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Dr. Md. Gheyasuddin
Medical Officer (Unani), APHC Kurisarai (under CHC Belaganj), District Gaya, Bihar, India

Dr. Khalid Eqbal
Assistant Professor, Dept. of Moalajat, Sufiya Unani Medical College Hospital and Research Centre, Bara Chakia East Champaran, Bihar, India

Dr. Md. Najmuddin
Medical Officer, Patna Health Clinic Subzibagh Patna, Bihar, India

Corresponding Author:
Dr. Md. Gheyasuddin
Medical Officer (Unani), APHC Kurisarai (under CHC Belaganj), District Gaya, Bihar, India

Understanding osteoarthritis and possible management: A review

Dr. Md. Gheyasuddin, Dr. Khalid Eqbal and Dr. Md. Najmuddin

Abstract
The most frequent kind of arthritis in the world is osteoarthritis (OA). Primary osteoarthritis and secondary osteoarthritis are the two types of osteoarthritis. Age, female gender, obesity, anatomical characteristics, muscular weakness, and joint damage (occupation/sports activities) are all risk factors for OA. Around 3.3 to 3.6 percent of the world's population suffers from OA. It is the 11th most debilitating disease in the world, affecting 43 million people and causing moderate to severe disability. OA affects the entire joint, leaving no tissues unaffected. A combination of risk factors (described above), mechanical stress, and improper joint mechanics cause OA. All patients should have a complete medical history and physical examination (including a targeted musculoskeletal examination). CBC, ESR, rheumatoid factor and ANA blood tests are normally normal in OA, although they may be conducted to rule out inflammatory arthritis. Radiographic features consistent with OA, such as marginal osteophytes, joint space narrowing, subchondral sclerosis, and cysts, can be seen on X-rays of the afflicted joint; however, radiographic findings do not correlate with disease severity and may not be present early in the disease. The goal of OA treatment is to reduce both pain and functional loss. Non-pharmacologic and pharmacologic therapy is used to treat the disease holistically. Furthermore, allopathic medications used to treat illness or relieve symptoms cause substantial toxicity and hazardous drug reactions. ADR is more common in elderly persons who have this condition on a regular basis. The Unani physicians' treatment principle for osteoarthritis involves *Istifragh* (removal of diseased materials) done *Munzij Wa Mushil* therapy and pain relief through *Musakinaat*, and it can be managed by using either single drugs, for example, *Muqil, Bozidan, Suranjan, Asgand, Zanjabeel, Sibr, Hanzal, Ghariqun, Turbud, Kalonji, Zanjabeel* and or compound formulations alike *Habbe Muqil, Habbe Suranjan, Habbe Asgand, Qurs Kushta Sadaf, Majoon Chobchini, Majoon Ushba, Majoon Jograj Guggul, Itrifal Muqil, Roghan Haft Barg, Roghan Babuna, Roghan Azaraqui, Roghan Darchini, Roghan Surkh*.

Keywords: Osteoarthritis, Arthritis, *Wajaul Mafasil*, Joint Problem, Unani Medicine

Introductions
It's been suggested that osteoarthritis is the world's oldest known disease, with evidence found in dinosaur skeletons dating back 50 to 70 million years [1]. The spine of a 200-million-year-old Dimetrodon Permian reptile discovered in Texas, on the other hand, reveals signs of a compound fracture of a spine that was infected with pus formation [2]. Osteoarthritis is commonly seen in Egyptian mummies and old English skeletons. May's description of rheumatoid arthritis in an Egyptian mummy is a textbook example of osteoarthritis [3]. There's evidence that osteoarthritis of the shoulders and degenerative abnormalities in the lumbar spine was more common in ancient skeletons, but knee joints were less impacted. Similarly, osteoporosis was less common in women over 65 [4]. This is likely due to lifestyle variations, with more physical labor being required in the past, resulting in less obesity and a lower incidence of knee osteoarthritis. There is also evidence that degenerative alterations in the cervical spine were less common than they are today, which is most likely due to lifestyle choices [5].

Prevalence of osteoarthritis:
The most common joint ailment in the United States is osteoarthritis (OA). Symptomatic knee OA affects 10% of males and 13% of women who are 60 years or older [6]. The number of people with symptomatic OA is expected to rise as the population ages and the obesity pandemic spreads [7]. The etiology of OA is multifactorial, and it can be thought of as the result of the interaction of systemic and local variables [8]. Age, female gender, obesity, knee injury, repetitive usage of joints, bone density, muscle weakness, and joint laxity all have a

role in the development of joint osteoarthritis, especially in weight-bearing joints [9]. Modifying these factors may help to lower the chance of osteoarthritis and the pain and impairment that comes with it [10].

