

# Understanding Osteoarthritis: Causes, Symptoms, And Treatment Options

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## ABSTRACT

Osteoarthritis is a chronic, progressive degenerative whole joint disease that affects the articular cartilage, subchondral bone, ligaments, capsule, and synovium. Primary osteoarthritis results from a combination of risk factors, with increasing age and obesity being the most prominent. The concept of the pathophysiology is still evolving. Today it is the most common joint disease and one of the main causes of disability of elderly people. Despite the huge amount of data of the OA the current treatment options are very limited with no effective cure that might stop or slow down the progression of this disease. The therapeutical options include NSAIDs, paracetamol, non-opioid analgesics, steroids, SYSADOAs, non-pharmacological and surgical methods. In recent years, significant progress has been achieved in understanding of the pathogenetic mechanisms of OA and promising options for biological and cell therapy have been proposed. However, further clinical studies are needed to examine their safety and efficacy. In this review, we focus on the recent pharmacological advances in the treatment of osteoarthritis and summarize the most significant promising agents based on their molecular effects.

**Keywords:** Quality Control, Herbal Drug, Medicinal plant, GMP

## INTRODUCTION

Arthritis is a term that describes inflammation of the joints, which can lead to pain, stiffness, and swelling. "Arthritis" literally means joint inflammation. Joints are places where two bones meet, such as elbow or knee.(1)



**Figure no. 1.1 Joints images of arthritis**

There are over 100 different varieties of arthritis and associated disorders, and the name "arthritis" does not refer to a single disease; rather, it refers to joint discomfort or joint disease. Arthritis is the most common cause of disability in the nation, affecting

people of all ages, ethnicities, and genders. (2) Although it is not an age-related condition, Even though arthritis is mainly an adult disease, some forms affect children besides they are more common in older adults than in younger ones, and it is more prevalent in women.

Some joints naturally wear down as you age. Lots of people develop arthritis after that normal, lifelong wear and tear. Some types of arthritis happen after injuries that damage a joint. Certain health conditions also cause arthritis. (3)

Although there is no cure for arthritis, there are many treatment options available to help manage pain and keep people active.

There are over 100 different types of arthritis, with osteoarthritis being the most prevalent. (4)

### 1.1 CLASSIFICATION OF ARTHRITIS: -

Arthritis encompasses a wide range of conditions that affect the joints, and there are over 100 different types. It can be classified in several ways, on the basis of cause, the nature of the inflammation, and the specific joints affected. Here are the main classifications (5).

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## 1. Based on Cause

- a) Primary Arthritis: This type arises without a known underlying cause. Examples include:
  - Osteoarthritis: Degenerative joint disease.
  - Rheumatoid Arthritis: An autoimmune disorder.
- b) Secondary Arthritis: This type occurs as a result of another condition or factor, such as:
  - Post-Traumatic Arthritis: Develops after joint injury.
  - Gout: Caused by the buildup of uric acid crystals.
  - Infectious Arthritis: Resulting from joint infection.

## 2. Based on Inflammation Type

- a) Inflammatory Arthritis: Characterized by inflammation in the joints, often with systemic effects. Examples include:
  - Rheumatoid Arthritis
  - Psoriatic Arthritis
  - Ankylosing Spondylitis
  - Reactive Arthritis
- b) Non-Inflammatory Arthritis: Typically involves wear and tear on the joints without significant inflammation. Example:
  - Osteoarthritis

## 3. Based on Onset and Duration

- a) Acute Arthritis: Sudden onset, often severe, and may resolve quickly. Examples include:
  - Gout Attack
  - Infectious Arthritis
- b) Chronic Arthritis: Long-lasting, often progressive, and can be debilitating. Examples include:
  - Rheumatoid Arthritis
  - Osteoarthritis

