

# **Osteoarthritis**

## **Introduction**

Osteoarthritis is a chronic and degenerative disorder of the skeletal system that is characterized by a loss of cartilage tissue. It is the most common joint disorder that affects around 25% of the adult population leading to pain and disability. In this disorder, there is a progressive loss of articular cartilage, a thickening of the subchondral region of the bone, production of osteophytes, synovial inflammation, ligament degeneration, and hypertrophy of the capsule on the joints. Risk factors for osteoarthritis include obesity, age, injury to the joint, and family history. The clinical features of this disorder include chronic pain, instability of the joint, joint stiffness, and narrowing of the joint spaces (Chen et al., 2017).

This report aims to throw light on osteoarthritis, its clinical symptoms and complications, the various techniques used for its diagnosis including imaging and histology, its treatment and prevention, and directions for future research required to prevent and treat this medical condition.

## **Symptoms and complications**

Osteoarthritis is a cause of both physical and psychosocial disability, causing affected people to lose their independence while performing simple daily tasks. The primary symptom of this condition is severe joint pain. It usually affects the knee in most patients, followed by the joints of the hand leading to deformity, loss of motion, and functional impairment. The joint pain that occurs in osteoarthritis is described as being more severe while performing activities and less severe during periods of rest.

However, in more advanced cases of osteoarthritis, pain can also occur at night leading to loss of sleep for the patients. Apart from pain, the patient may also express short-term stiffness in the joint especially after a period of inactivity. There may be joint instability where the joint buckles or gives way, causing loss of function. Finally, there may be reduced ability for movement, swelling, and crepitus in the affected joints (Khalid et al., 2017).

Physical examination may reveal a bony enlargement in the areas of affected joints, pain during passive movement, restricted range of movement, deformity in the affected joints, for instance, bowed legs when knees are severely affected, muscle weakness and atrophy, altered gait, and joint effusion (Khalid et al., 2017).

## **Diagnosis**

The most commonly used diagnostic technique for osteoarthritis is conventional radiography; however, newer techniques such as magnetic resonance imaging (MRI) and ultrasound can allow visualization of inflammatory lesions in the joints. X-ray has the advantage of being economical and widely available, and is therefore used as the most common imaging modality for osteoarthritis. It can be used to view changes such as narrowing of joint spaces, production of osteophytes, and subchondral cysts (Wang et al., 2018).

MRI is a more advanced imaging technique for the diagnosis of osteoarthritis as it can allow the visualization of all structures within a joint. It offers excellent soft tissue contrast and helps in the detection of synovitis by differentiating it from joint effusion.

However, this detection requires access to the intravascular system which is associated with a rare risk of allergic reaction and nephrogenic fibrosis (Wang et al., 2018).

Ultrasound is an extremely sensitive technique which has no side effects due to its use of sound waves. It can detect a wide range of structural abnormalities present in the articular cartilage, bone cortex, synovial tissues, and joint effusion. It is considered to be better than X-rays in the detection of morphological abnormalities and presence of osteophytes. The major disadvantage of this technique is that it can only help visualize superficial tissues and cannot detect subchondral cysts (Wang et al., 2018).

Finally, computed tomography (CT) is also a widely used imaging technique that can provide 3-dimensional imaging of the joint. It is cheaper, faster, and more widely available as compared to MRI; however, its main limitation is that it makes use of ionizing radiations. It is used for the detection of narrowed joint spaces and osteophytes that are not visible on X-rays. It is also useful for the identification of subchondral cysts and calcified cartilage that is not evident through other imaging modalities (Wang et al., 2018).

Histological diagnosis of the severity of osteoarthritis can be done using a widely accepted grading system, which is the Mankin scoring method. This method focuses on changes that occur in the articular cartilage, apart from changes at the cellular level and the proteoglycan content of the cartilage. The four important parameters that are used in this grading system include trabecular number, trabecular thickness, bone volume, and trabecular separation. Cartilage damage is represented by increased bone volume

and trabecular thickness, and decreased trabecular number and trabecular separation (Aho et al., 2017).

### **Treatment and prevention**

Treatment strategies for osteoarthritis can be divided into pharmacological and non-pharmacological interventions. Pharmacological interventions include acetaminophen which helps in reducing pain, oral non-steroidal anti-inflammatory drugs which act as analgesic, anti-depressant, and anti-inflammatory compounds, opioids which inhibit neurotransmission, topical substances that reduce pain, and intra-articular injections that comprise of corticosteroids that act as an anti-inflammatory substance. Non-pharmacological interventions include surgical treatment such as knee and hip replacement, regenerative therapies using cell therapy and gene therapy, exercise, physiotherapy, and patient education regarding the management of osteoarthritis (Khalid et al., 2017). Preventive measures include avoiding joint injuries, weight management, strengthening exercises, and use of braces in high-risk individuals (Runhaar and Zhang, 2018).

### **Conclusion and future directions for research**

Osteoarthritis is a chronic, progressive, degenerative, and debilitating disorder that affects a large proportion of the global population. Despite its prevalence, there is no treatment that can reverse cartilage damage in the body and no universally accepted pain management strategy that is both safe and suitable for long-term use. Currently, therapies such as gene therapy and stem cell therapy are in different stages of clinical trials and these are promising in providing disease-modifying effects to patients. More

research also needs to be done on the prevention of osteoarthritis in high-risk population from young adulthood so that this disease can be prevented, delayed, or its severity can be reduced at a later stage.

## References

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