

Osteoarthritis's Management – Challenges and its Prospective

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Abstract: Osteoarthritis refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. It is the most common form of arthritis, and one of the leading causes of pain and disability worldwide. The most commonly affected peripheral joints are the knees, hips and small hand joints. Clinical studies have demonstrated that osteoarthritis pain is strongly linked to disability and quality of life. Pain relief enables patients to regain their mobility and is therefore a key goal in the management of osteoarthritis (OA). Osteoarthritis pain is of multifactorial origin, and inflammatory mechanisms play only a partial role. Non-opioid analgesics are useful in the control of mild-to-moderate pain, but have limitations as regards efficacy, and may cause serious adverse reactions

Keywords: NSAID, opioids, steroids, crepitus, exercise.

1. Introduction

Osteoarthritis refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. It is the most common form of arthritis, and one of the leading causes of pain and disability worldwide. The most commonly affected peripheral joints are the knees, hips and small hand joints. Pain, reduced function and effects on a person's ability to carry out their day-to-day activities can be important consequences of osteoarthritis. Pain in itself is also a complex biopsychosocial issue, related in part to a person's expectations and self-efficacy (that is, their belief in their ability to complete tasks and reach goals), and is associated with changes in mood, sleep and coping abilities. There is often a poor link between changes visible on an X-ray and symptoms of osteoarthritis: minimal changes can be associated with a lot of pain, or modest structural changes to joints can occur with minimal accompanying symptoms. In some people, because of either overwhelming trauma or compromised repair, the process cannot compensate, resulting in eventual presentation with symptomatic osteoarthritis; this might be thought of as 'joint failure'. [1] This in part explains the extreme variability in clinical presentation and outcome that can be observed between people, and also at different joints in the same person. There are limitations to the published evidence on treating osteoarthritis [1]. Most studies have focused on knee osteoarthritis, and are often of short duration using single therapies. Although most trials have looked at single joint involvement, in reality many people have pain in more than one joint, which may alter the

effectiveness of interventions.

A. Definition

Osteoarthritis (OA) is a type of joint disease that results from breakdown of joint cartilage and underlying bone. The most common symptoms are joint pain and stiffness.[1] Initially, symptoms may occur only following exercise, but over time may become constant.[1] Other symptoms may include joint swelling, decreased range of motion, and, when the back is affected, weakness or numbness of the arms and legs.[1] The most commonly involved joints are those near the ends of the fingers, at the base of the thumb, neck, lower back, knee, and hips.[1] Joints on one side of the body are often more affected than those on the other.[1] Usually the symptoms come on over years.[1] It can affect work and normal daily activities.[1] Unlike other types of arthritis, only the joints are typically affected.[1]

B. Types

OA is classed as either primary or as secondary to a diagnosed cause.

Primary Osteoarthritis (OA):

This is the most commonly diagnosed form of OA and is considered to occur largely due to "wear and tear" over time. [2] Because of this, it is associated with aging; in fact, age is the most potent risk factor of OA and the longer a person uses their joints, the more likely they are to suffer from this form of OA. Theoretically, this means that primary OA is inevitable should we live to an advanced enough age.[2] People tend to develop this type of OA starting from the age of 55 or 60. It may be localized to certain joints therefore; primary OA is usually subdivided by the site of involvement (eg, hands and feet, knee, hip) though it may also involve multiple joints.

Secondary Osteoarthritis (OA):

This form of OA results from conditions that induce a change in the microenvironment of the cartilage. Such conditions include significant trauma, congenital joint abnormalities, metabolic defects (eg, Wilson disease), infections, diseases (eg, neuropathic), and disorders that alter the normal structure and function of cartilage (eg, Rheumatoid Arthritis, gout).

Secondary OA tends to appear in relatively young individuals aged approximately 45 or 50.

Common risk factors that can lead to secondary osteoarthritis include:

- **Trauma:** Fracturing a bone (common during sports) increases the likelihood of a person developing OA in the injured joint. Unfortunately, this also means that the person is more likely to suffer from OA at a younger age than those who have primary OA.
- **Obesity:** In a single leg stance, 3-6 times a person's body weight is transmitted across the knees. Therefore, it stands to reason that an increase in body weight would result in additional force across the knees during walking.
- Not only does this promote weight gain but inactivity is also correlated with weaker muscles and tendons surrounding the joints. This increases the risk of developing OA because the muscles are not strong enough to keep the joints correctly aligned, stable and supported.
- **Joint overuse:** This is either due to repetitive joint use in occupation or during leisurely activity. One reason this happens during work is because over long days, the muscles will gradually become tired and no longer serve as effective joint protectors.
- **Other conditions:** These may include peripheral neuropathies and neuromuscular disorders that put abnormal stress on the joint.