Symptomatic knee OA affects approximately 13% of women and 10% of males aged 60 and up. The number of people with symptomatic knee OA is expected to rise as the population ages and the rate of obesity or overweight in the general population rises [11]. Over the course of a year, 25% of adults over the age of 55 may experience recurrent episodes of knee discomfort, with one in every six of them having to see their general practitioner about it [12]. Around 10% of adults over the age of 55 have painful, crippling knee OA, with one-quarter being severely impaired [13]. In comparison to women, men have a decreased prevalence of knee OA. This was demonstrated in a meta-analysis of males and females, which found that males aged 55 years had a lower incidence of knee OA than females [14].

Females, especially those over 55, had more severe OA in the knee, but not in other joints. The findings of this study revealed a gender gap in the incidence of knee OA, especially after menopause [15].

Etiology of Osteoarthritis

The etiologies of osteoarthritis are multifaceted, resulting from the interaction of systemic and local causes. Osteoarthritis strikes people of all ages [16]. Several relevant genes are associated with the incidence of this devastating disease's pathogenesis. Adolescent athletes are predisposed to the development of early osteoarthritis due to sports activity, joint injury, obesity, and hereditary vulnerability [17]. Knee OA is 3.86 times more likely after a previous knee injury [18]. In the development of joint OA, factors such as age, female gender, overweight and obesity, knee injury, repetitive usage of joints, bone density, muscle weakness, and joint laxity all play a part [19]. The identification and management of risk factors, particularly in weight-bearing joints, may lower the incidence of OA and avoid subsequent pain and disability [20]. Mechanical forces acting on joints are a major cause of OA and one of the most modifiable risk factors, as measured by body mass index (BMI) [21]. Symptomatic sickness and eventual impairment are linked to the female sex, poorer educational levels, obesity, and weak muscular strength [22].

Risk Factor for osteoarthritis

Risk factors of OA can be divided into person-level factors (age, gender, obesity, genetics, and diet) and joint-level factors (injury, malalignment, and abnormal loading of the joints) that interact in a complex manner [23, 24].

Physiopathology of Osteoarthritis

Because the development of OA is based on interactions between various elements, this process can be thought of as the result of a systemic and local interaction [25]. Aging, genetics, trauma, knee malalignment, higher biomechanical loading of joints due to obesity, increased bone density, and an imbalance in physiological processes are all risk factors for this progressive and severe condition [26]. Obesity is now widely recognized as a complex condition characterized by inappropriate activation of neuroendocrine and pro-inflammatory pathways, which results in impaired food intake control, fat accumulation, and metabolic alterations [27]. Activated white adipose tissue boosts the production of pro-inflammatory cytokines including IL-6, IL-1, IL-8, TNF alpha, and IL-18 while lowering the production of regulatory cytokines like IL-10. This finding backs up the association between fat and OA [28]. Obesity genes and their products, such as leptin, may play a role in the onset and progression of OA [29].

However, osteoblasts and chondrocytes can create leptin, and local synthesis of this molecule could be very important [29]. In the cartilage and osteophytes of persons with OA, significant quantities of leptin were found, but just a few chondrocytes produced leptin in healthy people's cartilage [30]. Leptin was discovered in the synovial fluids of OA joints and was linked to BMI. Synovial inflammatory processes are triggered by cytokines, biomechanical stimuli, and proteolytic enzymes, which up-regulate metalloproteinases and limit chondrocyte compensatory synthesis pathways essential to restore the integrity of the destroyed matrix [3].

Subchondral bone enlargement, bone marrow lesions, meniscal rips, and extrusion are all part of a chain of changes in joint structure that eventually leads to cartilage abnormalities, which can lead to cartilage loss and radiographic osteoarthritis [32]. The menisci, ligaments, periarticular muscles, and joint capsules are all implicated in the OA process, according to research. Inflammatory cells can be found in the infrapatellar fat pad of patients with knee OA, which can contribute to discomfort in the anterior portion of the knee [33]. Extravasation of immune cells from infrapatellar fat pad inflammatory cells can cause vasodilation and immune cell extravasation, which may contribute to anterior pain in knee OA [34, 35].

