

“Rheumatoid Arthritis”

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ABSTRACT:

Arthritis is a chronic and debilitating condition affecting millions worldwide, causing joint pain, stiffness, and limited mobility. This article provides an overview of arthritis, its types, causes, risk factors, symptoms, diagnosis, and treatment options. The most common forms of arthritis, including osteoarthritis, rheumatoid arthritis, psoriatic arthritis, and gout, are examined. The impact of lifestyle factors, genetics, and autoimmune disorders on arthritis development is discussed. Effective management strategies, such as medication, physical therapy, exercise, and alternative therapies, are highlighted. Emphasis is placed on the importance of early diagnosis and multidisciplinary care to improve quality of life for individuals living with arthritis.

As there is no cure for RA, the treatment goals are to reduce the pain and stop/slow further damage. Here, we present a brief summary of various past and present treatment modalities to address the complications associated with RA.

Keywords: Arthritis, Osteoarthritis, Rheumatoid Arthritis, Psoriatic Arthritis, Gout, Chronic Pain, Joint Inflammation, Management Strategies.

I. INTRODUCTION-

Arthritis, a term from Greek meaning "joint inflammation," refers to a condition that causes pain, swelling, and stiffness in the joints.^[1] It can be either acute (short-term) or chronic (long-lasting) and is a leading cause of disability worldwide.^{[2][3]}

There are over 100 types of arthritis, with the most common being osteoarthritis and rheumatoid arthritis. Osteoarthritis is a "wear-and-tear" type of arthritis that usually affects the knees, hips, and fingers as people age.

Rheumatoid arthritis, on the other hand, is an autoimmune condition where the immune system attacks the joints, commonly affecting the hands and feet. Other types of arthritis include: Gout, which results from a buildup of uric

acid in the joints. Septic arthritis, caused by infection in the joint.^{[4][5]}

Conditions linked to other diseases, like lupus, scleroderma, and inflammatory bowel disease. Arthritis is not the same as arthralgia, which simply means joint pain without inflammation.^[6] It has been affecting humans since ancient times, including Neanderthals and Egyptians. The term "osteoarthritis" was first used in 1886 by Dr. John K. Spencer.

The goal here is to understand the common forms of arthritis and their key features to better manage and treat these conditions.^[7]

There are over 100 types of arthritis, but the most common forms are:

Osteoarthritis (OA): Wear and tear on the joints, often affecting weight-bearing joints like hips, knees, and spine.

1. Rheumatoid Arthritis (RA): An autoimmune disease where the immune system attacks the joint lining.

2. Psoriatic Arthritis (PsA): Inflammation of the joints and skin, associated with psoriasis.

3. Gout: Sudden, severe joint pain caused by uric acid crystal buildup

4. Fibromyalgia: Widespread muscle pain and fatigue.^[8]

Causes and Risk Factors:

- 1) Genetics
- 2) Age
- 3) Obesity
- 4) Injury or trauma
- 5) Infections
- 6) Autoimmune disorders
- 7) Lifestyle factors (smoking, lack of exercise)

Symptoms:

- 1) Joint pain and stiffness
- 2) Swelling and redness
- 3) Limited mobility
- 4) Fatigue

Treatment:

Diagnosis involves physical examination, medical history, imaging tests (X-rays, MRI), and blood tests. Treatment options include:

- 1) Medications (pain relievers, anti-inflammatory drugs)
- 2) Physical therapy
- 3) Lifestyle modifications (exercise, weight management)
- 4) Alternative therapies (acupuncture, massage)
- 5) Surgery (joint replacement)^[10]

History of Rheumatoid Arthritis (RA)

Rheumatoid arthritis (RA) was first described in 1800 by Augustin Jacob Landré-Beauvais, a young French physician at the Saltpêtrière asylum. He observed patients, mainly poor women, suffering from severe joint pain that didn't match other known conditions like gout or osteoarthritis.^[11] He called this new condition Goutte Asthénique Primitive or "Primary Asthenic Gout." While his classification was incorrect, his work inspired further study of RA. Later, in the mid-19th century, Alfred Garrod, an English doctor, played a key role in distinguishing RA from gout. In 1859, he published a book, *Treatise on Nature of Gout and Rheumatic Gout*, where he explained that gout was caused by high uric acid levels, which were not present in RA.^[12]

He referred to RA as "Rheumatic Gout," marking it as a distinct disease. In 1890, Alfred's son,

Archibald Garrod, advanced RA research by naming the disease "Rheumatoid Arthritis." This name better reflected how the condition affects the body and replaced the many terms used earlier. However, debates continued about RA's origins, with some researchers arguing it was a modern disease, while others believed it had ancient roots. This debate persists today. Causes of Arthritis.^{[13][14]}

The causes of arthritis depend on its type:

Osteoarthritis (OA): Mainly caused by wear and tear on joints. Risk factors include aging, being female, joint injuries, obesity, and genetic mutations in collagen-producing genes.