2. Epidemiology

Epidemiology Osteoarthritis is the single most common cause of disability in older adults. It ranks as the fifth highest cause of years lost to disability in the whole population in high-income countries, and the ninth highest cause in low- and middle-income countries [2]. It accounts for 50% of the entire musculoskeletal disease burden, and thus is considered the highest-burden condition within the musculoskeletal group of diseases, which also includes rheumatoid arthritis and osteoporosis. Radiographic evidence of knee osteoarthritis is present in approximately 30% of men and women over the age of 65.2 worldwide estimates are that 9.6% of men and 18.0% of women over the age of 60 years have symptomatic osteoarthritis. Approximately 80% of those with OA will have limitations in movement, and 25% cannot perform their major activities of daily life. [2]

A. Signs and symptoms

The main symptom is pain, causing loss of ability and often stiffness. The pain is typically made worse by prolonged activity and relieved by rest. Stiffness is most common in the morning, and typically lasts less than thirty minutes after beginning daily activities, but may return after periods of inactivity. Osteoarthritis can cause a crackling noise (called "crepitus") when the affected joint is moved, especially shoulder and knee joint. A person may also complain of joint locking and joint instability. These symptoms would affect their

daily activities due to pain and stiffness [3] Some people report increased pain associated with cold temperature, high humidity, or a drop in barometric pressure, but studies have had mixed results

Osteoarthritis commonly affects the hands, feet, spine, and the large weight-bearing joints, such as the hips and knees, although in theory, any joint in the body can be affected. As osteoarthritis progresses, movement patterns (such as gait), are typically affected. Osteoarthritis is the most common cause of a joint effusion of the knee [3].

In smaller joints, such as at the fingers, hard bony enlargements, called Heberden's nodes (on the distal interphalangeal joints) or Bouchard's nodes (on the proximal interphalangeal joints), may form, and though they are not necessarily painful, they do limit the movement of the fingers significantly [3]. Osteoarthritis of the toes may be a factor causing formation of bunions, rendering them red or swollen.



Fig. 1. Symptoms of knee osteoarthritis

B. Risk factors

Damage from mechanical stress with insufficient self repair by joints is believed to be the primary cause of osteoarthritis. Sources of this stress may include misalignments of bones caused by congenital or pathogenic causes; mechanical injury; excess body weight; loss of strength in the muscles supporting a joint; and impairment of peripheral nerves, leading to sudden or uncoordinated movements [3]. However exercise, including running in the absence of injury, has not been found to increase the risk of knee osteoarthritis. Nor has cracking one's knuckles been found to play a role.

C. Primary

The development of osteoarthritis is correlated with a history of previous joint injury and with obesity, especially with respect to knees. Changes in sex hormone levels may play a role in the development of osteoarthritis, as it is more prevalent among post-menopausal women than among men of the same age [4].

D. Secondary

Secondary Osteoarthritis [4] of the ankle (due to an old bone fracture) in an 82-year-old woman

This type of osteoarthritis is caused by other factors but the resulting pathology is the same as for primary osteoarthritis:

- Alkaptonuria
- Congenital disorders of joints

- Diabetes doubles the risk of having a joint replacement due to osteoarthritis and people with diabetes have joint replacements at a younger age than those without diabetes.
- Ehlers-Danlos Syndrome [4]
- Hemochromatosis and Wilson's disease
- Inflammatory diseases (such as Perthes disease), (Lyme disease)
- Obesity
- Joint infection.

E. Diagnosis

As of 2004, biochemical markers of the disease were not available. However, more recent research has indicated that it may be possible to assess bone and cartilage using biochemical markers [4]. Two processes that contribute to the development of osteoarthritis are bone degradation and cartilage degradation, and research has indicated that both of these two processes have potential biomarkers.

