




# Update on Hand Osteoarthritis: A Neglected Problem

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ABSTRACT

Osteoarthritis (OA) is the most common rheumatologic disease and one of the leading causes of disability worldwide. Hand OA is the most common OA types after knee and hip OA. Risk factors include age, obesity, and family history. Abnormal mechanical loads, sex hormones, and inflammatory changes play role in pathogenesis of hand OA. Diagnosis is primarily based on clinical examination according to ACR guidelines. Plain radiography may support the diagnosis. ACR 2019 recommends comprehensive individualized treatment which include single or combination of physical, psychosocial, and/or pharmacological intervention. Topical NSAIDs are conditionally recommended. For initial oral medication, oral NSAIDs are strongly recommended and preferable to other medications. Exercise is also strongly recommended. Hand orthoses are highly recommended for patients with first CMCJ OA and conditionally recommended for patients with OA in other joints of the hand.

**Keywords:** Hand, osteoarthritis, wrist

ABSTRAK

Osteoartritis (OA) adalah penyakit reumatologis paling umum dan salah satu penyebab utama kecacatan di seluruh dunia. Osteoartritis tangan adalah jenis OA yang paling umum setelah OA lutut dan pinggul. Faktor risiko penyakit ini adalah usia, obesitas, dan riwayat keluarga. Beban mekanis abnormal, hormon seks, dan reaksi inflamasi juga berperan pada patogenesis OA tangan. Diagnosis OA tangan dapat ditegakkan klinis sesuai pedoman ACR. Pemeriksaan radiologis dapat membantu diagnosis. Pedoman ACR 2019 merekomendasikan tatalaksana komprehensif tunggal atau gabungan dari intervensi fisik, psikososial, dan/atau farmakologis sesuai kebutuhan pasien. OAINS topikal direkomendasikan untuk OA tangan pada kondisi tertentu. Untuk pengobatan oral awal, OAINS oral direkomendasikan sebagai pilihan utama. Olahraga sangat direkomendasikan termasuk untuk OA tangan. Orthosis tangan sangat dianjurkan untuk pasien CMCJ OA awal dan direkomendasikan pada pasien OA persendian tangan lain dengan kondisi tertentu. **Dian Daniella, Marianto. Tinjauan atas Osteoartritis Tangan**

**Kata kunci:** Osteoarthritis, pergelangan tangan, tangan

## INTRODUCTION

Osteoarthritis (OA) is the most common rheumatologic disease and one of the leading causes of disability worldwide.[1] Hand OA is the most common OA type after knee and hip OA. Problem with OA arises from low quality of life due to functional limitations in daily activities, considerable amount of pain, and the hand aesthetic alterations for women.[2] A common misconception is that hand OA affects the quality of life less than knee or hip OA and many patients are encouraged to believe that hand OA is an inevitable result of aging and nothing can be done to improve the symptoms. This often leads to decrease physician's awareness of this disease. This review will discuss definition, epidemiology, risk factors, clinical manifestations, diagnosis methods and most importantly, management of hand OA.