Rheumatoid Arthritis (RA): An autoimmune disease where the immune system attacks the joints, causing inflammation. Caused by a combination of genetic factors (like the HLA-DRB1 gene) and environmental triggers, such as smoking. Overall, arthritis arises from a mix of genetic, environmental, and lifestyle factors.^[15]



Fig. Rheumatoid arthritis

Etiology

The cause of arthritis depends on the type of arthritis. In osteoarthritis, the main factors include getting older, being female, having joint injuries, and being overweight. Some genetic factors, like changes in certain collagen genes, may also play a role.^{[16][17]}

Rheumatoid arthritis (RA) is different because it's an autoimmune condition, meaning the immune system mistakenly attacks the body's joints. It results from a combination of genetic factors (like specific genes) and environmental factors, such as smoking, which trigger the immune system to cause inflammation.^[18]

Overall, arthritis can develop due to a mix of genetics, environment, and lifestyle choices.

Here's a comprehensive overview:

Environmental Factors:

- 1) Age: Risk increases with age, especially after 40.
- 2) Obesity: Excess weight puts additional stress on joints.
- 3) Trauma: Joint injuries (e.g., fractures, dislocations) can lead to arthritis.
- 4) Infections: Bacterial (e.g., Lyme disease) or viral (e.g., hepatitis) infections.
- 5) Autoimmune disorders: Conditions like lupus, rheumatoid arthritis.

Lifestyle Factors:

- 1) Diet: Consuming high amounts of:
 - a. Sugar
 - b. Salt
 - c. Saturated fats
 - d. Processed foods
- 2) Physical inactivity: Sedentary lifestyle contributes to joint degeneration.

- 3)Smoking: Increases inflammation and joint damage.
- 4)Stress: Chronic stress exacerbates arthritis symptoms.^{[4][6]}

Other Factors:

- 1)Hormonal changes: Hormonal fluctuations (e.g., menopause).
- 2)Metabolic disorders: Diabetes, thyroid conditions.
- 3)Occupational hazards: Repetitive strain, vibrations.
- 4)Sports-related injuries.

Specific Etiologies:

- 1)Osteoarthritis (OA): Wear and tear, joint overuse.
- 2)Rheumatoid Arthritis (RA): Autoimmune response.
- 3)Psoriatic Arthritis (PsA): Skin and joint inflammation.
- 4)Gout: Uric acid crystal build up.

Interplay between Factors:

- 1)Gene-environment interactions.
- 2)Epigenetic modifications.
- 3)Immune system^[19]

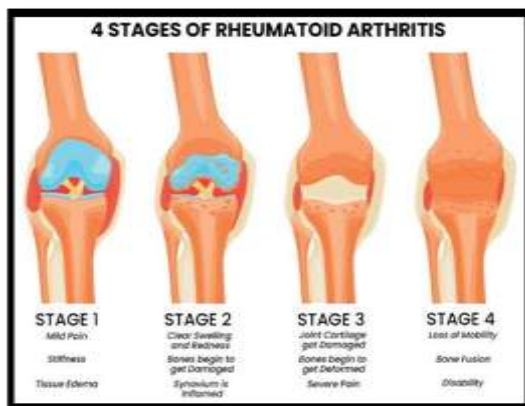


Fig.Stages Of Rheumatoid Arthritis

Stages of rheumatoid arthritis

Stage 1 of RA:

In the initial stages, people may experience a Mild Pain and Stiffness. The pain may be noticeable in the morning and after some movement, it can go away. The synovial lining becomes inflamed. There is a little swelling inside the joint.

However, the swelling may not be clearly visible on the skin's surface. Hands and feet are the main affected joints. Only one or two joints can be affected at this stage. The bones are not affected. It can be difficult for a person to identify if he or she

is suffering from rheumatoid arthritis at this stage. However, the swelling may not be clearly visible on the skin's surface. Hands and feet are the main affected joints. Only one or two joints can be affected at this stage. The bones are not affected. It can be difficult for a person to identify if he or she is suffering from rheumatoid arthritis at this stage.

Stage 2 of RA:

Stage 2 is known as the moderate stage. If the disease progresses to the second stage, the number of antibodies in the blood rises and joints may begin to show Clear Swelling and Redness. The symptoms become clear and apparent at this stage and it is easy to identify rheumatoid arthritis.

