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Review Article

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A NARRATIVE REVIEW ON THE CLINICAL FEATURES OF KNEE OSTEOARTHRITIS

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ABSTRACT

Osteoarthritis (OA) is a degenerative joint disease characterized by the progressive breakdown of articular cartilage, subchondral bone changes, and synovial inflammation, leading to joint pain, stiffness, and functional impairment. It is the most common form of arthritis, primarily affecting the elderly, and commonly involves the knees, hips, hands, and spine.

Clinical manifestations of OA typically begin insidiously and progress gradually. The hallmark symptom is joint pain, exacerbated by activity and relieved by rest. Pain is often described as a deep, aching sensation, and may be accompanied by stiffness, particularly after periods of inactivity or upon waking, lasting less than 30 minutes. As the disease advances, pain can become more persistent, occurring even at rest or during the night.

Joint stiffness and a limited range of motion are common, contributing to functional limitations and disability. Patients may also experience joint swelling due to synovial inflammation and effusion. Crepitus, a crackling or grating sound or sensation, is often reported during joint movement. In advanced cases, joint deformities and instability can occur, leading to increased risk of falls and further joint damage.

Radiographic features of OA include joint space narrowing, osteophyte formation, subchondral sclerosis, and cyst formation. However, the severity of radiographic findings does not always correlate with the degree of clinical symptoms.

OA can significantly impact quality of life, leading to decreased physical activity, social participation, and psychological well-being. Risk factors for OA include age, female sex, obesity, joint injury, genetic predisposition, and mechanical factors such as malalignment or abnormal joint loading.

Management of OA focuses on alleviating symptoms, improving joint function, and slowing disease progression. This includes a combination of non-pharmacological approaches (e.g., physical therapy, weight management, and exercise), pharmacological treatments (e.g., analgesics and nonsteroidal anti-inflammatory drugs), and, in severe cases, surgical interventions such as joint replacement. Ongoing research aims to better understand the pathophysiology of OA and to develop disease-modifying therapies.

INTRODUCTION

Osteoarthritis of knee (KOA) is widespread disease in America, impacting approximately 32.5 million people. Between 2008 and 2014, a significant 14% of the American population - equivalent to approximately 1 in 7 adults - experienced symptoms of KOA (1). We found a slightly higher incidence of KOA in women, with a 1.04 X probability compared to men, and 1.02 X probability in individuals over 40 compared to those under 40 (2). Our findings suggest that education level has a significant impact on the likelihood of developing knee osteoarthritis (KOA). Specifically, population having high school diploma are at 0.49 X lesser risk from experiencing KOA in comparison to less literate, whilst people having college degree are at 0.22 X lowered risk for KOA in comparison to less literate (3).

Studies have shown that 8% to 28% of older adults develop radiographic hip osteoarthritis (RHOA) every year (4, 5). Former NFL players who have had lower extremity injuries are more

likely to develop osteoarthritis (OA) in the lower extremities, with a prevalence of 29.6% to 44.4% (6). Osteoarthritis (OA) affects approximately 12% of individuals aged 25 and above (7). The prevalence of osteoarthritis (OA) jumps to nearly 68% among individuals aged 65 and older (8).

A study conducted in Pakistan revealed that knee osteoarthritis (KOA) affects a significant portion of the population, with 28% of urban residents and 25% of rural residents suffering from the condition (9). Bangladesh and India have recorded 10.20% and 5.78% incidence respectively (10). Knee osteoarthritis (KOA) affects approximately 16% of people worldwide. - KOA has an annual incidence of 203 cases per 10,000 individuals globally (11).

DEFINITION

KOA is a persistent and debilitating condition marked by recurring pain and impaired joint function, leading to reduced mobility and diminished quality of life (12). OA poses a significant global health burden, substantially impairing quality of life and overall well-being, and impacting millions of people worldwide (13). OA, most common form of arthritis, is complex condition marked by a disruption in balance in-between natural breakdown and repairing processes of joint tissues, leading to progressive damage and functional impairment of synovial joints (14). The pathogenesis of osteoarthritis involves a biochemical imbalance between the enzymes responsible for cartilage breakdown and those involved in cartilage repair and regeneration, leading to a net loss of cartilage tissue and progressive joint damage (15).

AFFECTED REGIONS

OA is a disorder of degenerative joints marked by osteophyte formation and cartilage degradation, affects primarily weight-bearing joints like knees and hips, as well as small hand joints, result in reduced mobility, inflammation and pain (16). Postmenopausal women are disproportionately affected by osteoarthritis (OA), making it a significant health concern in this demographic (17).

TYPES

The Asia-Pacific region has a high prevalence of two prominent rheumatic conditions: KOA and non-specific low back pain (NSLBP), which are amongst most frequent and debilitating musculoskeletal disorders in this part of the world (18).