Bone Degradation an osteoclast is a type of bone cell that degrades bone tissue by removing minerals and breaking up the organic bone; this process is called bone resorption [4]. The majority of bone resorption by osteoclasts is mediated by the protease cathepsin K, which specifically results in the fragmentation of collagen type I (CTX-I). The presence of CTX-I fragments has been used as a surrogate measure of bone resorption for in vitro, preclinical and clinical studies.

Cartilage Degradation an investigation of urinary concentrations of type-II collagen (CTX-II) fragments has revealed an association between these concentrations and the prevalence and progression of osteoarthritis of the knee and hip [5]. Furthermore, these concentrations seem higher in patients with joint pain. Baseline CTX-II concentration was higher in subjects with baseline OA and there were also associations between CTX-II and progression of OA [5] It has been proposed that an assessment of collagen degradation be used as a quantitative measure of cartilage damage in assessing OA.

1. A person with osteoarthritis may be diagnosed with the following symptoms:
 - pain exacerbated by moving the knee
 - knee locking or catching pain when standing up from a chair
 - pain when going up and down stairs
 - Weakening thigh muscles.
2. Holistic approach to osteoarthritis assessment and management
 - Assess the effect of osteoarthritis on the person's function, quality of life, occupation, mood, relationships and leisure activities
 - Agree a plan with the person (and their family members or careers as appropriate) for managing their osteoarthritis.
 - Apply the principles in NICE's recommendations [6] on patient experience in relation to shared decision-making

F. Exercise and manual therapy [7]

Advise people with osteoarthritis to exercise as a core treatment irrespective of age, comorbidity, pain severity or disability.

Exercise should include: local muscle strengthening and general aerobic fitness. It has not been specified whether exercise should be provided by the NHS or whether the healthcare professional should provide advice and encouragement to the person to obtain and carry out the intervention themselves. Exercise has been found to be beneficial but the clinician needs to make a judgement in each case on how to effectively ensure participation [7]. This will depend upon the person's individual needs, circumstances and self-motivation, and the availability of local facilities.

Manipulation and stretching should be considered as an adjunct to core treatments, particularly for osteoarthritis of the hip.

G. Pharmacological treatment:

OTC analgesics [8]

Analgesic, any drug that relieves pain selectively without blocking the conduction of nerve impulses, markedly altering sensory perception, or affecting consciousness. This selectivity is an important distinction between an analgesic and an anesthetic.

Analgesics may be classified into two types: anti-inflammatory drugs, which alleviate pain by reducing local inflammatory responses; and the opioids, which act on the brain. The opioid analgesics were once called narcotic drugs because they can induce sleep [8]. The opioid analgesics can be used for either short-term or long-term relief of severe pain. In contrast, the anti-inflammatory compounds are used for short-term pain relief and for modest pain, such as that of headache, muscle strain, bruising, or arthritis.

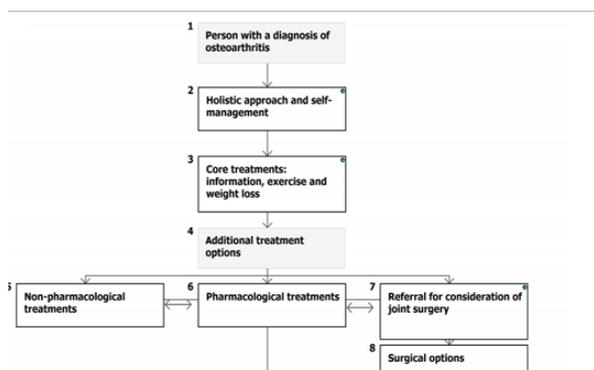


Fig. 2. Management

- Core Treatments/ Non-Pharmacological Treatment [6]: information, exercise and weight loss:

Management of osteoarthritis:

Currently, available oral nonprescription analgesics include acetaminophen, non-steroidal anti-inflammatory drugs (NSAIDs) (ibuprofen and naproxen), and salicylates (aspirin, magnesium salicylate, and sodium salicylate) [8]. Topical analgesics include menthol, camphor, capsaicin, and trolamine salicylate. Nonprescription analgesics are available in both brand and generic formulations in tablets, capsules, gencaps, powders, creams, ointments, suppositories, sprays, and patches.

While nonprescription analgesics are generally safe and effective treatments when used as directed, their use has been associated with certain risks and adverse effects [8]. There is a common misconception among many consumers that OTC drugs are harmless because they are readily available without a prescription.