Clinical features

The EULAR recommends three symptoms for the diagnosis of knee OA: persistent knee discomfort, limited morning stiffness, and diminished function [36]. In addition, crepitus, joint mobility restriction, and bony enlargement are all helpful in the diagnosis of knee OA [37]. The most prevalent symptom of knee OA is pain, which is a primary cause of persistent disability and a major source of OA-related disability [38]. Pain can range in intensity from barely perceptible to incapacitating. Knee OA pain is usually worse by exercise and alleviated by rest [39]. The likelihood of developing radiographic knee OA jumps to 99 percent when the aforementioned six symptoms and indications are present. Synovitis may develop in severe cases, causing pain at rest or at night [40].

In OA patients, a brief bout of stiffness lasting less than 30 minutes may occur in the morning or after periods of inactivity [41]. Physical examination may reveal tenderness to palpation of the affected joints [42]. There may be joint effusions, which have a slight pleocytosis, normal viscosity, and a modestly raised protein level [43]. Crepitus is frequent when moving joints or walking. Range of motion limitation is a frequent symptom of OA of the knee. Malalignment may be visible in advanced cases (genu varus or genu valgus) [44, 45].

Radiographic and MRI findings in knee osteoarthritis [41]

Radiographic findings: The radiographic hallmarks of primary osteoarthritis include nonuniform joint space loss, osteophyte formation, cyst formation, and subchondral sclerosis [46].

MRI findings in knee osteoarthritis

In otherwise healthy, asymptomatic, undamaged knees, the prevalence of knee osteoarthritis characteristics on MRI is high—up to 43% in persons over 40. Prevalence rates rise with age and are impacted by a variety of factors, including physical activity levels and the type of MRI sequences employed, common findings include Cartilage abnormalities, Osteophytes, Bone edema, Subarticular cysts, Bone attrition, Meniscal tears, Ligament abnormalities, Synovial thickening, Joint effusion, Intra-articular loose bodies, and Periarticular cysts [47, 48].

Laboratory findings

Despite the presence of moderate synovitis in patients with knee OA, inflammatory indicators such as the erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are frequently normal [49]. The synovial fluid in OA knees is non-inflammatory. CRP levels in the blood and synovial fluid are significantly lower in OA than in inflammatory arthritis. Both serum and synovial fluid of patients with knee OA are negative for anti-cyclic citrullinated peptide antibodies. Anti-CCP levels in synovial fluid can be utilized to distinguish OA from RA in cases of suspected knee OA [50].

The value of laboratory investigations in osteoarthritis has lately increased due to advances in pathogenic mechanisms and a clearer characterization of the illness, as well as the availability of new technology (OA). Early diagnosis, assessment of disease activity and severity, and evaluation of therapy effectiveness are the key goals of these findings [51]. Biochemical markers could be effective in this situation because they are non-invasive and non-expansive [52]. However, only a few molecules, such as COMP, antigenic keratan sulfate, hyaluronic acid, YKL-40, type III collagen N-propeptide, and urine glucosyl-galactosyl pyridinoline, appear to be real disease indicators in OA. Due to their complicated metabolism, serum or urine measurements of these compounds are challenging to interpret correctly [53]. Synovial fluid analysis, primarily for leukocyte count and crystal detection, is still required for diagnosis, as well as for determining the amounts of critical markers of local inflammation, such as metalloproteinases and cytokines, which appear to be relevant in the pathogenesis of OA [54, 55].

Management of Osteoarthritis

The goal of OA treatment is to reduce both pain and functional loss. Non-pharmacologic and pharmacologic therapy is used to treat the disease holistically. Patients with modest symptoms can usually be managed with the former, however more advanced disorders require a mix of the two 56-58].

Non-pharmacological treatment

Ongoing and integral care should include education, counsel, or information regarding the etiology, progression, prognosis, and treatment choices for OA. In the case of the knee and hip OA, weight loss (if overweight) is a critical component of treatment [59]. Exercise should be explored independently of age, structural disease severity, functional status, pain levels, or the presence of comorbidities in the knee, hip, and hand OA [60]. Patients with hip and knee OA should use walking aids/devices, while patients with carpometacarpal (CMC) joint OA should use orthoses. It is critical to have trained healthcare providers who are able to give the basic therapies [61].

Pharmacological treatment

Currently, the goal of medication therapy in OA is to relieve symptoms; however, drug therapy in OA should ideally modify joint structural deterioration and, as a result, reduce pain and improve joint function [62]. Non-steroidal anti-inflammatory medicines (NSAIDs), one of the therapeutic classes used to treat OA symptoms, may have the potential to change the structure damaged in the disease, such as the synovium, but this has yet to be proven in clinical investigations [63]. In ankylosing spondylitis, it has been suggested that nonsteroidal anti-inflammatory drugs (NSAIDs) may operate as a disease-modifying agent. There are currently no medications that can successfully influence the disease process in OA [64].

