

# Differential Diagnosis And Tests Of Rheumatoid Arthritis And Its Implication For Physiotherapy

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**Abstract:** Rheumatoid arthritis (RA) is one of the most common type of autoimmune arthritis. It is caused when the immune system, which is the body's defense system is not functioning properly. Rheumatoid arthritis cause joint pain, swelling in the wrist and small joints of the hand and feet, leading to damage throughout the body. Possible risk factors for rheumatoid arthritis include sex, age, genetic background, smoking, and environmental exposure. Though there is no cure for rheumatoid arthritis, its treatment works best when diagnosed early. The treatment of rheumatoid arthritis involves patient education, rest and exercises, joint protection, medications, and occasionally surgery. Physiotherapist designs an exercise program that is low-impact aerobic exercises, such as walking, and exercises which increases muscle strength. This will improve overall health and lower pressure on the joints. Proper diagnosis of rheumatoid arthritis is important, because there are diseases that can be mistaken for it. Rheumatoid arthritis can affect people of all ages, its cause is unknown.

**Keywords:** Rheumatoid arthritis (RA), Physiotherapist, Differential diagnosis.

## I. INTRODUCTION

Rheumatoid arthritis is an autoimmune disease, meaning the arthritis results from the immune system attacking its body's own tissues (Watson, 2017; Mayo Clinic, 2018a). The disease causes inflammation in the joints usually starts in the wrists, hands or feet, and then spreads to other joints and other parts of the body. The joint effect is usually symmetrical, which means if one knee or hand is affected, usually the other one is also affected (Nse, 2017). This is one way that doctors differentiates rheumatoid arthritis from other forms of arthritis, like osteoarthritis. It is a chronic inflammatory disorder that affects the lining of your joints, unlike the osteoarthritis which causes a wear and tear damage. It causes swelling thereby leading to bone erosion and joint deformity (Mayo Clinic, 2018a). There is no cure for rheumatoid arthritis, but treatment to relieve the symptoms is effective.

Rheumatoid arthritis is a chronic and progressive disease in which inflammatory changes occur throughout the connective tissues of the body. Inflammation and thickening of the synovial membranes (the sacs holding the fluid that lubricates the joints) cause irreversible damage to the

joint capsule and the articular cartilage as these structures are replaced by scar like tissue called pannus (The Editors of Encyclopaedia Britannica, 2000).

Most persons with rheumatoid arthritis have characteristic autoantibodies in their blood, these autoantibodies are collectively called rheumatoid factor. The cause of autoimmune reaction is unknown, but there is evidence that persons affected with the disease have a genetic susceptibility to an environmental agent such as a virus. Inflammation occurs as a result of the series of immune system reactions (The Editors of Encyclopaedia Britannica, 2000).

## II. EPIDEMIOLOGY

About 1.5 million people in the United States have rheumatoid arthritis (RA). Rheumatoid arthritis commonly begins between ages 30 and 60 in women, and for men, it occurs later in life (Tennant, 2015; Arthritis Foundation, 2018a). Onset is uncommon under the age of 15 and from then the incidence rises with age until the age of 80 (Jijith, 2007). Women are three times more affected as men (Eustice, 2018).

### III. TYPES OF RHEUMATOID ARTHRITIS

#### A. SEROPOSITIVE RHEUMATOID ARTHRITIS

This is the most common type with about 60% - 80% of patients with rheumatoid arthritis, testing positive to rheumatoid factor (RF), or anti-cyclic citrullinated peptide (anti-CCPs), or anti-citrullinated protein antibodies (ACPAs). This means presence of antibodies that cause the immune system to attack their joints (WebMD Medical Reference staff, 2017).

#### B. SERONEGATIVE RHEUMATOID ARTHRITIS

Patients test negative to rheumatoid factor (RF), or anti-cyclic citrullinated peptide (anti-CCPs) blood test result, but still have rheumatoid arthritis symptoms (WebMD Medical Reference staff, 2017).

#### C. JUVENILE RHEUMATOID ARTHRITIS

This is also called Juvenile idiopathic arthritis, seen in patients under 17 years of age. The symptoms are the same as those of other types of rheumatoid arthritis, but they may also include eye inflammation and issues with physical development, especially in severe condition (Health line, 2018).

### IV. CAUSES

The main cause of rheumatoid arthritis is unknown. Rheumatoid arthritis occurs when the components of the immune system attack the lining of the membranes that surrounds the joints (synovial tissue). The resulting inflammation thickens the synovium, leading to erosion of the cartilage, bone, and ligaments of the joint, causing deformity, instability, and scarring within the joint. Gradually, the joint loses its shape and alignment. Many factors, including genetic predisposition and unknown environmental factors may play a role in the pattern of the disease (Kontzias, 2018).