However, acetaminophen (APAP), one of the most commonly used OTC analgesics, is the leading cause of acute liver failure in the United States.

Acetaminophen

While APAP is considered to be an effective and safe analgesic/antipyretic [9]; it does not have any anti-inflammatory activity. APAP is available as a single-entity product, but is commonly found in cough, cold, and allergy combination products and sleep aids. Since APAP can be found in more than 600 OTC and prescription products, patients should be advised to always check medication labels if taking multiple medications to avoid potential therapeutic duplication [9] and toxicities.

NSAIDs

Available nonprescription NSAIDs include the propionic acid derivatives ibuprofen and naproxen sodium. NSAIDs [10] have the potential to interact with a variety of prescription medications. Examples of clinically significant drug interactions associated with NSAIDs include bisphosphonates, digoxin, beta blockers, ACE inhibitors, diuretics, anticoagulants, and methotrexate. Patients with a history of impaired renal function, congestive heart failure, or medical conditions that compromise renal hemodynamics should not self-medicate with NSAIDs.

Salicylates:

Available nonprescription salicylates include aspirin (ASA) and magnesium salicylate [11]. The use of ASA is associated with several clinically significant drug–drug interactions including valproic acid, beta blockers, ACE inhibitors, diuretics, anticoagulants, methotrexate, and sulfonyleureas. The maximum analgesic dose for self-medication with ASA is 4 gm/day; however, dosages of 4 gm to 6 gm/day may be needed to produce anti-inflammatory effects. ASA [11] and other salicylates should not be administered to patients 15 years and younger who are recovering from the chicken pox or influenza.

Topical Analgesics [12]

Topical analgesics are commonly used for minor musculoskeletal injuries (sprains and strains) and include camphor, menthol, methyl salicylate, methyl nicotinate, trolaminesalicylate, and capsaicin [12]. These products may have local analgesic, anesthetic, antipruritic, and/or counterirritant effects. When used properly, they are considered to be safe and effective and are intended for external use only and for a short duration. Patients on anticoagulation therapy should be advised to not use topical products that contain salicylates since concomitant use has been associated with prolonged prothrombin time.

3. Combinations of treatments for osteoarthritis

What are the benefits of combinations of treatments for osteoarthritis, and how can these be included in clinically useful, cost-effective algorithms for long-term care?

Why this is important?

Most people with osteoarthritis have symptoms for many years, and over this time they will receive several treatments, sometimes in combination. This may involve a combination of non-pharmacological and pharmacological treatments, such as using a walking stick and taking analgesics at the same time. Perhaps more commonly, a person may take different analgesics at the same time (for example, NSAIDs and opioids). However, most of the osteoarthritis trial evidence only evaluates single treatments, and often such trials are of short duration (for example, 6 weeks). We need to understand the benefits of combination treatments relevant to particular anatomy sites of osteoarthritis (for example, hand compared with knee) and whether particular combinations provide synergistic [12] benefit in terms of symptom relief. Also needed is an understanding of how combinations of treatments can be included in algorithms (for example, dose escalation or substitution designs) for use in clinical practice. Trials to address this area may need to utilize complex intervention methodologies with health economic evaluations, and will need to stratify for comorbidities that affect the use of a particular intervention.

4. Risks of OTC analgesics [12]

Although OTC analgesics have strong safety profiles when used as directed, there are risks associated with these

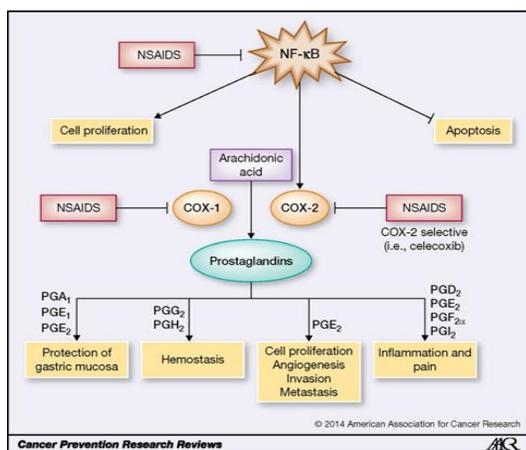


Fig. 3. Cancer prevention research reviews

medications, and they must be considered. Gastrointestinal (GI) complications, CV risks, renal dysfunction, and bleeding are all potential adverse events known to be associated with NSAIDs

