



## “Overview of Arthritis Pathophysiology to Management”

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### Abstract:

Arthritis is a broad term describing inflammation and degeneration of joints, encompassing more than 100 related disorders. The most common forms are Osteoarthritis (OA), a degenerative joint disease caused by cartilage wear, and Rheumatoid Arthritis (RA), an autoimmune condition in which the immune system attacks synovial joints, leading to chronic inflammation and tissue destruction. Arthritis significantly affects mobility, daily functioning, and quality of life. RA involves abnormal immune activation, increased lymphocyte activity, formation of immune complexes, and release of inflammatory mediators that damage joint cartilage and bone. Multiple factors contribute to arthritis, including age, genetic predisposition, obesity, smoking, joint overuse, and environmental exposures. Diagnosis combines clinical assessment, imaging, and laboratory markers such as RF, ACPA, and CRP. Management includes NSAIDs, glucocorticoids, DMARDs, and supportive therapies. Herbal remedies like Moringa oleifera, rich in antioxidants and anti-inflammatory compounds, show potential benefits in reducing oxidative stress and joint inflammation. Understanding arthritis pathophysiology and risk factors is essential for improving early diagnosis, preventing complications, and enhancing patient outcomes.

### Keywords:

Arthritis, Osteoarthritis, Rheumatoid Arthritis, Joint Inflammation, Autoimmune Disease, Pathophysiology, Diagnosis, Management, NSAIDs, DMARDs, Moringa oleifera.

## **Introduction:**

The word “arthritis” comes from Greek, meaning “joint inflammation.” The main signs of arthritis are pain, stiffness, swelling, and reduced movement in the joints. Even though the joints are often the main area affected, many types of arthritis can also cause symptoms throughout the body. The two most common types worldwide are Osteoarthritis (OA) and Rheumatoid Arthritis (RA). Osteoarthritis is a type of wear and tear that damages the cartilage and changes the bone. Rheumatoid Arthritis is an autoimmune disease that causes inflammation in the joint lining, damages the joints, and can affect other parts of the body. Arthritis is a major reason for disability around the world, making it hard to move, do daily activities, and enjoy life. (1)

Arthritis is a general term that refers to inflammation or damage to one or more joints. It is not just one illness, but a group of more than 100 different conditions that affect the joints. The word “arthritis” comes from the Greek words “arthro” meaning joint and “-itis” meaning inflammation. The main signs of arthritis include pain, stiffness, swelling, and difficulty moving the joints. Even though the joints are the main area affected, many types of arthritis can also cause symptoms throughout the body. The two most common types of arthritis worldwide are Osteoarthritis (OA) and Rheumatoid Arthritis (RA). Osteoarthritis is mainly a wearing down of the cartilage and changes in the bone that make up the joints. Rheumatoid Arthritis, on the other hand, is an autoimmune disease where the body’s own immune system attacks the joints, causing inflammation, damage, and sometimes affecting other parts of the body. Arthritis is a major cause of disability around the world, making it hard for people to move, carry out daily tasks, and enjoy life. In patients with Rheumatoid Arthritis, there are more activated lymphocytes found in the blood, the lining of the joints, and the fluid inside the joints. This has been shown through studies looking at the structure of tissues and by the way lymphocytes take in a special type of radioactive substance. More signs of early lymphocyte activation can be seen in normal blood cells after they are exposed to joint fluid from people with RA. RA also causes the body to produce immune proteins, especially rheumatoid factors, and certain substances called lymphokines. It is that the inflammation and damage in RA are kept going because immune complexes form, which happen when rheumatoid factors interact. These immune complexes lead to the production of enzymes like collagenase and other signals that cause cells to break down bone. Other findings have given us more insight into the types of cells involved in RA. (2)

## **Defination**

Arthritis is when one or more joints become inflamed, leading to pain, stiffness, and swelling.

It refers to more than 100 different conditions that can harm joints and other connective tissues. Some common types are osteoarthritis, which happens due to wear and tear on cartilage, and arthritis, which is an autoimmune condition where the body’s immune system attacks its own joint tissues.

Arthritis (RA) is a long-lasting inflammatory disease where the body’s own immune system attacks itself. It causes joint problems that can lead to damage and deformity, and also affects other parts of the body. The exact cause of RA is not known, and many different things are involved in how the disease develops. The

disease is complex. Recent advances in understanding how RA works have made people more interested in looking at the different stages of the disease, specifically stage four.(3)



**Fig. 1 Arthritis**

## **Types of Arthritis**

1. Rheumatoid Arthritis
2. Osteoarthritis Arthritis
3. Gout Arthritis
4. Infectious Arthritis

### **1. Rheumatoid arthritis (RA)**

Rheumatoid arthritis (RA) is a long-term and slowly getting worse type of autoimmune disease that causes inflammation. It mainly affects the joints in the hands and feet, causing them to feel tender, swollen, and painful, which can make it hard to move. Other symptoms may include losing weight and feeling very tired. (4)

It happens when the cartilage in the joints wears down over time, and the bones under the cartilage change. This condition is often linked to getting older, being overweight, or putting too much stress on the joints.