## 4. Based on Age of Onset

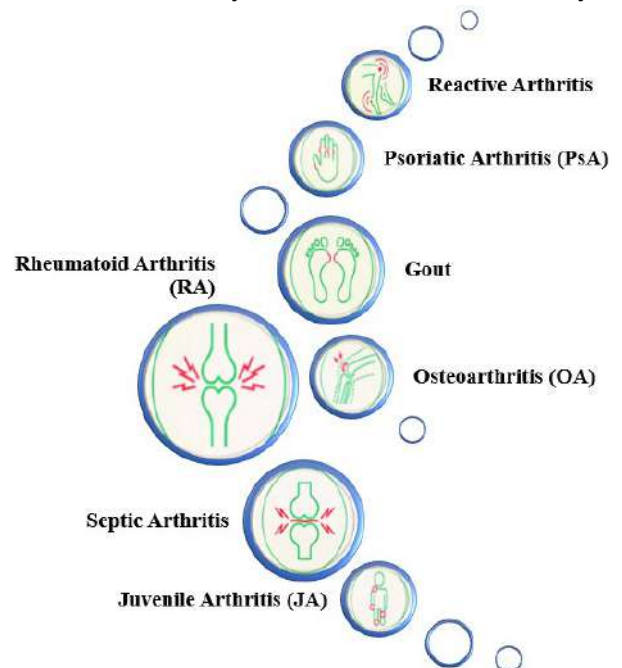
- a) Juvenile Arthritis: Arthritis that occurs in children and adolescents.
- b) Adult-Onset Arthritis: Arthritis that develops in adults, which can include various types like osteoarthritis and rheumatoid arthritis.

## 5. Based on Joint Involvement

- a) Monoarthritis: Involvement of a single joint (e.g., gout).
- b) Oligoarthritis: Involvement of 2 to 4 joints (e.g., oligoarticular juvenile idiopathic arthritis).

- c) Polyarthritis: Involvement of 5 or more joints (e.g., rheumatoid arthritis).

Understanding the underlying causes and characteristics of each form of arthritis allows medical practitioners to identify and treat it more successfully.



**Figure No.1.2 Types of Arthritis**

### 1.2 OSTEOARTHRITIS: -

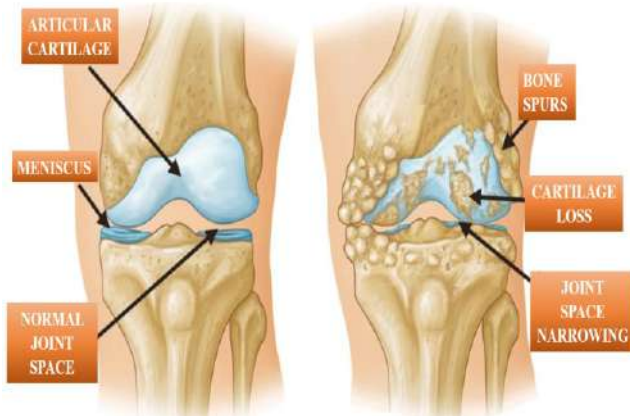
**Osteoarthritis (OA)** is a chronic condition that can significantly impact quality of life. It is the most common type of arthritis and is frequently called "wear-and-tear" arthritis. Cartilage, the protective tissue that covers the ends of bones in the joints, breaks off in this degenerative joint condition. Pain, swelling, and a reduction in movement may result from bones rubbing against one another as the cartilage degrades. (6) As a degenerative cartilage disease, osteoarthritis has long been recognised for its gradual loss of function brought on by a variety of reasons, including genetic susceptibility, senior age, excessive body weight, repetitive joint traumas, and surgical joint therapies.

The natural aging-related deterioration of cartilage, damage, or excessive use can all lead to osteoarthritis. Although osteoarthritis is strongly inherited, the genetics of the condition are complicated and little understood. Since osteoarthritis has no single recognised gene, it is most likely caused by a mix of several genes. According to scientists, this kind of genetics is "multifactorial." (7)

Osteoarthritis frequently causes increased discomfort in weight-bearing joints such the spine, hip, and knee. On the other hand, osteoarthritis symptoms may also

be seen in joints that have been injured or often utilised in sports or work.

