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Review Article

Osteoarthritis with its Physiotherapeutic Management

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Abstract

Osteoarthritis is the most common type of arthritis; it is a multi-factorial progressive and non-inflammatory degenerative disease of synovial joint. Degenerative changes led to irreversible destruction of articular cartilage and other tissue of joint. Inter-phalanges joint of finger and carpometacarpal joint of thumb, knee and hip joints are most commonly affected. There is unilateral involvement of joints , complaint of pain, loss of mobility, morning stiffness and decrease range of motion. The exact cause of osteoarthritis is unknown however current evidence says that major risk factor of Osteoarthritis are age, sex, races, genetic factor, joint trauma and occupation related stress over joint etc. On the basis of risk factor, it can be primary and secondary Osteoarthritis. Pharmacological treatment mostly steroids and NSAID (Non-Steroidal anti-inflammatory Drugs) drugs that provide symptomatic relieve from pain and inflammation next DMOADS (disease modifying Osteoarthritis drugs) are under develop and aim to modify the underline osteoarthritis to prevent long term disability. Surgical intervention may required for advanced stage of Osteoarthritis when pain is unbearable and disability pause the Activities of daily living(ADL). Physiotherapeutic management includes exercise therapy, electro-therapy along with electric modality, aqua therapy, agility and perturbation training, balance and proprioception.

Keywords: Osteoarthritis; Rheumatoid Arthritis; Crepitus; Heberden's Node; Bouchard's Node; Aquatic Therapy; Tai Chi

Abbreviation

OA: Osteoarthritis; IPJ: Inter-phalangeal Joint; ADL: Activities of Daily Living; MCPJ: Metacarpophalangeal Joint; DMOADS: Disease Modifying Osteoarthritis Drugs; NSAID: Non-steroidal Anti-Inflammatory Drugs; ROM: Range of Motion

Introduction

Osteoarthritis (OA) is a multi-causative degenerative disorder, with progression, and initially non-inflammatory degeneration of the synovial joints that is almost age related and/or trauma induced. It is most predominant types of arthritis in the world. It is a group of overlapping pronounce disease, which may have different etiology but with analogues biologic outcomes. Degenerative processes inevitably lead to the irreversible destruction of the articular cartilage and other tissues of the joints. According to "National Institute of Arthritis and Musculoskeletal and Skin Diseases (April 2015); most commonly affected joints are weight-bearing joints (hips and knee) the cervical and lumbar spine and the distal interphalangeal joints of the fingers and carpometacarpal joint of thumb. Since it is the communal musculoskeletal condition

worldwide that led to marked health, economic, and social problems as it affects quality of work life and person well being [31,37].

Aetiology

Osteoarthritis has a multicomponent etiology yet the researchers are unable to extract exact cause for osteoarthritis. It affects people of all ages. Present evidence shows age related tear of articular cartilage and subchondral bone, overuse of joint, over loading and malalignment (varus/valgus) of the joint, genetic disorder, metabolic syndrome (Diabetes mellitus, Hyperparathyroidism, Acromegaly, Hyper-uremic), inflammatory response (post joint trauma), endocrine disorders etc. There are various risk factor which can .Make patients more prone to osteoarthritis. Such as female sex, post menopausal women, geographic factors, occupational knee bending, physical labour, vitamin D deficiency and Chondrocalcinosis [3,4,8,11,12,31,37,51,54,59].

Epidemiology

A survey done by "Global Rheumatoid Network 2021" shows more than 350 million people have arthritis globally. Centre of disease control and prevention (CDC), united states in 2020 produces a report which reflects " more than 60% of people who have arthritis are between age of 18 years to 64 years and more than 8million working adults face work limitation because of their arthritis or other rheumatic conditions.Osteoarthritis Action Alliance (OAAA) in 2020 gives a report on patient with arthritis "62% of people with osteoarthritis are female [9,47,54,61].

Clinical features

Osteoarthritis is a public health problem that will probably increase in future with the aging of population. Osteoarthritis patients had shown various degenerative changes due to degenerative changes of the joint. The key features are pain, limited or loss of range of motion, joint stiffness, joint swelling and muscle weakness [9,55].

