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Osteoarthritis (OA)

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Smith, Ashley, "Osteoarthritis (OA)" (2022). *Nursing Student Class Projects (Formerly MSN)*. 522.
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Osteoarthritis (OA)

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Signs & Symptoms

- Joint pain:** usually starts sharp, as OA progresses becomes dull and achy
- Stiffness:** worse in the AM or after prolonged inactivity
- Joint or bone inflammation**
- Reduced range of motion:** joint impairment, typically reported as joint inflexibility
- Tenderness:** to area around inflamed joint
- Synovitis:** can develop as OA progresses

Risk Factors

- Increasing age:** most common risk factor for OA
- Gender:** female sex
- Race:** African-Americans, especially in symptomatic hip and knee OA
- Obesity:** poor dietary choices, inactivity, lifestyle
- Injury:** sports or occupational risks, history of trauma to joint; frequent squatting motions or overuse of joint
- Joint/Bone instability:** muscle and/or joint and bone weakness
- Genetic predisposition**
- Bone deformities**

Underlying Pathophysiology

- Osteoarthritis is simply explained by the degeneration of the protective cartilage in the joint that cushions the end of bones ("Osteoarthritis," 2021)
- OA is characterized by cartilage erosion, synovial inflammation, and subchondral sclerosis with osteophyte formation (Yunus et al., 2020)
- OA is often referred to as the "wear and tear disease" ("Osteoarthritis," 2021)
- Early changes are seen in the region of articular cartilage surface that carries the heaviest workload (Yunus et al., 2020)
- Cartilage is a unique tissue that is made up of extracellular matrix that consists of primarily collagen and proteoglycans ("Osteoarthritis: Pathophysiology," 2019)
- Chondrocytes proliferate rapidly when losing matrix and many become hypertrophic (Yunus et al., 2020)
- As OA progresses, increased degradation and matrix loss due to cytokines, proteases and chondrocyte apoptosis (Yunus et al., 2020)
- OA further progresses, bone changes with osteophyte formations and bone cysts (Yunus et al., 2020)
- Symptomatic OA presents with synovial inflammation and hypertrophy contributing to the progression of pain (Yunus et al., 2020)
 - OA is now considered a disease of the whole joint; recent studies have shown pain is associated with alterations of peripheral and central nerve sensitization, bone marrow lesions and synovitis as well (O'Neill & Felson, 2018)

Left: An example of Kellgren-Lawrence (KL) OA grading scale of knee joint.

Significance of Pathophysiology

Understanding the underlying pathophysiology for OA, including the inflammation process, is a necessary step to slowing the progression of this degenerative joint disorder and managing its effects throughout the patient's life. OA is commonly encountered in an outpatient pain management setting, and the prevalence and cost of care for OA has only continued to increase in the last century (Johnson et al., 2021) As a practicing family nurse practitioner, it will be key to identify early risk factors, signs and symptoms and use that in combination with the understanding of pathophysiology of OA to manage prevention and treatment while providing effective education to OA patients.

Vitamin D/Dietary Fiber

- It has been hypothesized that vitamin D deficiency is associated with a higher risk of development of OA (Vina & Kwoh, 2018)
- Vitamin D plays a key role in cartilage and bone metabolism (Vina & Kwoh, 2018)
- In a case study referenced in Vina & Kwoh (2018) vitamin D3 supplementation did not reduce joint space narrowing; however, after 2 years, effusion synovitis remained stable in OA patients receiving vitamin D3 and had progressively increased in the placebo group
- Two cohort studies included in Vina & Kwoh (2018) noted the significance of higher total dietary fiber intake in relation to less knee pain associated with OA

"The future depends on what you do today." -Mahatma Gandhi

Introduction

Osteoarthritis (OA) affects an estimated 240 million people worldwide, with symptoms such as pain, inflammation, decreased range of motion and reduced ability to complete activities of daily living (Katz et al., 2021). OA can affect all small, medium or large joints, but will most often present symptoms in the knee. The knee is the largest synovial joint in the human body and is at the highest risk for OA development due to its frequent use and high stress load it carries for the body (Jang et al., 2021).