The outermost regions of osteoarthritic joints frequently generate spurs, which are growths of bone. Sclerosis is a hardening of the bone. Inflammation of the joint results in pain and oedema. The joint hurts to use continuously. (8)



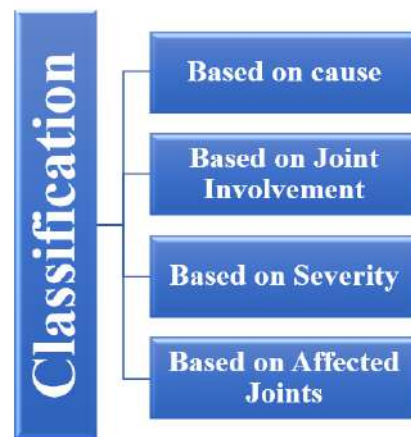
**Figure no.1.3 Osteoarthritis frequently results in bone rubbing on bone**

### 1.2.1 Significant Features of Osteoarthritis:

1. Causes:
  - a. Age
  - b. Obesity
  - c. Joint Injuries
  - d. Genetics
  - e. Repetitive Stress (9)
2. Symptoms:
  - a. Pain
  - b. Stiffness
  - c. Swelling
  - d. Reduced Range of Motion
  - e. Crepitus (10)
3. Commonly Affected Joints:
  - a. Weight-bearing joints like the knees, hips, and spine.
  - b. Joints in the hands, particularly the fingers and base of the thumb.
4. Diagnosis:
  - a. Based on medical history, physical examination, and imaging tests such as X-rays or MRIs to assess joint damage. (11)
5. Treatment:
  - a. Lifestyle Modifications Medications
  - b. Injections
  - c. Surgery

### 1.2.2 Classification of osteoarthritis: -

Osteoarthritis (OA) can be classified in several ways based on different criteria. (12)



#### 1. Based on Cause: -

- A. Primary Osteoarthritis: Occurs without any identifiable cause and is typically related to aging and the natural wear and tear of joints.
- B. Secondary Osteoarthritis: This type develops as a result of another condition or factor, such as:
  - a. Joint Injuries
  - b. Obesity
  - c. Metabolic Disorders
  - d. Genetic Factors (13)

#### 2. Based on Joint Involvement: -

- A. Localized Osteoarthritis: Affects a limited number of joints, typically one or two. Commonly affected joints include the knees, hips, and hands.
- B. Generalized Osteoarthritis: Involves multiple joints throughout the body, often including the hands, knees, hips, and spine. (14)

#### 3. Based on Severity: -

- A. Mild Osteoarthritis: Minimal symptoms, with slight joint pain and stiffness that may not significantly affect daily activities.
- B. Moderate Osteoarthritis: Increased pain and stiffness, with some limitations in joint function and daily activities.
- C. Severe Osteoarthritis: Significant pain, joint deformity, and major limitations in movement, often leading to a reduced quality of life. (15)

#### 4. Based on Affected Joints: -

- A. Knee Osteoarthritis: One of the most common forms, affecting the knee joints.
- B. Hip Osteoarthritis: Affects the hip joints and can lead to significant mobility issues.