### V. RISK FACTORS

Factors that may increase the risk of rheumatoid arthritis include:

- ✓ Sex: More women than men tend to develop rheumatoid arthritis.
- ✓ Age: Rheumatoid arthritis can occur at any age, but it most commonly begins between the ages of 30 and 60.
- ✓ Family history: There is increased risk when a member of the family has rheumatoid arthritis.
- ✓ Smoking: Cigarette smoking increases the risk of developing rheumatoid arthritis, especially when there is a genetic predisposition for developing the disease.
- ✓ Environmental factors: This aspect is uncertain and poorly understood, some exposures such as asbestos or silica may increase the risk for developing rheumatoid arthritis.

- ✓ Obesity: People who are overweight or obese tend to be at somewhat higher risk of developing rheumatoid arthritis, especially in women diagnosed with the disease when they were 55 or younger (Mayo Clinic, 2018a).

### VI. SYMPTOMS

Rheumatoid arthritis symptoms are as follows:

- ✓ Joint pain, tenderness, swelling or stiffness for six weeks or longer.
- ✓ Morning stiffness for 30 minutes or longer.
- ✓ More than one joint is affected.
- ✓ The same joints on both sides of the body are affected.
- ✓ Joint deformity at the small joints, like hands, wrists, fingers, feet, and toes. Other joints includes knees, shoulders, elbows, ankles, and hips.
- ✓ Rheumatoid arthritis may cause a loss of appetite with weight loss and a low-grade fever (Arthritis Foundation, 2018b).

### VII. COMPLICATIONS

Complications in relation to rheumatoid arthritis includes:

- ✓ Osteoporosis: Medications used for treating rheumatoid arthritis, can increase your risk of osteoporosis, a condition that weakens the bones and makes them more prone to fracture.
- ✓ Rheumatoid nodules: These firm bumps of tissue commonly form around pressure points, such as the elbows. It can also form anywhere in the body, including the lungs.
- ✓ Dry eyes and mouth: Most people who have rheumatoid arthritis are more likely to experience Sjogren's syndrome, a disorder which decreases the amount of moisture in your eyes and mouth, leading to dryness.
- ✓ Infections: Most of the medications in this treatment impairs the immune system, leading to increased infections.
- ✓ Carpal tunnel syndrome: Inflammation affecting the wrists, leads to compression of the nerve at the hand and fingers.
- ✓ Heart problems: Rheumatoid arthritis can increase your risk of hardened and blocked arteries, as well as inflammation of the sac that encloses your heart.
- ✓ Lung disease: People with rheumatoid arthritis have an increased risk of inflammation and scarring of the lung tissues, which can lead to progressive shortness of breath.
- ✓ Lymphoma: Rheumatoid arthritis increases the risk of lymphoma, a group of blood cancers that develop in the lymph system (Mayo Clinic, 2018a).

### VIII. STAGES

There are four distinct stages of rheumatoid arthritis progression each with their own treatment courses.

- ✓ *STAGE 1*: This is early stage rheumatoid arthritis. It involves inflammation in the joint capsule and swelling of

synovial tissue, which induces the clear symptoms of joint pain, swelling, and stiffness.

- ✓ **STAGE 2:** This the moderate stage of rheumatoid arthritis. The inflammation of synovial tissue becomes severe which causes cartilage damage, leading to loss of mobility and range of motion.
- ✓ **STAGE 3:** This is considered severe stage of rheumatoid arthritis. Inflammation in the synovium now destroys not only the cartilage of the joint but as well as the bone. Potential symptoms of this stage include joint deformity without permanent stiffening of the joint, extensive muscle atrophy, abnormalities of soft tissue around joint possible.
- ✓ **STAGE 4:** In this end stage of rheumatoid arthritis, the inflammatory process ceases, joint deformity with permanent fixation of the joint (ankylosis). Pain, swelling, stiffness and loss of mobility are still the primary symptoms in this stage (Rheumatoid Arthritis, 2016b).
- ✓ Rheumatologists classified the functional status of people with rheumatoid arthritis as follows:
  - ✓ Class I: Ability to perform usual activities of daily living.
  - ✓ Class II: Ability to perform usual self-care and work activities but limited in activities outside of work.
  - ✓ Class III: Ability to perform usual self-care activities but limited in work and other activities.
  - ✓ Class IV: Limited in ability to perform usual self-care, work, and other activities (Shiel, 2018).

#### IX. DIAGNOSIS

**PHYSICAL EXAMINATION:** The physician will ask about personal and family medical history as well as perform physical examination of each joint, looking for tenderness, swelling, warmth and painful or limited movement. The physical exam may reveal other signs, such as rheumatoid nodules or a low-grade fever.