OA is a leading cause of significant disability in daily living, and it not only physically limits people, but it has also shown correlations with increased mental illness (Vina et al., 2018). OA, specifically lower limb OA, has been associated with higher rates of suicidal ideation, depressive symptoms, mood impairment, and memory loss due to lack of sleep. OA is debilitating, painful and can be expensive to manage and treat.



(Belleza, 2021)

Testing & Diagnosis

- Upon assessment and diagnosis, it is important to gather full patient history and thorough physical exam (Katz et al., 2021)
- There is no single lab or diagnostic test to diagnose OA, the primary goal is to differentiate between OA and other forms of arthritis (Katz et al., 2021)
- Physical assessment:**
 - Decreased range of joint motion
 - Creptus
 - AM stiffness and pain that improves within 30 minutes of waking
 - Patient complaint of bony joint enlargement
 - Joint swelling, tenderness, redness
- Symptoms of OA and pathological features can present despite normal radiographic images (Katz et al., 2021)
- Diagnosis:**
 - X-ray imaging:** will not show cartilage changes, but can show joint space narrowing and osteophytes ("Osteoarthritis," 2021)
 - MRI imaging:** seldom indicated, but maybe used to rule out fractures, tumor, or infection (Katz et al., 2021)
 - Lab testing:** Synovial fluid analysis and blood tests that rule out other causes of pain, such as rheumatoid arthritis or infection ("Osteoarthritis," 2021)

Treatment	OARSI	ACR	AAOS
Exercise (Land-based)	Appropriate	Strong recommendation	Strong recommendation
Exercise (Water-based)	Appropriate	Strong recommendation	Strong recommendation
Transcutaneous electrical nerve stimulation	Uncertain	Strong recommendation against use	Inconclusive
Cane (Walking stick)	Appropriate	Strong recommendation	
Weight control	Appropriate	Strong recommendation	Moderate recommendation
Chondroitin or Glucosamine	Not appropriate for disease modification, Uncertain (6x relief)	Strong recommendation against use	Recommendation against use
Acetaminophen	Without comorbidities: appropriate	Conditional recommendation	Inconclusive
Duloxetine	Appropriate	Conditional recommendation	No recommendation
Oral NSAIDs	Without comorbidities: appropriate; With comorbidities: Uncertain	Strong recommendation	Strong recommendation
Topical NSAIDs	Appropriate	Conditional recommendation against use	Strong recommendation
Opioids	Uncertain	No recommendation	Recommended (only tramadol)
Intra-articular corticosteroids	Appropriate	Strong recommendation	Inconclusive
Intra-articular viscosupplementation	Uncertain	Conditional recommendation against use	Recommendation against use

(Jang et al., 2021)

Above: Recommended management of Osteoarthritis from three societies Abbreviations: OARSI, Osteoarthritis Research Society International; ACR, American College of Rheumatology; AAOS, American Academy of Orthopedic Surgeons, NSAIDs, non-steroidal anti-inflammatory drugs

Implications for Nursing Care

- Patients should be educated early on about many preventative measures that could help reduce the effects of OA, including:
 - Weight loss and weight management programs
 - Structured exercise programs that focus on strengthening upper and lower extremity muscles, this leads to improved pain and function (Katz et al., 2021)
 - Referral to physical and occupational therapy programs can improve muscle weakness and limitations in joint range of motion (Katz et al., 2021)
 - Setting realistic expectations for pain management is an important factor. Overall, it has been argued in many studies that opioids do not demonstrate any advantage over nonopioid treatment (Krebs et al., 2018)

Conclusion

OA is a multifactorial, chronic, degenerative joint disorder that should be managed with preventative measures and symptomatic treatment. Patients should be educated early on about the importance of body movement, strength training programs, healthy nutrition, weight management, and vitamin supplementation to slow the progression of OA, especially in patients with a family history. A variety of treatment options, from NSAIDs to viscosupplementation injections, are available and research is ever-evolving to cellular therapy and gene therapy treatment. The goal is to manage the effects of OA and optimize quality of life for all patients.

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