



ORIGINAL RESEARCH PAPER

Medicine

SYSTEMIC REVIEW OF OSTEOARTHRITIS KNEE

KEY WORDS: Osteoarthritis, Physiotherapy, Exercises.

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ABSTRACT

Osteoarthritis is the most common form of joint disease and its impact is set to grow as the prevalence of obesity rises and our elderly population increases. Many clinicians regard osteoarthritis as being simply a disease of wear and tear and by implication one in which disease modification is not possible. It is a chronic genetic disorder characterized by cartilage loss. It is extremely prevalent in society and is a major cause of disability.

1. INTRODUCTION:

The most common cause of Knee pain is knee arthritis. Osteoarthritis of the knee takes several years to develop and it progresses in stages. While age is a major risk factor for Osteoarthritis of the knee. Some young people can suffer it. In some individuals, it may be hereditary and develop after injury or infection or even from being overweight. Osteoarthritis, commonly also known as wear and tear arthritis. It is a condition in which the natural cushioning between joints cartilage wears away. The bones of joints rub more closely against one another with less shock – absorbing benefit of cartilage. The rubbing of cartilage results in pain, swelling, stiffness, decreased ability to move and some time, the formation of bone spurs. Osteoarthritis can occur even in young people. The chance of developing Osteoarthritis rises after 45 years of age and older. It is a degenerative wear and tear type of arthritis. In Osteoarthritis cartilage becomes frayed and rough, and the protective space between the bones decreases. This can result in bone rubbing on bone, and produce painful bone spurs in long time. Cartilage is a slippery tissue that provides a smooth surface for joint motion and acts as a cushion between the bones. Synovium is soft, and it lines the joints. It produces fluids, called synovial fluid, for lubrication, and it supplies nutrients and oxygen to the cartilage. There is no cure for Osteoarthritis of the knee, but treatment can help relieve discomfort and slow the damage. It can improve your quality of life and keep up with your day – today activities.

2. Epidemiology: Osteoarthritis is the most common disease of the joints worldwide, with the knee being most commonly affected joint in the body. It mainly affects people over the age of 45 years. It can lead to pain and loss of function, but is not correlated with the findings of Knee radiograph. Study shows, only about 15% of the patients with positive radiographic findings of osteoarthritis knee are symptomatic. It affects nearly 6% of all adults; women are more commonly affected than men. Roughly 13% of women and 10% of men 60 years and older have symptomatic knee osteoarthritis, along those older than 70 years of age, the prevalence rises to as high as 40%. Prevalence will continue to increase as life expectancy and obesity rises.

3. Etiology: Knee Osteoarthritis is classified as either primary or secondary, depending upon its cause. Primary Osteoarthritis is a result of degeneration of articular cartilage without any known reason. It is typically thought of as a degeneration due to as well as wear and tear. Secondary Osteoarthritis knee is the result of degeneration of articular cartilage with or without known reasons. Possible causes of secondary Osteoarthritis knee are obesity, joint hyper

mobility or instability, mal-positioning of joint e.g. Valgus/varus posture, previous injury to the joints e.g. fracture along articular surface, congenital defects, immobilization and loss of mobility, family history and metabolic causes e.g. rickets.

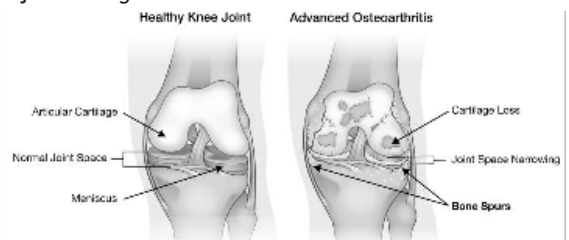
4. Pathological process:

The process of osteoarthritis affects the articular cartilage mainly type 2nd that covers the articular surface of bone. Articular cartilage is normally maintained in a healthy equilibrium of chemical reactions. When Osteoarthritis starts to develop, the reactions are disrupted, leading to changes in the collagen of the cartilage. Disruption in the equilibrium which results in the disorganized pattern of collagen and loss of articular cartilage elasticity. This results in cracking and fissuring of the cartilage which leads to reasons of the articular surface. Cartilage that has been damaged cannot recover. Cartilage will continue to wear away. Once the cartilage has worn away, the bony surface will start to be affected. The bone will expand and spurs (osteophytes) will develop later on.