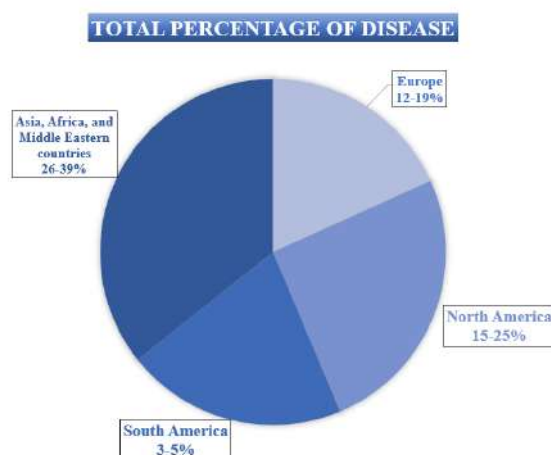
- C. Hand Osteoarthritis: Affects the joints in the hands, particularly the fingers and base of the thumb.
- D. Spinal Osteoarthritis: Involves the facet joints in the spine, which can lead to back pain and stiffness. (16)

**1.2.3 History and statistics of Osteoarthritis: -**

The history of Osteoarthritis reflects how evolution evolved from early observation of joint problem to a contemporary of a complicated degenerative illness. In order to enhance the quality of life of people those how are suffering from osteoarthritis, research is continually attempted to better diagnosis, treatment, and management techniques. (17)

The statistics of osteoarthritis have been assessed at about 25%. Accordingly in recent years estimation of OA shows regional and individual nation difference exist. Certainly, OA incidence has been recorded in middle-eastern, Asia and Africa. The worldwide prevalence of OA has been estimated between 12–19% in Europe, 15–25% in North America, 3–5% in

South America, 26–39% in Asia, Africa, and Middle-Eastern countries (18)



**Figure no 1.4 statistic of osteoarthritis**

**1.2.4 Medicinal treatment of osteoarthritis**

Here’s a table summarizing the medicinal treatments for osteoarthritis, including their categories, examples, mechanisms of action, and notes on their use (19)

**Table No. 1.1 Medicinal treatment of Osteoarthritis**

S.No.	Category	Example	Mechanism	Notes
1.	Acetaminophen	Acetaminophen (Tylenol)	Alters pain perception in the brain	First-line treatment for mild to moderate pain; does not reduce inflammation.
2.	Nonsteroidal Anti-inflammatory Drugs (NSAID)	Ibuprofen (Advil, Motrin)	Reduces pain and inflammation by inhibiting cyclooxygenase (COX) enzymes	Available over-the-counter (OTC) and by prescription; may cause gastrointestinal side effects.
3.	Analgesics	Tramadol	Acts on the central nervous system to relieve pain	Used for moderate to severe pain; may have a risk of dependence.
4.	Corticosteroids	Cortisone injections	Reduces inflammation and suppresses the immune response	Provides temporary relief; repeated use may lead to joint damage.
5.	Hyaluronic Acid Injections	Hyaluronic acid (e.g., Synvisc)	Supplements natural joint lubrication	May provide pain relief; effectiveness varies among individuals.
6.	Disease-Modifying Osteoarthritis Drugs (DMOADs)	Research ongoing (e.g., sprifermin)	Aims to slow disease progression	No widely approved DMOADs yet; still under investigation.
7.	Complementary and Alternative Medicine	Glucosamine	Believed to support cartilage health	Mixed evidence on effectiveness; consult a healthcare provider before use.

This table provides a concise overview of the medicinal treatments available for osteoarthritis.

**CONCLUSION**

Arthritis is a manageable condition with the right approach to treatment and lifestyle adjustments. Each

type of arthritis has its own causes, symptoms, and treatment options. Accurate diagnosis and tailored treatment plans are essential for managing the specific type of arthritis and improving the quality of life for those affected. Osteoarthritis is a chronic condition

that can significantly impact quality of life. Understanding the different types of osteoarthritis is crucial for diagnosis and treatment. The medicinal treatment of osteoarthritis involves a combination of pain relief strategies and anti-inflammatory medications.