In addition, known risks exist when OTC analgesics are combined with other medications. For example, GI bleeding risk may be increased by: taking NSAIDs and anticoagulants; taking NSAIDs and steroids; taking multiple prescription and nonprescription NSAIDs; and taking NSAIDs while consuming 3 or more alcoholic drinks daily. Similarly, severe liver damage may occur if the patient uses multiple acetaminophen [12]-containing products, or uses acetaminophen while consuming or more alcoholic drinks daily. Because of these potential risks, it is important to consider concomitant medication use when recommending an OTC analgesic.

5. Discussion

Every day, we are practicing self-medication in the form of self-care of our health. Around the 1960's in the West self-care and self-medication were regarded as unnecessary and potentially even unhealthy practices [12]. This paternalistic approach to medicine, supported by health systems designed to treat sickness (rather than to prevent disease) remains a familiar aspect of health care in many countries to this day.

Self-medication has traditionally been defined as "the taking of drugs, herbs or home remedies on one's own initiative, or on the advice of another person, without consulting a doctor

Major problems related to self-medication [12] are wastage of resources, increased resistance of pathogens and causes serious health hazards such as adverse reaction and prolonged suffering. Antimicrobial resistance is a current problem worldwide particularly in developing countries where antibiotics are available without any prescription. Hence, the government should take necessary steps to regulate responsible self-medication. This can be done by making availability of safe drugs along with proper instructions about its use and if in need consulting a physician.¹⁰

Statistics:

Studies carried out on self-medication states that it is very common practice, especially in economically deprived communities. Self-medication also has some advantages and disadvantages.

Now-a-days health care services getting costlier and in developing countries health care facilities are not available. Hence, that time self-medication becomes an obvious choice of healthcare service. Furthermore, it has been noted that purchase of drugs and many drugs that can only be purchased with prescription in developed countries are OTC [13] in developing countries. In addition, lax medical regulation has resulted in the proliferation of counter free drugs that are in high demand for the treatment of highly prevalent diseases.

Self-medication is very common now a days and it is being used world-wide.

Why do people use Self-medication?

Modern consumers (patients) wish to take a greater role in

the maintenance of their own health and are often competent to manage (uncomplicated) chronic and recurrent illnesses (not merely short-term symptoms) after proper medical diagnosis and with only occasional professional advice, e.g. use of histamine H₂-receptor blocker, topical corticosteroid, antifungal and oral contraceptive [13]. They are understandably unwilling to submit to the inconvenience of visiting a doctor for what they rightly feel they can manage for themselves, given adequate information.

6. Potential risks

Individual level

- Incorrect self-diagnosis
- Failure to seek appropriate medical advice promptly
- Incorrect choice of therapy
- Failure to recognize or report adverse drug reactions
- Incorrect route of administration
- Inadequate or excessive dosage
- Excessively prolonged use
- Risk of dependence and abuse [13]
- Food and drug interaction

7. Role of health profession

Health professionals are one who has potential role in preventing risks of self-medication. Because he is the one who work on three main therapeutic aspects of professionalism in his daily practice: Information, therapeutic advice and education.

8. Role of pharmacist

He is one of the key role players in educating his customers about the proper use of medicines, which are intended for self-medication [15]. For that necessary steps have to be taken in his training and practice.

Pharmacists play a valuable role in identifying, solving and preventing drug-related problems for the purpose of achieving optimal patient outcomes and quality of life. Ambulatory based pharmacists have the opportunity and responsibility to foster safe, appropriate, effective and economical use of all medications, especially those therapies patients are self-selecting. Pharmacists should guide their customers to consult the physician before taking any medication by self.

9. Conclusion

We have summarized current knowledge about the epidemiology and management of osteoarthritis. Osteoarthritis [15] is currently a major public health problem and the impact of the ageing baby boomers will further increase the burden to society. We anticipate, that with the current major research initiatives driving a better understanding of the course of symptomatic and structural change in the disease, that new treatments to retard the progress of osteoarthritis will be developed in the medium term. At present clinicians should

manage patients with osteoarthritis with a combination of methods (NSAID AND OPOIDS)

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