**BLOOD TESTS:** The blood tests will measure inflammation levels and look for biomarker like antibodies (blood proteins).

- ✓ Erythrocyte sedimentation rate (ESR), or sedimentation rate (SED rate), or Westergren sedimentation rate and C-reactive protein (CRP) level are markers of inflammation. An erythrocyte sedimentation rate (ESR) is a type of blood test that measures how quickly erythrocytes (red blood cells) settle at the bottom of a test tube that contains a blood sample. A high ESR or CRP is not specific to rheumatoid arthritis, but when combined with other, such as antibodies, helps make rheumatoid arthritis diagnosis (Arthritis Foundation, 2018c).
- ✓ Rheumatoid factor (RF) is an antibody found in about 80% of people with rheumatoid arthritis. Due to its occurrence in other inflammatory diseases, it is not a good sign for rheumatoid arthritis diagnosis. A different antibody, anti-cyclic citrullinated peptide (anti-CCP) occurs primarily in patients with rheumatoid arthritis, which makes a positive anti-CCP test a stronger diagnosis of rheumatoid arthritis. But anti-CCP antibodies are found in only 60 to 70 percent of people with RA and can exist even before symptoms start (Arthritis Foundation, 2018c).

- ✓ An X-ray, ultrasound or magnetic resonance imaging scan may be performed to look out for joint damage, such as loss of bone within the joint, and narrowing of joint space. Absence of these signs does not rule out rheumatoid arthritis, but that the disease is in the early stage (Arthritis Foundation, 2018c).

#### X. TREATMENT

**MEDICATIONS:** There are different drugs used in the treatment of rheumatoid arthritis. Some are used primarily to ease the symptoms of rheumatoid arthritis, others are used to slow or stop the course of the disease and to inhibit structural damage.

- ✓ Nonsteroidal anti-inflammatory drugs (NSAIDs) are used to ease pain and inflammation. NSAIDs include ibuprofen (Advil, Motrin IB) and naproxen sodium (Aleve) (Mayo Clinic, 2018b). Celecoxib is prescribed for patients with risk of stomach ulcers, a type of NSAID called a cyclooxygenase-2 (COX-2) inhibitor, which is safer. These NSAIDs can be taken orally or applied to the skin directly to a swollen joint (Arthritis Foundation, 2018d).
- ✓ Corticosteroid medications, such as prednisone, prednisolone and methylprednisolone reduce inflammation and pain and slow joint damage. Side effects includes thinning of bones, weight gain and diabetes (Mayo Clinic, 2018b).
- ✓ Disease-modifying antirheumatic drugs (DMARDs) are drugs that slow the progression of rheumatoid arthritis and save the joints and other tissues from permanent damage. Common DMARDs include methotrexate (Trexall, Otrexup, and Rasuvo), leflunomide (Arava), hydroxychloroquine (Plaquenil) and sulfasalazine (Azulfidine) (Mayo Clinic, 2018b).
- ✓ Greater intake of vitamin D reduces the risk of rheumatoid arthritis.

**REST AND NUTRITION:** Regular rest often help relieve pain, reduce inflammation, and fatigue that can comes with a flare on the joint. A healthy diet rich in fish (omega-3 fatty acids) and plant oils that relieves pain and stiffness but low in red meat can partially relieve symptoms in some people. Fat diets should be avoided (Kontzias, 2018).

**PHYSICAL THERAPY:** The physiotherapist conducts a physical examination on the joints and muscles, also asks about their functional activities. Goals in rheumatoid arthritis treatment may include reduce inflammation, relieve pain symptoms, prevent joint damage, improve physical function and overall well-being, and minimize long-term complications. Treatment includes as follows:

- ✓ Exercise is considered an essential part of rheumatoid arthritis treatment. The physiotherapist emphasizes on low-impact aerobics, range of motion, muscle strengthening and flexibility exercises.
- ✓ Heat and Cold Therapies: Heat treatments, such as heat pads or warm baths, tend to relieve stiff joints and tired muscles. Cold is best for acute pain. It can numb painful areas and reduce inflammation. It is an important self-care treatment advised by the physiotherapist.

- ✓ Topical Treatments: Nonsteroidal anti-inflammatory drugs (NSAIDs), salicylates or capsaicin, help reduce pain. These cream or patches are applied directly to the skin over the painful muscle or joint. (Arthritis Foundation, 2018e).
- ✓ Posture: The physiotherapist will analyse the person's gait (walking) patterns, and suggest simple ways of improving poor gait such as insoles and walking aids.
- ✓ Hydrotherapy: This may include using hot tubs in combination with massage or exercises for treatment.
- ✓ Massage: This is commonly used by a physiotherapist to improve flexibility and general well-being, and can help to diminish swelling of inflamed joints.
- ✓ Transcutaneous electrical nerve stimulation (TENS) therapy is a method for relieving pain in rheumatoid arthritis.
- ✓ Rest/splinting: It is important to rest joints in a functional position and splints can be used to provide extra support. Patient may be referred to an orthotist by the physiotherapist to get a fit splint (Irish health Clinic, 2018).

