structures, a stretching program done initially with a therapist and then taught to the patient, should be used to achieve maximal joint ROM. This should be initiated before an exercise program is engaged in. Often a pulley system or wand is used to facilitate the strengthening process. For patients who have a ROM deficit because of the severe joint destruction and who have very limited or no joint space, ROM can not be expected to increase

appreciably. Forceful stretching should be avoided in the unstable or biomechanically deranged joint in the presence of moderate to large joint effusion.³⁷

Recreational Exercise

Patients with arthritis may participate safely in a variety of recreational sports and activities, including swimming, dancing, walking, cycling, low impact aerobics, gardening, yardwork and table tennis. Activities that place high force against joints are to be avoided: running, fast walking, high impact aerobics, tennis, and contact sports. Recreational exercise, when used appropriately, helps to preserve joint motion, increase and maintain muscle strength, and increase muscle endurance and overall aerobic capacity. It also provides social contact, helps increase self-esteem, and has an antidepressant effect, probably because of endorphin release.

The degree of recreational exercise done by a person depends on the person's interest, community resources, stage of the arthritis, and degree of inflammation. Patients with acute joints; active unstable myositis, and large joint effusions should avoid recreational exercises that would involve use of the affected joints and muscles. Sports equipment adapted for arthritic hands is now available and includes adaptive handles for racquets, garden tools, table tennis paddles, and golf clubs.

Precautions for exercise therapy

Patients with neuropathy and neuropathic joints should avoid highly repeatable, progressive resistive exercise that fatigue muscles and destroys joints. One must be cautious before prescribing exercises to these patients.

A number of factors must be taken into account when designing an exercise program for patients with different form of arthritis: -

1. Assessment of local or systemic involvement
2. Stage of joint involvement
3. Stage of the disease
4. Preparation for exercise
5. Age of the patient
6. Compliance of the patient
7. Sequencing exercise

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