## **Epidemiology**

About 1% of the world's population has rheumatoid arthritis, and women are three times more likely to get it than men. Arthritis is one of the most common chronic health problems and a major cause of disability. In 2002, about 43 million adults in the U.S. had arthritis, and by 2020, this number is expected to rise to 60 million. Smoking increases the risk of rheumatoid arthritis three times more than not smoking, especially in men, heavy smokers, and people who test positive for rheumatoid factor. A 2010 study found that people who drank small amounts of alcohol regularly were four times less likely to develop rheumatoid arthritis than those who never drank. In developed countries, acute rheumatic fever and rheumatic heart disease were thought to be becoming less common until recent outbreaks were reported. In developing countries, most studies on these diseases have been done in hospitals and have focused on children since the 1980s. To better understand these conditions, we conducted a community-based study to explore several things: whether the pattern of acute

rheumatic fever in India is different from that in developed countries, whether revised Jones criteria are needed for developing countries, the typical course of rheumatic fever over three years, and the lowest possible estimate of the impact of rheumatic fever and rheumatic heart disease on a community in a developing country.(5)

India, with its ageing population and rising rates of obesity and diabetes, is witnessing a growing burden of arthritis. The Longitudinal Ageing Study in India) reported that 14.7% of adults aged 50 years self-reported arthritis, with higher prevalence in women (17.3%) than men (11.7%) A nationwide study using LASI data among adults aged years estimated the prevalence of arthritis at 9.36%, identifying risk factors such as female gender, obesity, older age, and diabetes. In rural India, a Community Oriented Programme for Control of Rheumatic Diseases study in Gadchiroli (Maharashtra) found an overall prevalence of musculoskeletal pain at 16%, and specific arthritis prevalence of 12.2%, with rheumatoid arthritis at 0.4% Historical data from a rural Delhi survey reported an RA prevalence of 0.75% among 39,551 adults The trend analysis indicated that both the incidence and prevalence of RA in India have increased. (6)

### **Pathophysiology**

The incidence of the condition is directly connected to how long a person has had a systemic autoimmune disease. Accelerated atherosclerosis is seen as the main risk factor. Chronic inflammation speeds up the development of atherosclerosis by causing problems with the endothelium, allowing inflammatory cells to enter plaques, and leading to sudden plaque ruptures. Some studies have also shown that people with this condition have a higher risk of cardiovascular issues, which suggests there may be a genetic component. There is a strong link between high levels of C-Reactive protein, which is made in response to tumour necrosis factor (TNF)- $\alpha$  and interleukin, and a greater risk of atherosclerosis in rheumatoid arthritis patients who have certain antibodies, like rheumatoid factor or cyclic citrullinated peptide antibodies (9).

Current knowledge about the genetics of rheumatoid arthritis has grown from large studies using new genetic tools. by looking at single nucleotide polymorphisms, researchers have found hundreds of genetic variations that make someone more likely to develop the disease. Most of these are related to immune system functions, and some are also linked to other inflammatory conditions. The most important system involved in the development and outcome of rheumatoid arthritis is the HLA (Human Leukocyte Antigen) system. This strong link has led to the idea that peptide binding plays a role in the disease's start. The HLA type not only helps predict if someone will develop the disease, but also can show how severe it might be, what complications may happen, and even the chance of death. While HLA is very important, several other genetic locations are also strongly linked to rheumatoid arthritis (10).

Although the pathophysiology of osteoarthritis has long been thought to be related to cartilage, recent evidence shows otherwise.

## Sign and Symptoms

1. Joint pain, stiffness, swelling affecting multiple joints
2. Symmetrical symptoms affecting both sides of the body
3. Morning stiffness lasting longer than 30 minutes.



**Fig. 2 symptoms**

## Causes

### Smoking and Other Airborne Exposures

Understanding the lungs as a key area where disease starts has been a big step in learning about the condition. This is shown by how certain harmful substances in the air are strongly linked to rheumatoid arthritis (RA). Smoking is the most important of these exposures and is known to greatly increase the chances of developing RA. (14)

- 1. Age:** The risk of the disease goes up as people get older because the joints wear out over time.
- 2. Obesity** or being overweight: having too much body weight puts extra stress on joints like the knees and hips, and it also causes a type of ongoing inflammation that can lead to osteoarthritis (OA).
- 3. Joint injury or overuse:** previous injuries to a joint, such as a broken bone or a torn meniscus, or repeated stress from work or sports, can raise the risk of OA in that joint. (15)

**Table. 1**

Frequency of osteoarthritis causal attributions [n=29]	
Category	Frequency
Genes/heredity	11
Wear and tear	9
Occupation	8
Sport(exposure to elements, e cold, damp)	8
Excessive weight	7
Falls	2
Aging	4
Accident	5
Virus	2
cracked/locked while walk	1
Knee went "bang" while walking	1
Driving car (heavy clutch)	1
Running barefoot	1
Injury	1