5. Clinical Presentation:

i. Sign of Knee Osteoarthritis are:

- Pain on movement
- Stiffness, particularly early morning stiffness.
- Loss of range of movement
- Pain after prolonged sitting or laying
- Pain on joint line palpations
- Joint enlargement



ii. Symptoms of Knee Osteoarthritis are:-

- Joint becomes stiff and swollen, making it difficult to bend and straighten the knee.
- Pain and swelling may be worse in the morning or after sitting or resting.
- Vigorous activity may cause pain to flare up.
- Loss of fragments of cartilage and other tissue can interfere with the smooth motion of joints.
- The knee may 'lock' or 'stick' during movement. It may creak, click, snap or make a grinding noise (crepitus)
- Pain may cause a feeling of weakness or buckling in the

knee.

- Many people with arthritis note increased joint pain with rainy weather.
- The skin over the knee may become red and warm.

6. Causes of Osteoarthritis knee.

- **Age-** The ability of cartilage to heal decreases as a person gets older.
- **Weight/obesity-** weight increase the pressure on the joint especially, on the knee. Every pound of weight you gain adds 3 to 4 pounds of extra weight on your knees.
- **Heredity:** - This includes genetic mutations that might make a person more likely to develop osteoarthritis knee. It may also be due to inherited abnormalities in the shape of bone or knee joint surrounding's.
- **Gender-** women ages 55 and older are more likely than men to develop osteoarthritis of knee.
- **Joints stress and chronic injuries-** These are usually a result of job or occupations activity that can stress the joint, such as kneeling, squatting, or lifting heavy weight. (55 pounds or more)
- **Athletics** - Athletes involved in soccer, tennis, or long distance running may be at high risk for developing osteoarthritis of knee. Athletes should take extra precautions to avoid injuring. Regular moderate muscle exercise is important to strengthens the joint and can diereses the risk of osteoarthritis. In fact, weak muscle around the knee can lead to osteoarthritis.
- **Other illness-** Rheumatoid arthritis is the second most common type of arthritis, most likely, to develop osteoarthritis. People with certain metabolic disorders also run high risk osteoarthritis.
- **Lock of Exercises-** muscle movement facilitates the circulation of joint fluid throughout the knee Joint.
- **Poor muscles Tone-** When hamstring, quadriceps and calf muscles, are weak, more stress is put on the Knee cartilages. This stress can load to knee osteoarthritis
- **Sex:-** Women are about 40% more likely than men to develop osteoarthritis in the knee.

7. Diagnosis

i. By physical examination: During physical examination doctor will look for

- Joint swelling, warmth or redness
- Tenderness about the knee
- Range of passive or active motion
- Instability of the joint
- Crepitus with movement
- Pain when weight is placed on the knee
- Problem with gait on walking
- Any sign of injury to the muscles, tenderness and ligaments surrounding the knee.
- Involvement of other joint (i.e. indication of rheumatoid arthritis)

ii. By imaging test:

- X-ray- x-ray of an arthritic knee may show a narrowing of the joint space, changes in the bone and the formation of bone spurs (osteophytes).
- Magnetic resonance imaging (MRI): MRI scans may be prescribed when x-rays do not give a clear reason for joint pain.
- Computed tomography (CT) scan: Determine the condition of bone and joint tissue in the knee joint.
- Bone – Scan:- Determine the bone condition and density.

iii. Laboratory tests: There is no single test to diagnose knee osteoarthritis, lab tests can be helpful to rule out other problem, such as infection/gout/rheumatoid and arthrocentesis (Joint aspiration). A doctor is trained to consider all the possible causes of the knee pain ranging from a maniscal tear to rheumatoid arthritis during diagnostic process.

8. Radiographic Finding of osteoarthritis -

- Joint space narrowing.
- Osteophyte formation.
- Subchondral Sclerosis.
- Subchondral Cysts.
- Early stage shows minimal unequal Joint space narrowing.
- In severe stage of osteoarthritis shows complete disappear of joint line.