The Synovium is Inflamed, and joint cartilage and Bones begin to get Damaged at this stage. Cartilage is the tissue that protects or covers the endpoints of the bones. Cartilage damage can cause pain and it can become difficult for the patient to move. The joints can show stiffness and it can become difficult to move them. Especially after some rest, you can find it difficult to move your joints again. The other organs of the body also begin to be affected. Your lungs, heart, and eyes can show signs of illness.

Stage 3 of RA

This is the stage where the disease becomes very serious. The Joint Cartilage has been damaged and the bone also starts to get affected. Since cartilage is the soft cushion between the joints, its absence means the joints will start rubbing together. The Bones begin to get Deformed and the shape of the joint or bone can change. For example, the fingers can be twisted or knuckles can be thickened. The joint tendons can also be compressed or ruptured. The ruptured tendons may not heal but it can be prevented if attention is paid on time. These deformed joints can also affect your veins or press your veins so it can result in nerve pain as well. There can be extreme pain and swelling. The muscles are also weakened by this stage. The patient can find it extremely difficult to move the affected joints.

Stage 4 of RA

This is the last stage of rheumatoid arthritis patients. By this time, the swelling is gone. The patient can experience a little pain but the movement is completely gone. The bones will fuse together and at this stage, it will no longer be possible to move the affected joint.

But, you don't have to wait for your bones to join together before consulting a doctor.

Rheumatoid Arthritis can be controlled in the initial stages.^{[20][21]}

Epidemiology

Arthritis Overall: More than one-third of Americans show arthritis on imaging, and the number is rising as the population ages.^[22]

Osteoarthritis: This is the most common type of arthritis.^[23]

19-30% of adults over 45 have knee osteoarthritis

.27% have hand osteoarthritis.

27% have hip osteoarthritis

.Lifetime risk: 40% for men and 47% for women, rising to 60% if their BMI is over 30.^{[24][25]}

Gout: The most common inflammatory arthritis in the U.S.:

Affects over 8 million people (3.9% of the population).^{[26][27]}

Prevalence rises to over 9% in people over 60. Incidence is over 45 cases per 100,000 people annually.

Gout cases have more than doubled in recent decades.

Pseudo gout: Affects 4-7% of adults, often involving the knees.

Rheumatoid Arthritis: Affects about 1% of Caucasians, more common in women.

Lifetime risk: 3.6% for women, 1.7% for men.^{[28][29]}

Common onset is early adulthood, with 5% of women over 65 affected.

Septic Arthritis: Caused by bacterial infection in a joint, often from skin or urinary tract infections.^[30]

Rare in the general population (0.01%), but more common in people with rheumatoid arthritis (0.7%)^{[31][32]}

Classification of rheumatoid arthritis:

A. Nonbiological Drug:

1) Immunosuppressant: Methotrexate, Azathioprine, Cyclosporine

2) Sulfasalazine

3) Chloroquine or Hydroxychloroquine

4) Leflunomide

5) Gold drugs: Auranofin

B) Biological agents:

1) TNF α inhibitors: Etanercept, Infliximab, Adalimumab.

2) IL-1 antagonist: Anakinra.^[33]

Slow acting anti rheumatoid drugs:

Methotrexate (Mtx)

- Dihydrofolate reductase inhibitor, immunosuppressant and anti-inflammatory.
- Inhibition of cytokine production, chemotaxis and cell-mediated immune reaction afford benefits in RA.
- Administration of oral low-dose (7.5-15 mg) weekly Mtx regimen RA patients acceptability. improvement of
- Relatively rapid (4-6 weeks) onset of symptom relief preferred for initial treatment
- Mtx is now the DMARD of first choice for most patients of RA including cases of juvenile RA.
- Response is more predictable and sustained over long-term.
- Combination regimens of 2 or 3 DMARDs include Mtx.
- Pharmacokinetics Oral bioavailability of Mtx is variable and may be affected by food. Its excretion is delayed in renal disease: not recommended for such patients.
- Interaction Probenecid and aspirin increase Mtx levels and toxicity.
- Combination of trimethoprim Mtx additive inhibition of dihydrofolate reductase bone marrow depression.
- Adverse effects Oral ulceration and g.i. upset are the major side effects of low dose Mtx regimen. With prolonged therapy, dose dependent progressive liver damage leading to cirrhosis occurs in some patients (this is not seen with short courses used in cancer). Incidence of chest infection is increased.
- Contraindication Pregnancy, breast-feeding, liver disease, active infection, leukopenia and peptic ulcer.
- Marketed preparations NEOTREXATE, BIOTREXATE 2.5 mg tab.^[34]

Clinical features:

The main symptoms of rheumatoid arthritis are stiffness in the morning and pain with swelling in multiple joints. People often feel stiff when they wake up, especially in their fingers, making it hard to form a fist. The joint pain is usually accompanied by swelling and difficulty moving.^[35]

These symptoms often appear in the joints of the fingers and toes (like the middle finger joints, knuckles, and toe joints), as well as in the knees, feet, hands, elbows, and neck. However, the joints at the tips of the fingers are rarely affected at

first. Patients may also experience general issues like feeling unwell, tired, or having a fever.