## REFERENCE

- Sahu P, Sahu GK, Sharma H, Kaur CD. Formulation, characterization and ex vivo evaluation of epinephrine transdermal patches. *Research Journal of Pharmacy and Technology*. 2020;13(4):1684-92.
- Sahu P, Mishra S, Sahu GK, Sharma H, Kaur CD. Formulation and Characterization of Resorcinol Gel. *Research Journal of Pharmaceutical Dosage Forms and Technology*. 2019;11(3):159-63.
- Ali S, Sahu A, Sahu P, Sharma H, Gulati M, Menon SA, Anik S, Sahu GK. A Global Public Health Emergency: COVID-19.
- Sahu P, Mishra S, Sahu GK, Sharma H, Kaur CD. Formulation and Characterization of Resorcinol Peel. *Research Journal of Pharmacy and Technology*. 2019;12(11):5437-43.
- Sahu P, Bhimte P, Sharma H, kumar Sahu G. A Modern Era Prospective of Novel Drug Delivery System.
- Nagwanshi P, Sahu L, Sahu P, Sahu A, Sharma H, Sahu G. Emphasis of Phytoconstituent in the treatment of cancer. *Research Journal of Pharmaceutical Dosage Forms and Technology*. 2020;12(3):169-77.
- Sahu L, Nagwanshi P, Sahu P, Sahu A, Sahu G, Sharma H. Novel Approaches of Treatment of Cancer: Nanoparticle. *Research Journal of Pharmaceutical Dosage Forms and Technology*. 2020;12(2):115-24.
- Sahu P, Sahu GK, Sharma H, Kaur CD. Formulation, characterization and ex vivo evaluation of epinephrine transdermal patches. *Research Journal of Pharmacy and Technology*. 2020;13(4):1684-92.
- Sahu P, Nema RK. Bioenhancer: an agent for increasing bioavailability. *World J Pharm Res*. 2021 Apr 1;10(6):613-34.
- Sahu M, Choubey R, Sahu P, Mishra A. A comparative molecular docking study of *Syzygiumcumini* to understand the binding pattern with four different proteins Used for anti diabetic activity.
- Sahu P, Sahu G, Sharma H, Sahu GK. Preparation and Characterization of Nutraceutical Drink.
- Tandi DY, Sahu P, Sharma H, Nema RK, Sahu GK. Piperine: Physicochemical Aspects for Lung Cancer. *International Journal of Biology, Pharmacy and Allied Sciences*, January 2023, 12(1): 294-304
- Sahu P, Bhimte P, Singh S, Sarparaj S, Sahu N, Sharma H, Sahu G K. Formulation of polyherbal soap and evaluation of its physic-chemical parameters. *Acta Scientific Pharmaceutical Sciences*, Vol- 7, Iss 4 (April 2023), 2581-5423
- Sahu P, Yadav S, Bhimte P, Sarparaj S, Sahu N, Sharma H, Sahu G K. Development & Characterization of Vanishing Cream. *Acta Scientific Pharmaceutical Sciences*, Vol- 7, Iss 4 (May-June 2023), 2581-5423
- Sahu P, Chandravanshi A, Bhuneshwar, Singh S, Sharma H, Sahu G K. Development of Analgesic Chewable gummy tablet for palatable drug delivery. *International Journal for Multidisciplinary Research*, Vol- 5, Iss 2 (March-April 2023), 2582-2160
- Sahu P, Sahu G, Sharma H, Sahu G K. Preparation & Characterization of nutraceutical drink. *International Journal for Multidisciplinary Research*, Vol- 5, Iss 2 (March- April 2023), 2582-2160
- Sahu P, Nema R K. A Peer Review on Herbal Cosmetics and Skin Care. *World Journal of Pharmacy and Pharmaceutical Sciences*; Vol-10, Iss-7 (June 2021): 613-634.
- Sahu P, Nema R K. Bioenhancer: An Agent for Increasing Bioavailability. *World Journal of Pharmaceutical Research*; Vol-8, Iss-6 (May 2021): 613-634
- Sahu P, Nema R K. Covid-19: Pandemic in India; an update. *European Journal of Biomedical and Pharmaceutical sciences*; Vol-8, Iss-6 (June 2021): 312-320.

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