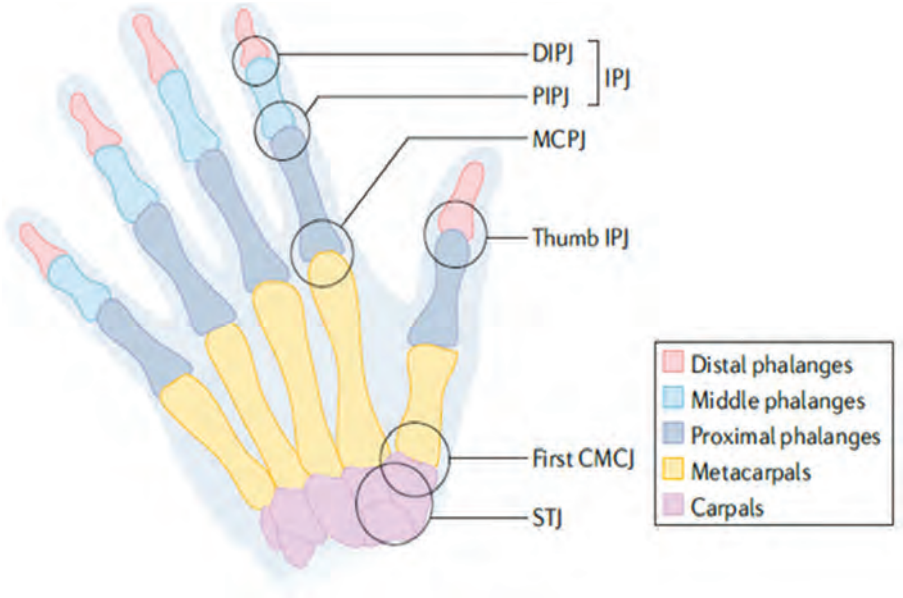


**Figure.** Anatomy of hand joints[1]

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## DEFINITION

Hand OA can be defined by the American College of Rheumatology (ACR) clinical criteria, by structural changes determined by imaging (most frequently using plain radiography) and by radiographic changes accompanied by the presence of typical symptoms (pain, aching or stiffness; referred to as symptomatic hand OA).[1] American College of Rheumatology clinical criteria is hand pain, aching or stiffness and three of the following four criteria (hard tissue enlargement of two or more of ten selected joints, hard tissue enlargement of two or more distal interphalangeal joints (DIPJs), fewer than three swollen metacarpophalangeal joints (MCPJs) and deformity of at least one of ten selected joints) **(Figure)**.

Radiographic criteria for hand OA is based on Kellgren Lawrence classification, which divided into four grades. Grade 1 demonstrates doubtful narrowing of the joint space with possible osteophyte formation. Grade 2 demonstrates possible narrowing of the joint space with definite osteophyte formation. Grade 3 demonstrates definite narrowing of joint space, moderate osteophyte formation, some sclerosis, and possible deformity of bony ends and grade 4 demonstrates large osteophyte formation, severe narrowing of the joint space with marked sclerosis, and definite deformity of bone ends.[3]

Radiographic criteria for hand OA consist of Kellgren–Lawrence grade 2 or greater in at least one hand joint, Kellgren–Lawrence grade 2 or greater in at least two hand joints, Kellgren–Lawrence grade 2 or greater in two of three groups of hand joints (DIPJs, proximal interphalangeal joints (PIPJs), the first carpometacarpal joint (CMCJ) and/or the scaphotrapezial joint (STJ)) and Altman atlas score of 1 or more for osteophytes or joint space narrowing in one or more hand joints.[1]

Symptomatic criteria for hand OA consist of hand pain, aching or stiffness and the presence of at least one hand joint with a Kellgren–Lawrence grade 2 or greater; hand pain, aching or stiffness and the presence of Kellgren–Lawrence grade 2 or greater in the same joint, with at least one hand joint affected; and hand joint symptoms and the presence of at least one hand joint with radiographic OA in the same hand.[1]

## EPIDEMIOLOGY

In United States of America, hand OA happen in 23% of population (52 million).[2] In Asian countries, such as Japan, the prevalence of hand OA is higher (92%). The prevalence of symptomatic hand OA is lower than radiographic hand OA, higher in patient with