Intra-articular treatment

Several studies have found that IAHA (intra-articular hyaluronic acid) is more cost-effective than nonsteroidal anti-inflammatory drugs (NSAIDs), analgesics, and corticosteroids in treating the pain associated with knee OA, and several authors have concluded that IAHA should be the primary treatment strategy [65].

Intra-articular medication delivery has several advantages over systemic injection; yet, intra-articular therapeutic choices for knee osteoarthritis (OA) have been limited for the past 20 years to analgesics, glucocorticoids, hyaluronic acid (HA), and a few dubious alternative therapies [66].

Management of Osteoarthritis in Unani Medicine

The Unani System of Medicine, also known as Greek-Arab medicine, was founded by Hippocrates and is based on the concept of natural body humor homeostasis and balance (blood, bile, black bile, and phlegm). Diseases are caused by an imbalance in the quality and quantity of these humor, whereas restoring this balance maintains a person's health. Regimental therapy, Diet therapy, Pharmacotherapy, and Surgery are the four therapeutic modalities that are used to treat diseases [55].

Regimenal therapies consist of Leech therapy, Hijama, Fasd, Dalk, Nutool, Riyazat etc. [55] Irsale Alaq (Leech or Hirudo therapy) is one of the most essential and extensively utilized regimental therapeutic procedures for removing morbid touches of humor from the immediate area. It is a therapy method that involves the use of medicinal leeches. For a long time, Greek-Arab physicians have recommended and effectively used it in the treatment of musculoskeletal ailments, gynecological disorders, chronic skin diseases, thromboembolic diseases, varicose veins, ENT problems, and other conditions. The efficacy of leech therapy is related to the analgesic and resolvent properties of leeches, according to Unani doctrine. From a modern standpoint, however, leech saliva contains approximately 100 pharmacologically active biological components such as Hirudin, hyaluronidase, vasodilators, anesthetics, bactericidal, fibrinases, collagenase, and so on. The analgesic, anti-inflammatory, and anesthetic benefits of leech therapy are due to these compounds being administered into the human body while sucking blood [54].

Leech therapy, according to Unani belief, is based on the principles of Tanqiyae Mawad (Evacuation of sick humour) and Imalae Mawad (Evacuation of morbid humors)

(Diversion of humor). Tanqiyae Mawad refers to the removal of diseased humors and surplus fluids from the body, hence preserving equilibrium in the quality and quantity of four body humors, which is actually responsible for sustaining normal health. Imalae Mawad is the process of diverting morbid fluids from the damaged organ's site to a location where they can be easily evacuated from the human tissues. Unani physicians have been widely adopting this therapeutic regimen for a variety of ailments based on this holistic approach. The Mussakin (sedative) and Muhallil (anti-inflammatory) properties of leech saliva may also contribute to the therapy's success [54]. Hijamah (Cupping therapy) is a type of Unani therapeutic regimen. It's an ancient method that the Chinese, Babylonians, Egyptians, Greeks, Romans, Arabs, and Indians all used. Hijamat-Bish-Shart (Wet cupping/cupping with scarification) and Hijamat-Bila-Shart (Dry cupping/cupping without scarification) are the two types of Hijamat. Nashtar/Lancet is referred to as Shart. Hippocrates is credited with inventing this form of treatment, which involves producing vacuum through suction (460-377B.C). When reading Unani traditional literature, one can see the vast array of Hijamah indications, which include inflammatory and painful illnesses such as arthritis and sciatica. When Muslim physicians and their scientific writings were the principal sources of medical sciences, this therapy invaded Europe through Spain. This method of treatment had not been used for a long time. With advancements in science and technology, this style of treatment has also been scientifically proven to be useful in a wide range of sick diseases. It has been embraced as a modality of therapy in numerous nations since its rebirth following scientific support. Several clinical studies have been conducted in India under the supervision of several Unani Institutions throughout the country [57].

Conclusion

Osteoarthritis (OA) is a complex etiological chronic degenerative condition marked by articular cartilage loss and periarticular bone remodeling. Non-pharmacological management, pharmacological treatment in the form of medications that can change symptoms, symptomatic slow-acting OA therapies, or structure modifying OA drugs are all options for treating osteoarthritis, depending on the patient's clinical needs. Patients who are experiencing prolonged discomfort and a gradual limitation of daily activities despite medical treatment may be surgical candidates.

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