9. Stages of osteoarthritis Knee-

i. Stage 1

- No apparent narrowing in joint space.
- Slight damage to the cartilage.
- Osteophyte may grow in the Knee area.
- Unlikely to feel pain or experience discomfort.
- Joint will appear normal on x-ray.

ii. Stage-2

- The space between the bones will still appear normal but the area where the bones and the tissue meet will be harden.
- Cartilage will begin to thin
- More osteophytes growth shown in knee joint of stiffens and joint pain
- Person may start to notice the symptoms joint of stiffens and joint pain and doctor can see some sign of wear.

iii. Stage-3

- X-rays show narrowing in joint space and cartilage loss. The damage to the cartilage has progressed.
- Pain and discomfort may occur while performing daily activities, such as running, walking, kneeling and banding. There may be early sign of joint inflammation.
- Cartilage will continue to thin and break down.
- The tissue that lines the Joint will become inflamed and it may produce extra synovial fluid, resulting in increased swelling. This is called synovitis, and it commonly known as water on the knee.

iv. Stage-4

- The symptoms are very visible, the space between bones in joint has continued to narrow, cartilage to break down further.
- Stiffness in the joint, constant inflammation, and less fluid around the joint.
- More significant pain and discomfort while moving.
- X- Ray will show bone to bone meaning that either cartilage completely worn away or there is very little left.
- The patient will develop more bone lumps and experience more pain that is often intense during simple activity or walking.
- In severe cases, bones may become deformed and angulated due to asymmetric loss of cartilage.
- At this stage, surgical treatment is often the only option.

10. Treatment/Management

Treatment of knee O.A can be (A) conservative treatment (B) surgical treatment

(A) Conservative Treatment

I. Patient education and physiotherapy: Quadriceps drill and home expertise programme should be demonstrated for at least 6 months continuously. Strengthening the muscles around the knee, makes the joint more stable and decreases joint pain. Stretching exercises help to keep the knee joint mobile and flexible. Therapist can help the patient to prepare a suitable programme for home care exercise.

II. Occupational therapy: An occupational therapist can help the patient to discover the way to do everyday task without putting extra stress on painful joint.

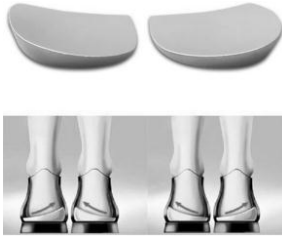
III. Regular Exercises: Exercises are playing a crucial role in osteoarthritis. It can help by building up muscles strength, muscles support and reduce stress and stay mobile. Some aerobic exercises are very useful including cycling, walking,

swimming or other water aerobics, yoga and stretching and balancing exercises.

IV. Using Devices such as Braces: there are two types of braces (a) unloader braces- which takes the weight away from the side of the knee affected by arthritis (b) Support brace- which provide the support for the entire knee.

V. Maintain the healthy weight- Losing weight can reduce the strain on your joints. Weight loss may also help to reduce inflammation and the risk of other health issues, such as high blood pressure type 2 diabetes and cardiovascular disease. Plan to lose weight and what kind of diet can help you, better managed by a dietitian.

VI. Transcutaneous electrical nerve stimulation (TENS): this uses a low voltage electrical current to relieve pain. It provides short term relief for the patients.



VII. Appropriate footwear and Shoe inserts: patient is advised to bear the appropriate, selected and designed shoes. Body weight pressure over knee joint is transferred with the help of lateral Medical or posterior heel wedge correction. This wedges correction in the sole of shoes play a role to change the axis of weight on the joint. Shoe inserts are play a role in weak joints or in foot drop cases.

VIII. Alternative Therapies: Other non-medical therapies may help to manage osteoarthritis of knee these includes-

- Stress management activities such as yoga.
- Acupuncture
- Heat and cold packs for relieving pain and inflammation.
- Cognitive behavioral therapy which can help to manage the pain, discomfort and stress of living with a chronic condition.