**Table 1.** Cases of hand osteoarthritis in the last ten years

| Author | Year | Sex | Age (years) | Unilateral/ Bilateral | Complaint | Physical exam | Laboratory values | Radiographic finding | Management |
|---|---|---|---|---|---|---|---|---|---|
| Ongkowijaya et al | 2010 | Male | 54 | Bilateral | Swollen fingers and pain at the tips of fingers | Heberden's node on left and right DIP II-V joints with tenderness and deviation toward radial of left DIP IV and right DIP V joints | ESR: high (35 mm/hr), CRP normal, RF negative, anti-CCP negative and uric acid normal. | Luxation of right DIP IV and left DIP V joints, sclerosis of distal of medial phalanx and proximal of distal phalanx II-V of both hands and narrowing of DIP joints of both hands. | Conservative |
| Ulusoy et al[1] | 2011 | Women | 54 | Bilateral | Pain, swelling, morning stiffness and deformity of DIP and PIP in both hands | Swelling of the fingers, especially on the fourth fingers of both hands and first finger of right hand. Flexion deformities are seen on fourth fingers of both hands. | ESR high (34 mm/hr), CRP high (14 mg/L), RF negative, anti-CCP negative, ANA negative and C3 and C4 complement negative | Joint space narrowing, subchondral sclerosis, marginal osteophytes and erosions in the central portion of the joint | Conservative |
| Cho et al[2] | 2015 | Female | 55 | Bilateral | Pain of bilateral IP joint I, left DIP III, right PIP IV and severe pain with joint deformity of right DIP II | Not mentioned | Not mentioned | Deformity on right DIP II | Conservative |
| Larcher[3] | 2015 | Male | 36 | Bilateral | Hand athralgia | Hands' deformities with Heberden's and Bouchard's nodes and decreased ROM. | ESR normal, CRP normal, RF negative, anti-CCP negative, ANA negative, uric acid normal | Not mentioned | Conservative |
| Larcher[3] | 2015 | Female | 52 | Bilateral | Hand pain and stiffness | Deformations with Heberden's nodes and PIP joints were swollen | | Not mentioned | Conservative |
| Larcher[3] | 2015 | Male | 57 | Unilateral | Hand pain particularly affecting the left DIP III. | Heberden's node on the left DIP III | | Not mentioned | Conservative |
| Larcher[3] | 2015 | Male | 61 | Bilateral | Hand pain and deformities | Heberden's nodes, Bouchard's nodes, tender but not swollen DIP and PIP joints and pronounced deviation of the fingers | | Not mentioned | Conservative |
| Lewis et al[4] | 2019 | Female | 48 | Bilateral | Bilateral hand pain, stiffness, swelling and redness | Bilateral IP joints were red and swollen; weakness in finger flexion, abduction and adduction; and painful on palpation | ESR normal, CRP normal, RF negative and ANA negative | Periarticular osteopenia and marginal erosion at the base of metacarpal V | Conservative |




hip and knee OA and higher in some groups of individuals, such as in patients with an HIV-1 infection. The lifetime risk of developing symptomatic hand OA in at least one hand by the age of 85 years was estimated at 40%, with 47% of women and 25% of men. The incidence of hand OA peaks at age of 50 in women.[1]

## RISK FACTORS

There are multiple risk factors for hand OA, such as age. Age is the most well-known and important risk factor in hand OA, whereas the prevalence of hand OA strongly increased over the age of 50. Other risk factor to be considered is **obesity**. Obesity increases 9 to 13% risks of getting hand OA per kilogram increase in body weight. Obesity is a risk factor for OA due to its proinflammatory consequences, whereas excessive adipose tissue produces humoral factors that contribute to articular cartilage damage. Cytokines produced by adipocytes (adipocytokine) such as leptin, visfatin, adiponectin and resistin will contribute to hand OA. Leptin is correlated with the degree of cartilage destruction and the number of osteophytes. Visfatin inhibits proteoglycans synthesis dose-dependently in articular chondrocytes. Serum levels of adiponectin were increased in female patients with erosive hand OA compared to non-erosive hand OA, suggesting that adiponectin may play a role in the pathophysiology of erosive hand. As in resistin, it has proinflammatory properties whereas its serum level was associated with radiographic changes in hand OA and subchondral bone erosions particularly. **Family history** is a recognized risk factor of hand OA with alteration in genetic will cause increased amount of proinflammatory cytokines and catabolic activities in articular cartilage.[2]

According to cases found in the last 10 years, this disease happened predominantly in patients > 50 years, but some risk factors are not stated in these case reports regarding body mass index (BMI) and family history **(Table 1)**.