**SURGERY:** Surgery is needed when the drugs have not helped. Surgery is important for people with permanent damage that limits daily function, mobility and independence. Hip and knee replacements are the most common type of surgery performed on rheumatoid arthritis conditions. However, ankles, shoulders, wrists, elbows, and other joints may be considered for replacement. The following procedures may be involved in the surgery of rheumatoid arthritis:

- ✓ Synovectomy: This is the surgical removal of the inflamed joint lining (synovium). Synovectomy can be performed on knees, elbows, wrists, fingers and hips.
- ✓ Tendon repair: Tendons surrounding the joints can damage due to inflammation and joint damage, and may cause tendons around the joint to loosen or rupture.
- ✓ Joint fusion: Surgically fusing a joint may be recommended to stabilize a joint and for pain relief when a joint replacement is not an option, most especially in the foot. The thumb can also be fused to enable a person to pinch, and unstable vertebrae around the cervical region (top of the neck) can be fused to prevent them from compressing the spinal cord.
- ✓ Total joint replacement: Removal of damaged parts of the joint by a surgeon, and replaced with prosthesis made of metal and plastics. Total hip replacements and knee replacements are most successful (Mayo Clinic, 2018b).

#### ALTERNATIVE MEDICINE

**Tai chi:** This therapy involves gentle exercises and stretches in combination with deep breathing. Many people use tai chi to relieve stress in their lives. Studies have shown that tai chi may reduce rheumatoid arthritis pain. Tai chi is safe, with a knowledgeable instructor (Mayo Clinic, 2018b).

#### XI. DIFFERENTIAL DIAGNOSES

There are other medical conditions that resemble rheumatoid arthritis, and it can be distinguished with various diagnosis.

- ✓ Osteoarthritis. This is distinguished with x-rays of the affected joints and blood tests, older age, pain commence less than an hour, deterioration of the joints, asymmetric distribution of affected joints and pain increases when the joint is subjected to activity over longer periods.
- ✓ Psoriatic arthritis resembles rheumatoid arthritis, and can be distinguished with nail changes, skin symptoms, and skin biopsy.
- ✓ Gout. Distinguished by the absence of joint space narrowing, and absence of periarticular osteopenia. There is presence of uric acid in the blood and tissues. Synovial fluid analysis is used for differential diagnosis.
- ✓ Pseudogout or Calcium pyrophosphate crystal deposition (CPPD). X-rays and synovial fluid analysis is used for differential diagnosis, identifying the presence of crystals in the joint. Pseudogout typically disappears two weeks even if left untreated.
- ✓ Lyme disease causes erosive arthritis and may closely resemble rheumatoid arthritis, and may be distinguished by blood test in endemic areas.
- ✓ Sarcoidosis. This manifests with synovitis in several joints, but tissue biopsy can be used for diagnosis.
- ✓ Fibromyalgia. This can be characterized by diffuse symmetrical arthralgia and stiffness at rest, but absence of synovitis, lack of pain on motion, normal laboratory and imaging studies can distinguish it from rheumatoid arthritis.
- ✓ Ankylosing spondylitis. Presents symptoms in the shoulders, hips and lower back first, also some experience eyes symptoms (redness, light sensitivity and blurred vision). It is mostly diagnosed in males under 40 years of age.
- ✓ Systemic lupus erythematosus (SLE). This is different due to its erosive nature, with laxity of the tendon and ligament. Distinguished by specific clinical symptoms and blood tests.
- ✓ Reactive arthritis (formerly called Reiter's syndrome). This condition affects more men than women. It comes with arthritis, conjunctivitis or urethritis, usually occurs one month after the infection. It involves knee, heel, sacroiliac joints and large joints of the leg asymmetrically.
- ✓ Bacterial arthritis such as streptococcus is usually asymmetric, while rheumatoid arthritis involves both sides of the body symmetrically.
- ✓ Gonococcal arthritis (a bacterial arthritis) is also initially migratory and can involve tendons around the wrists and ankles.
- ✓ Sjogren's syndrome. Specialized test such as antinuclear antibody (ANA test), immunoglobulin are elevated, can be used to distinguish between Sjogren's syndrome and rheumatoid arthritis. (Berkow, 1992; Lovy, et al., 1996).

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