CAUSES

Trauma to the knee can lead to inflammation of the cartilage, which can cause pain, swelling, and damage to the joint (19). Prolonged overweight or obesity can cause muscle atrophy and fat accumulation, causing release of inflammatory mediators which alter knee biomechanics or increase joint stress, ultimately leading to KOA (20). Hip dysplasia has been repeatedly linked to early-onset osteoarthritis in multiple studies, solidifying its status as a primary risk factor for this joint disorder (21). Research has extensively indicates that ligamentous and meniscal injuries are significant risk factors for knee osteoarthritis (KOA) (22).

SIGNS AND SYMPTOMS

Women with KOA tend to experience more pronounced pain and disability than their male (23). Individuals with hip-related conditions often experience symptoms such as groin pain or a sense of hip instability, which can manifest as a feeling of weakness or uncertainty in the hip joint (24). Knee osteoarthritis (KOA) is characterized by a triad of primary symptoms: chronic knee pain, stiffness in the joint, and limited mobility, which may be accompanied by additional signs such as crepitus (grating or crackling sounds) or swelling, further confirming the diagnosis (25). Knee osteoarthritis (KOA) can often progress without noticeable symptoms, leading to a delay in diagnosis until the condition has already advanced to a point where imaging tests reveal significant joint damage (26). Pain is the primary motivator for patients to seek specialized medical care for KOA (27).

DIAGNOSIS

Individuals diagnosed with lower extremity joint injuries and osteoarthritis (OA) often experience significant limitations in their daily functioning and a decline in their ability to engage in physical activities (28-31). A KL grade of 2 or higher was used to indicate OA,

signifying the presence of significant joint damage and degeneration (32). KOA is common and debilitating condition in older adults, causing significant pain and functional impairment (33). Sudo's study identified that certain factors, including high body mass index (BMI), female gender, advanced age, and high bone mineral density (BMD), were significantly linked to an increased likelihood of developing radiographic knee osteoarthritis (34).

TREATMENT

Existing treatments for knee osteoarthritis, such as Chinese patent medicine, NSAIDs, sodium hyaluronate injections, and hormone injections, only provide symptomatic relief and do not modify the disease course or reverse its progression (35). Surgical replacement of the shoulder joint, known as total shoulder arthroplasty (TSA), is a highly effective treatment option for a range of conditions affecting the glenohumeral joint (36, 37).

RISK FACTORS

Research has shown that sustaining a healthy weight over a decade can significantly lower the risk of developing knee osteoarthritis (KOA) by 27.5% (38). Given the strong link between excess weight and KOA, patients are urged to maintain a healthy weight through home-based weight management strategies for preventing onset of KOA. Additionally, cartilage defects and joint instability, which are more common in women, can increase the likelihood of developing KOA as people age, with the risk reaching its peak around age 50 (39). Individuals with osteoarthritis (OA) are more prone to having co-occurring health conditions, such as obesity, heart disease, and gastrointestinal disorders, compared to those without OA (40).

LITERATURE REVIEW

To prospectively assess interplay in-between clinical characteristics and structural abnormalities in knee osteoarthritis (OA) patients, a study was conducted with approval from the institutional medical ethics review board, and all participants included were sought for signed informed consent. The study included 205 patients (42 men [20%], 163 women [80%]; median age, 60 years; range, 43–77 years) diagnosed with OA in various joints, who underwent magnetic resonance imaging (MRI) of their knees. The MRIs were analyzed for multiple OA-related anomalies, and each patient was questioned about pain and stiffness in the imaged knee. The

relationship between imaging findings and clinical characteristics of OA was determined using odds ratios (ORs) with 99% confidence intervals (CIs). The results showed that a large joint effusion was significantly associated with both pain (OR, 9.99; 99% CI: 1.28, 149) and stiffness (OR, 4.67; 99% CI: 1.26, 26.1). Additionally, pain was linked with osteophyte presence in patellofemoral compartment (OR, 2.25; 99% CI: 1.06, 4.77). Other imaging findings, such as bone marrow edema, subchondral cysts, cartilaginous abnormalities, meniscal tears, meniscal subluxation and Baker cysts, showed no association with symptoms. These suggest that only two specific structural abnormalities identified on MRIs are associated to clinical symptoms in knee OA patients (41).

In a study conducted in USA with the objective to assess linkage of structural abnormalities and clinical features using magnetic resonance imaging (MRI) in knee OA patients. Study design was observational with the non-probability sample technique. The sample size was 205 with gender distribution of 42(20%) men and 163(80%) women. Mean age was found to be 60 years with the range of (43-77 years). This study concluded that only two MRI findings were in concordance with the clinical features of osteoarthritis , joint effusion in correlation with knee pain(OR,9.99; 99%CI: 1.28,149) and stiffness(OR,4.67;99% CI:1.26,26.1) while patellofemoral osteophyte was related to knee pain (OR,2.25;99%CI: 1.06,4.77) only (42). Although osteoarthritis (OA) of patellofemoral joint is frequently linked to pain and impairment, there is currently no distinction made between OA of the patellofemoral and tibiofemoral joints in the categorization criteria. Objective of the research was to evaluate possibility of reliable clinical diagnosis in community and to present empirical evidence of clinical characteristics of PFJOA. A cross-sectional analysis of 745 persons with knee pain who were 50 years of age or older was conducted as part of this study. Participants were divided into four (on radiographic OA, isolated PFJOA, isolated tibiofemoral joint OA, and combined patellofemoral/tibiofemoral joint OA) based on two different cut-offs: "any OA" and "moderate to severe OA" based on three radiographic views of the knee (weight-bearing semi-flexed posteroanterior, supine skyline, and lateral). Comparing the clinical characteristics of each subset and their capacity to distinguish PFJOA from other subsets was done using binary logistic and multinomial regression models.