## Complications

1. Infection and Treatment-related Complications Increased infection risk: Rheumatoid arthritis (RA) itself, along with immunosuppressive treatments like corticosteroids and biologics, can make a person more likely to get infections, including opportunistic ones. Surgical and orthopaedic complications: Patients with RA who are on certain treatments, such as JAK inhibitors, may have a higher chance of experiencing flare-ups or issues with wound healing after orthopaedic surgery.
2. Hematologic and Immunologic Complications Anaemia of chronic disease: Long-term inflammation can slow down the body's production of red blood cells and affect iron use, leading to anaemia, fatigue, and a lower quality of life. Fealty's syndrome: A rare condition that can occur in long-term RA, characterised by low white blood cell counts, an enlarged spleen, and repeated infections.(11)

## Diagnosis

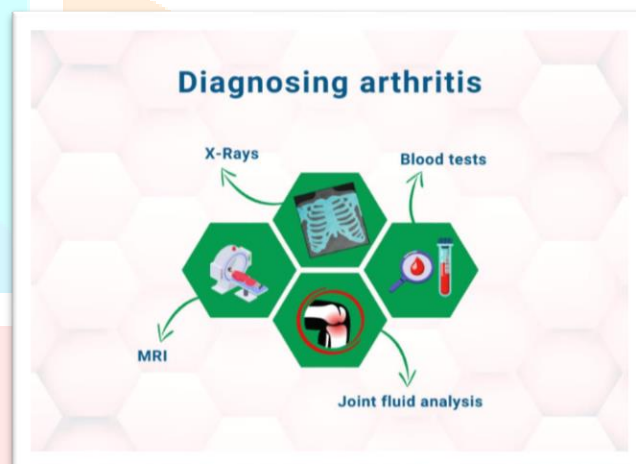
Arthritis is diagnosed by looking at your medical history, checking your joints physically, and doing some lab tests. For diagnosing rheumatoid arthritis (RA), the main sign is joint swelling. Other reasons for this swelling need to be ruled out. Besides the swelling, the following are considered:

- Number and type (small or large) of joints that are painful and swollen
- Lab results, including rheumatoid factor, ACPA (anti-citrullinated protein antibody), and CRP (C-reactive protein)

### 1. Physical Examination

The doctor checks your joints for:

- Swelling, redness, or feeling warm.
- Pain when touched. (12)



**Fig. 3 Diagnosis**

- How well you can move your joints and how flexible they are.

Plain X-rays (especially weight-bearing ones for knee osteoarthritis) are important. For example, a review from British Columbia said that weight-bearing knee X-rays are the “gold standard” in primary care. (13)

## Treatment

Treatment helps reduce pain and inflammation.

Examples include:

- 1) Ibuprofen (like Advil or Motrin),
- 2) Ketorolac (Iodine),

And other non-steroidal anti-inflammatory drugs (NSAIDs).

These are quick-acting treatments. When taken in large amounts, aspirin can strongly reduce inflammation because it lowers the production of substances called prostaglandins.



1 .NSAIDs are used to treat joint pain. They are newer drugs on the market.

2. NSAIDs just as well as aspirin but usually need smaller daily doses.

These drugs stop an enzyme called cyclooxygenase, which helps make prostaglandins, thromboxane, and other substances. This can cause side effects like stomach pain, ulcers, and gastritis. (14)

### **A) Allopathy**

Short-term use of glucocorticoids like Prednisone may be used as a temporary treatment while waiting for DMARD (Disease-Modifying Anti rheumatic Drug) to work .However, long-term use of glucocorticoids is not advised because it can cause serious side effects such as osteoporosis, infections, and problems with metabolism. The guidelines strongly suggest starting DMARD treatment without waiting for three months or more on glucocorticoids.(15)

### **B) Therapy of Allopathy**

1. over the counter

Drug ex. Acetaminophen, Aspirin, Ibuprofen (16)

### **Herbs Used in Arthritis**

#### **Moringa**

Moringa oleifera is a quickly growing tree that comes from certain parts of the world.

It is grown in many tropical and warm climate areas. Different parts of the plant, like leaves, seeds, and pods, are used.

Other names: Guilindna moringa.

Family: Moringaceae. (17)



**Fig.4 Moringa leave**



## Anti-Arthritic Activity

*Moringa oleifera* has strong properties that help with arthritis because it has a lot of active plant chemicals, such as flavonoids, alkaloids, tannins, and phenolic acids. These substances have powerful antioxidant abilities that help stop harmful oxygen molecules from causing damage. These harmful molecules are involved in the development of arthritis. The antioxidant power of moringa leaves and seeds lowers stress on joint tissues, which helps stop more damage to cartilage and reduces inflammation (18).

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