## PATHOGENESIS

Studying pathogenesis of hand OA is difficult due to limited access to involved tissue and no animal model. **Abnormal mechanical loading** is the most important factor. This shows in the prevalence of hand OA is higher in dominant hand than non-dominant hand (80% of right-handed individuals with hand OA are predominantly affected their right hand). **Sex hormone** also plays a role pathogenesis of hand OA. Decreased estrogen levels in menopause will cause loss of anti-inflammatory and pro-reparative effects. Sex hormone plays an important role, as it can be seen in the last 10 years, this disease affects female more than 50 years old predominantly **(Table 1)**. **Inflammatory changes** occur in OA as well as hand OA. Its pathogenic role is not as prominent as rheumatoid arthritis (RA), but intraarticular steroid proven to help.[1]

## DIAGNOSIS

Diagnosis of hand osteoarthritis is primarily based on clinical examination. Plain radiography can be helpful in confirming and ruling out other conditions. [8–10] It should be used prior to other modalities. Plain radiography on OA may reveal the presence of osteophytes, loss of joint space, juxta articular sclerosis, local or central erosion, and subchondral cysts.[11,12] Plain radiography in the last decade cases showed deformities, erosion, narrowing of joints **(Table 1)**. Advanced imaging modalities are rarely needed unless the diagnosis is atypical and there is a strong suspicion for other diagnosis.[9,13] Advanced imaging, such as ultrasound, Magnetic Resonance Imaging (MRI) may be used to detect soft tissue abnormalities and CT (Computed Tomography) or MRI may be used for bone.[13]

The most common symptom of osteoarthritis is asymmetric joint pain. The pain worsens with activity, especially following a period of rest (gelling phenomenon). Osteoarthritis also can cause morning stiffness (less than 30 minutes).[9] The most common symptoms that we observe in the last decade are joint pain, stiffness, swelling, redness and deformities that happens bilaterally but asymmetric **(Table 1)**.

Other typical feature in hand OA is the formation of nodes which characteristically involves the DIP (Heberden's node) and PIP joints (Bouchard's node). Both of these nodes can occur with or without associated symptoms of pain, stiffness and disability.[14] A cross sectional study showed a positive association of nodes and radiographic changes in OA especially in joint narrowing.[15] European League Against Rheumatism (EULAR) has determined that the presence of Heberden's node increases an individual's risk to 20% for hand OA and up to 88% if there were other risk factors such as family history and joint space narrowing.[16]

There were a number of standardized scoring methods for OA, such as Kellgren-Lawrence, Kessler and Kallman grading scales, the OARSI scoring atlas, the Verbruggen-Veys anatomical phase score, and the Gent University scoring system (GUSS).[12,17] These scores differ in the joints assessed, the type and total score ranges. A systematic review concluded that there were no major differences among them, but the methodological quality of the included studies was not assessed due to the heterogeneity across studies.[12]

European League Against Rheumatism recommended that no individual test on its own should be used to diagnose hand OA. Diagnosis of hand OA should include combination of multiple approaches such as clinical examination, radiographic images, and laboratory results.[11] On the other hand, ACR recommended the diagnosis of hand OA if they meet ACR criteria as mentioned above. Sensitivity for hand OA if all of these criteria are fulfilled is 92%, and specificity is 98%. If at least 3 of these 4 criteria are met, sensitivity increases to 94% while specificity drops to 87%.[10]

Laboratory test is not mandatory for diagnosis, except for ruling out other diagnoses. Immunology test, such as the antinuclear antibody (ANA) and rheumatoid factor (RF) can be tested if joint inflammation or synovitis presents and autoimmune arthritis is suspected. ACR recommends against the rheumatic panels for routine testing due to high false positive rates in primary care scenario. Uric acid level is only recommended if gout arthritis is suspected because false positive results are still possible.[9] The other common laboratory tests examined are Erythrocyte Sedimentation Rate (ESR), C-Reactive Protein (CRP), and anti-Citrullinated Protein Antibody (anti-CCP). In hand OA, ESR which can show high results, but other laboratory values are normal (**Table 1**)

## MANAGEMENT

There's still no definitive therapy for OA.

However, treatment can reduce pain, correct deformities, and improve join function, hence improving quality of life.[8] Comprehensive management for hand osteoarthritis should include educational, behavioral, psychosocial, physical interventions, and pharmacological management.[9,18] Treatment should begin with the safest and least invasive therapy before proceeding to more invasive and costly treatment. ACR recommended appropriate application of physical, psychological, and/or pharmacologic therapies. However, for some patients, a single intervention may be adequate to control symptoms; for others, multiple of these approaches may be used in sequence or in combination, but which interventions and the order in which interventions used vary among patients.[18]