Moderate to severe isolated PFJOA is characterized by noticeable pain, valgus deformity, swelling and significantly weakened quadriceps upon compression of patellofemoral joint. In

contrast, mild PFJOA is often indistinguishable from cases with no radiographic osteoarthritis (AUC 0.71, 95% CI 0.66, 0.76), with only slight difficulties in descending stairs and coarse crepitus providing minimal additional information beyond age, sex, and BMI. Key knee osteoarthritis signs such as effusion, bony enlargement, limited flexion, varus deformity and mediolateral instability typically indicate tibiofemoral joint OA. Early isolated PFJOA presents with self-reported functional limitations and symptoms but lacks distinct clinical signs. Advanced PFJOA can be identified through a few simple signs and the absence of typical knee OA symptoms, that are primarily associated with tibiofemoral joint OA. However, diagnosing even advanced PFJOA in community settings remains challenging. (43).

A research study was undertaken in America in year 2012. Objective of the study was to report clinical manifestation of patellofemoral arthritis. Sample size was 745 with gender distribution of 335(45%) men, 410(55%) women. The study design took an observational approach with the non-probability sampling technique. Mean age was 65.2 (± 8.6). Pain, slow swelling, decreased strength of quadriceps and valgus deformity on patellofemoral joint compression were identified to be the clinical manifestations of moderate to severe patellofemoral joint arthritis, while early diagnosed PFJOA had the similar manifestations as the non-radiographic OA supported by the values of (AUC 0.71, 95% CI 0.66, 0.76) which were difficulty in descending stairs and coarse crepitus. The clinical signs for the tibiofemoral and the classic knee osteoarthritis were presence of effusions, bony enlargement, Medio lateral instability, varus deformity and decreased flexion range of movement (44). KOA is prevalent disorder which increases with age, presenting challenges in clinical management due to the complex relationship between anatomical findings and clinical symptoms, particularly in older adults where research is limited. A cross-sectional study was conducted over six months, comparing characteristics of knee osteoarthritis in two groups: patients over 65 years (Group 1, n=56) and those under 65 (Group 2, n=56). Group 1 had an average age of 71 years with a predominance of female participants. They reported knee pain lasting an average of 8.4 years, bilateral in 82.6% and primarily mechanical in 94.6%. The average pain intensity was 65.2 mm on a visual analog scale. Axial lower limb deviation was observed in 60.7% and knee mobility was limited in 48.2%. The mean Lequesne index was 11.02 ± 4.8 , and 37.5% reported no limitation in walking distance. Comparative analysis revealed several distinctions in elderly patients compared to younger ones: they had smaller waist circumference ($p=0.003$), longer duration of knee pain ($p<0.0001$), more widespread pain

distribution ($p=0.004$), greater limitation in walking distance ($p<0.0001$), increased axial deviation ($p<0.0001$), and more frequent knee mobility limitations ($p=0.005$). Resting knee pain was more common among the elderly ($p=0.001$). Elderly patients also exhibited more advanced functional impairment ($p=0.001$) and radiographic evidence of joint damage ($p=0.02$). These findings underscore that knee osteoarthritis manifests more severely in elderly patients, affecting various anatomical aspects and significantly impacting daily functioning (45).

A study was conducted in Tunisia in the year 2017 with the objective to present extent of function impairment, radiographical details and epidemio-clinical profile of knee osteoarthritis in the elderly patients as opposed to patients aged less than 65. The study design was cross-sectional with non-probability sampling technique. The sample size was 112 patients divided into two groups, group 1 included patients over 65 years and group 2 below 65 years, each with 56 patients. The mean age of group 1 was 71 ± 5 . The main clinical complications observed in group 1 patients were pain (65.2%), axial deviation of lower limb (60.7%), limited walking distance in (62.5%) and limited knee mobility (48.2%) with mean Lequesne index of 11.02 ± 4.8 . This study concludes that elderly patients experienced significant knee osteoarthritis severity as they had smaller waist size ($p=0.001$), long course of gonalgia ($p<0.0001$), widespread site of pain (0.004), limited joint mobility ($p=0.005$), recurrent resting gonalgia ($p=0.001$), impaired functioning ($p=0.001$) and progressive radiographic damaged ($p=0.02$) (46).

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