Common accompanying symptoms include:

Dry eyes (seen in about 45% of patients).

Dry mouth due to inflammation of salivary glands (40%).

Small, firm lumps under the skin on the back of the forearm(35%).

Numbness or tingling in the hands and feet caused by nerve compression(25%).

Shortness of breath or a dry cough from lung inflammation (15%).

During physical exams, doctors often find tenderness, swelling in the soft tissues of the joints, and fluid build up in the joints. Affected joints may show signs of inflammation like swelling, redness, and warmth.

In general, multiple joints are usually affected on both sides of the body in a similar way and are often the ones that move frequently. As the joints become more damaged, different types of deformities can appear, like:

Buttonhole deformity: where the finger bends at one joint and straightens at another.

Swan-neck deformity: where the finger bends backward at the middle joint and forward at the tip. If the neck joints (atlantoaxial area) are affected, it can cause headaches at the back of the head and numbness in the hands.

When inflammation affects the tendons, it can lead to carpal tunnel syndrome, causing wrist pain or trigger finger (a finger stuck in a bent position).

In lab tests: About 80% of patients test positive for rheumatoid factors.

However, this test isn't always specific, as healthy people or those with liver disease can also test positive.

The anti-CCP antibody test is more accurate, with over 90% sensitivity and specificity. People with rheumatoid arthritis often test positive for this antibody even before symptoms appear.

In patients with high levels of anti-CCP antibodies or rheumatoid factors, joint damage tends to progress quickly.

Inflammation can be identified by:

High ESR (erythrocyte sedimentation rate) and C-reactive protein (CRP) levels, which indicate active inflammation.

Increased white blood cell counts and anemia (low red blood cell count).

Diagnosis of Rheumatoid Arthritis (RA)

Diagnosing RA involves a combination of symptoms, physical exams, and tests: Symptoms and tests helpful in diagnosis:

1. Joint symptoms: Warmth, swelling, and pain in the joints.
2. Anemia: Low red blood cell count.
3. Rheumatoid factor: Found in about 80% of patients with RA.
4. High ESR and CRP: Indicate inflammation.
5. Vasculitis: Inflammation of blood vessels, reducing blood flow to tissues.
6. Felty syndrome: Low white blood cell counts with an enlarged spleen.
7. Pericarditis: Inflammation around the heart.
8. Pleuritis: Inflammation of the lining around the lungs.
9. Sjogren's syndrome: Inflammation and damage to the glands of the eyes and mouth. Other diagnostic methods:

Imaging tests: X-rays, MRI, and ultrasound to check joint damage.

Blood tests: To detect rheumatoid factors, anti-CCP antibodies, and inflammation markers.^[37]

Diagnosis of Rheumatoid Arthritis (RA);

The diagnosis of RA is based on symptoms, physical exams, and tests. Common signs include:

- Joint symptoms: Warmth, swelling, and pain in the joints.
- Anemia: A low red blood cell count.
- Rheumatoid factor: A protein found in about 80% of people with RA.
- Elevated ESR (erythrocyte sedimentation rate): A blood test that shows how much inflammation is in the joints.
- Vasculitis: Inflammation in blood vessels that can affect blood flow to tissues. Felty syndrome: Low white blood cell count, often with an enlarged spleen.
- Pericarditis: Inflammation of the heart lining.
- Pleuritic: Inflammation of the lining around the lungs.
- Sjogren's syndrome: Inflammation and damage to glands in the eyes and mouth, and sometimes other parts of the body.
- Other diagnostic methods include:
 - X-rays
 - MRI
 - Ultrasound to check joint damage.

Blood tests to detect inflammation and RA-related proteins

II. CONCLUSION:

1. Rheumatoid arthritis (RA) is an autoimmune disease where the immune system attacks the lining of the joints. A rheumatologist is a doctor who specializes in diagnosing and treating RA and will help create the best treatment plan for patients.
2. The exact cause of RA is unknown. Symptoms include sore and stiff joints, joint pain, difficulty moving joints, and anemia (low red blood cells).
3. To diagnose RA, doctors use tests like blood tests, X-rays, MRIs, and ultrasounds. There is no cure for RA, but treatment can help manage the symptoms and slow down the damage.

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