### Pharmacological Treatment[14,18–21]

#### Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

Topical NSAIDs are conditionally recommended for patients with hand OA. Practical considerations and the lack of direct evidence of topical NSAIDs' efficacy in the hand OA lead to a conditional recommendation for its usage, but the least systemic exposure therapy (topical NSAIDs) should be considered before using the systemic NSAIDs.[19] For initial oral medication, oral NSAIDs remain as the strong recommendation regardless of anatomic location. It is also recommended over all other available oral medications. ACR does not recommend the use of topical capsaicin in hand OA because of a lack of direct evidence, as well as a potentially increased risk of contamination of the eye.[18]

#### Intraarticular Glucocorticoid Injection

Intraarticular glucocorticoid injections are conditionally recommended for patients with hand OA due to lack of evidence in the specific anatomic location, but these injections are conditionally recommended over other forms of intraarticular injection, including hyaluronic acid preparations. Head-to-head comparisons are few, but the evidence for efficacy of glucocorticoid injections is considerably higher quality than that for other agents.18

#### Acetaminophen/ Paracetamol

Paracetamol is conditionally recommended for patients with hand OA due to its small effect. A meta-analysis has suggested that use of paracetamol as monotherapy may be ineffective.[18,20]

#### Duloxetine

Duloxetine is conditionally recommended for patients with hand OA. While studied primarily in the knee, the effects expected to be similar for hand OA. While a variety of centrally acting agents (e.g., pregabalin, gabapentin, selective serotonin reuptake inhibitors, serotonin norepinephrine reuptake inhibitors, and tricyclic antidepressants) have been used in the management of chronic pain, only duloxetine has adequate evidence recommendation for OA. Evidence suggests that duloxetine has efficacy when used alone or in combination with NSAIDs; however, there are issues regarding tolerability and side effects.[18]

#### Tramadol

Tramadol is conditionally recommended for patients with hand OA. Recent study has highlighted the very modest level of beneficial effects in the long-term (3 months to 1 year) management of non-cancer pain with opioids.[18]

#### Non-tramadol Opioids

Non-tramadol opioids are conditionally recommended against in patients with hand OA with the recognition that they may be used under certain circumstances, particularly when alternatives have been exhausted. As noted above, evidence suggests very modest benefits of long-term opioid therapy and a high risk of toxicity and dependence. Use of the lowest possible doses for the shortest possible length of time if necessary due to less pain relief occurs during longer trials.[18]

#### Fish Oil and Vitamin D

Both fish oil and vitamin D are conditionally recommended against in patients with hand OA. The evidence for both is limited and questionable.[18]

#### Bisphosphonate, Glucosamine, and Chondroitin Sulphate

Bisphosphonate and glucosamine are strongly recommended *against* in patients with hand OA. Large study about bisphosphonate shows no improvement in pain or functional outcomes.[21] The study about glucosamine with the lowest risk of bias also fail to show any important benefits over placebo. Chondroitin

**Table 2.** Summary treatment recommendations for hand OA18

| Pharmacological | Non-Pharmacological |
|---|---|
| Oral nonsteroidal anti-inflammatory drugs | Exercise |
| | Self-efficacy and self-management programs |
| | Hand orthosis (first carpometacarpal) |
| Topical nonsteroidal anti-inflammatory drugs | Cognitive behavioral therapy |
| Acetaminophen | Hand orthosis (other joints) |
| Duloxetine | Acupuncture |
| Tramadol | Thermal interventions |
| Chondroitin sulfate | Paraffin |
| Intraarticular glucocorticoid injection | |
| Intraarticular botulinum toxin | Manual therapy with/without exercise |
| Prolotherapy | Balance training |
| Stem cell injection | Weight loss |
| Platelet-rich plasma | Tai chi |
| Intraarticular hyaluronic acid injection (first carpometacarpal) | Yoga |
| Bisphosphonates | Massage therapy |
| Glucosamine | Radiofrequency ablation |
| Hydroxychloroquine | Pulsed vibration therapy |
| Methotrexate | Transcutaneous electrical nerve stimulation |
| Biologics (tumor necrosis factor inhibitors, interleukin-1 receptor antagonists) | Iontophoresis (First carpometacarpal) |

| |
|---|
| Strongly recommended |
| Conditionally recommended |
| Conditionally recommended *against* |
| No recommendation |
| Strongly recommended *against* |




sulfate is conditionally recommended for patients with hand OA. A single trial suggested analgesic efficacy of chondroitin sulfate, without evidence of harm in hand OA.[18]