IX. Medications for pain and inflammation- Several types of drugs are useful in treating arthritis of knee because patient responds differently to medications. The first line treatment for all patient after physio therapy is pharmacological management

- **Non steroidal anti-inflammatory drugs (NSAIDS):** such as ibuprofen, naproxen sodium.
- **Acetaminophen:** it reduce mild to moderate pain in osteoarthritis. It is also use if patient cannot tolerate NSAIDS.
- **Cox 2 inhibitors:** As celecoxib, meloxicam, etoricoxib etc.
- **Tropical preparation:** That contains NSAIDS or capsaicin in gel or jelly from.
- **Glucosamine and Chondroitin Sulphate:** Are available as dietary supplements. These are structural components of articular cartilage and the thought is that a supplement will aid in the health of articular cartilage no strong evidence exists that these supplements are beneficial in knee osteoarthritis.
- **Omega 3 fatty acids-** Relive pain and improve function of the joint.

X. Intra Articular Injections:-

(a) Injection of corticosteroids: are powerful anti inflammatory agents that can be injected in to the joints. It reduces the pains and inflammation. Patient may take three or four injection per year after the recommendation of the doctor. Repeated injections may lead the joint damage or injection over an extended period of time.

(b) Hyaluronic Acid Injections:- Provide lubrication to the joint and reduce joint friction. It also relief some pain providing some cushioning effect in knee joint. Hyaluronic

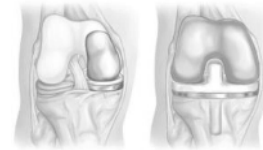
Acid in similar to a component normally found in the joint fluid.

B. Surgical Treatment: If joint pain becomes severe and therapies do not help than surgical option are open for treating the osteoarthritis knee.

I. Arthroscopic Surgery:- It is a minimally invasive procedure. It is performed by an arthroscope which is useful to remove osteophytes, degenerative meniscal tear and debris. It can also repair an injury or clean out debris (such as bone fragments, meniscal, ligaments and damaged cartilage). The procedure is often used on younger patient, age 55 and younger, surgeon can remove damaged cartilage or loose particles clean the bone surface and repair all type of tissue if those damaged in the joints.

II. Osteotomy: Is a procedure that aims to make the knee alignment better by changing the shape of bone. In the knee osteotomy either the tibia or femur is cut and then reshaped to relive pressure on the knee joint. Knee osteotomy is used in early stage osteoarthritis that has damaged just one side of the knee joint. An osteotomy is not permanent and further surgery may be necessary later on after some years.

III. Arthroplasty (total or partial knee replacement): Surgeon removes damaged joint surface and replace them with plastic and parts or metal prosthesis device. Recovery from surgery may take reversal weeks and require patience and discipline with continuous physical occupational therapy to regain full mobility. Today's modern advancement, most new joints will last over 20 years. Surgical risk includes infections and blood clots. Artificial joint can wear out or come loose and may need to eventually be replaced.



IV. Stem cell therapy: In this treatment, use bone marrow stem cells from the hip bone to help regenerate cartilage tissue in the knee. Stem cell therapy can help to reduce knee pain and improve function but if does not appear to result in cartilage regrowth. In this therapy taking a small amount of blood, usually from the arm, concentrating the stem cells together and injecting the stem cells back into the knee. Stem cell therapy aims to slow and repair damaged cartilage, decrease inflammation and reduce pain, possible delay or prevent the need for knee replacement surgery.

11. Prevention: A number of factor may put a person at risk of development osteoarthritis of knee. Making some changes may not prevent the condition, but a person may be able to reduce their or keep osteoarthritis from advancing. Maintaining a healthy weight, controlling blood sugar and exercising regularly reduce the risk of injury, undergoing in posture and bone alignment tests avoiding over use.

12. Walking aid and support:- device that may help include-

- A walking cone which can help with balance.
- Knee brace- support the knee joint
- Knee frame- Support knee joint on standing and walking.
- Knee shocks- To reduce the inflammation and pain.
- Tripod and bipod sticks- For better support and balance.



13. Risk factors- includes-

- Increasing age
- Obesity
- Previous joint injuries
- Over use of joints
- Weak thigh muscles.
- Genetic factor and associated studies include UDR, AGC1, IGF-1, ER-alpha, CRTN and Collegen II, IX, X.

14. Conclusions- osteoarthritis knee is best managed by conservative management. Osteoarthritis has no cure and thus attempts should be made to prevent the progression of the disease. Treatment begins with conservative methods and progresses to surgical treatment options when conservation treatment fails. A multi disciplinary team approach should be taken to promote healthy life style and control pain i.e. physiotherapists, dietitian, pharmacist and orthopedic specialists.

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