### Others

Hydroxychloroquine and methotrexate are strongly recommended against in patients with hand OA. Well-designed RCTs of both drugs conducted in the subset of patients with erosive hand OA, have demonstrated no efficacy.[18]

Tumor necrosis factor inhibitors and interleukin-1 receptor antagonists are strongly recommended *against* patients with hand OA. These drugs have been studied in trials, but efficacy has not been demonstrated, including in erosive hand OA. Other therapies, such as prolotherapy, platelet-rich plasma treatment, and stem cell injections have not been evaluated in hand OA. Therefore, no recommendation is made with regard to hand OA.[18]

### Non-Pharmacological Treatment[18,22]

### Exercise

Exercise is strongly recommended for patients with osteoarthritis including hand OA. To date, there is still no best recommendation on type and duration of exercise for osteoarthritis. Exercise should be recommended based on patient's preferences and access which frequently are the main barriers. Though patients with hand osteoarthritis might be hesitant to exercise because of the pain, there is no recommendation on which pain level patients should or should not exercise.[18]

### Self-Efficacy and Self-Management Programs

Other non-pharmacological programs such as self-efficacy and self-management programs may have small effects on OA outcomes, but the results are consistent and risks are minimal. These programs use a multidisciplinary group–based format combining sessions on skill-building (goal-setting, problem-solving, positive thinking), education about the disease, medication effects and side effects, and others option approaches. In the previous studies reviewed, sessions generally occurred 3 times weekly.[18]

### Cognitive Behavioral Therapy

Cognitive behavioral therapy (CBT) is conditionally recommended for patients with hand OA. A well-established body of literature supports the use of CBT in chronic pain conditions and the management of OA.[22] Trials have demonstrated improvement in pain, quality of life, negative mood, fatigue, functional capacity, and disability in conditions other than OA.[18]

### Hand Orthoses

Hand orthoses are strongly recommended for patients with first CMCJ OA and conditionally recommended for patients with OA in other joints of the hand. A variety of mechanical supports are available in the market, including digital orthoses, ring splints, and rigid or neoprene orthoses, but data are insufficient to recommend one type of orthosis over another.[18]

### Kinesiotaping

Kinesiotaping is conditionally recommended for patients with first CMCJ OA. Kinesiotaping permits range of motion of the joint to which it is applied, in contrast to braces. The published studies are limited in terms of blinding, thereby limiting the quality of evidence.[18]

### Thermal Interventions

Thermal interventions (locally applied heat or cold) are conditionally recommended for patients with hand OA. The method of delivery of thermal interventions varies in published reports, including moist heat, diathermy (electrically delivered heat), ultrasound, and hot and cold packs, but using diathermy or ultrasound were more likely to be sham controlled than using other modalities. The heterogeneity of modalities and short duration of benefit for these interventions led to the conditional recommendation of thermal interventions. Paraffin as an additional method of heat therapy for the hands is conditionally recommended for patients with hand OA.[18]

### Acupuncture

The efficacy of acupuncture remains controversy although there were a large number of trials regarding its use. The greatest number of positive trials with the largest effect sizes have been conducted in knee OA.[18]

### Iontophoresis

Iontophoresis is conditionally recommended *against* patients with first CMCJ OA. Currently there are no published randomized controlled trials evaluating iontophoresis for OA in any anatomic location.[18]

## CONCLUSION

Hand OA is a chronic debilitating disease, but often underdiagnosed. Multiple risk factors for hand OA are age, obesity and family history with abnormal mechanical loading, sex hormone and inflammatory response contribute in its pathophysiology. Diagnosis could be made with physical examination with radiology examination to aid. Until now, there are no definitive treatment for OA, but ACR 2019 guideline recommended the single or combination of comprehensive individualize treatment including pharmacological treatment. There are few recommendations for hand OA such as the usage of topical and oral NSAIDs, exercise and hand orthoses.

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