Patients complaint mechanical type of pain, which initiated by mobilization speed up with fatigue, the pain is typically aggravated by prolonged activity and relieved by rest. Pain comes in the morning or a period of inactivity, the intensity of pain is variable some time it's dull and tolerable other times its very heavy with short peaks. There are broadly two types of pain in patient with osteoarthritis first is intermittent, which is sever it has greatest impact on quality of life specially when unpredictable episodes of pain triggered by an activity are the distinct characteristics while the other is constant pain or sling, which is particularly at night tends to occur in middle stage of osteoarthritis. Patient with advanced stage of osteoarthritis have more constant and unpredictable pain.

Limitation in movement is pretentious, crippling and will be captured after several years of onset of osteoarthritis, this restriction is mainly associated to the decrease the functioning of voluntary muscles and the reflex contracture of muscles surrounding the affected joints. It is also aftermath of changes in the articular spaces due to incongruity of joint surface.

Affected joints are stiff and felt tight when patients gets up in the morning, so called as morning stiffness. Its persistence can last from a few to 10 minutes rarely lasting up to 30minutes and can be alleviated by joint activity or other physical activity, but may come back with period of inactivity or prolonged straining of joints. Some patient having stiffness in morning which comes on, for longer period but less severe than the morning stiffness from Rheumatoid arthritis and Ankylosing spondylitis which lasts more than 30minutes , may lasts for an hour.

Joint affected with osteoarthritis sometimes may produce cracking, scraping and crepitating sound when joint is set for motion. The sounds which are heard or felt is called "crepitus". It may be due to discontinuity in the articulating joint surfaces and degenerative changes of remaining articular cartilage [15,23,24,43,44,59].

Osteophytes, osseous outgrowth, outburst in the periosteum at the junction between cartilage and bone. Which is surrounded by synovium in diarthrodial joints. There are broadly two types osteophytes first is Marginal osteophytes: spur begins with irregulation chondrogenesis involving the differentiation of chondrogenic cells that reside in the periosteum, whose outcome is in a cartilage like structure called a chondrophyte and second is Periarticluar osteophytes: osteophytic proliferation happens as the results of enhanced vascularity of the bone adjacent to the joint, including bone beneath articular cartilage and at the articular

margins Affected joint may get sell and enlarged, recorded as nodes.. Heberden's nodes (enlargment of the distal interphalangeal joint of the fingers) and Bouchard's node (enlargment of the proximal interphalangeal joints) are common as shown in Figure 1 [2,66].

Figure 1: Heberden's node.

In patients with osteoarthritis there is marked muscles weakness around affected joints mainly due severe pain, stiffness of joint and limited range of motion of affected joint , the loss of muscles strength of the affected joint and supporting muscles and impairment of the related soft tissue ended into uncoordinated movements with progression of osteoarthritis.

Diagnosis

According to recent clinical practice guidelines, clinical diagnosis is made on the basis of clinical findings yet in few cases in atypical presentation of sign and symptom, imaging tests are required to make clinical diagnosis certain [64].

X-ray techinques which is broadly available, cost effective and well cherished by patients or population. Imaging tests are floating rock persistently which is marked for producing an image based Osteoarthritis (OA) diagnosis. Win win., *et al.* 2018 Radiographs showcase features related to bone in Osteoarthritis (OA) like osteophytes at joint margin, sclerosis of subchondral site and cysts formation. Along with this there is marked space reduction between articulating bones of affected joints, irregularly broken cartilage, damaged meniscus and extrusion. Grading for what radiography showcased is given and still accepted with Kellgren and Lawrence grading system scoring which is as follow:

Grade Description

- 0 (none) definite absence of x-ray changes of osteoarthritis
- 1 (doubtful) doubtful joint space narrowing and possible osteophytic lipping
- 2 (minimal) definite osteophytes and possible joint space narrowing
- 3 (moderate) moderate multiple osteophytes, definite narrowing of joint space and some sclerosis and possible deformity of bone ends
- 4 (severe) large osteophytes, marked narrowing of joint space, severe sclerosis and definite deformity of bone ends [29,47,63].

Ultrasound imaging

Ultrasound imaging used in cases of osteoarthritis featured with inflammatory and structural abnormality. It is way more sensitive than x-ray techniques for locating osteophytes at tibiofemoral joint [50].

Computed tomography imaging

Computed tomography(CT) imaging used to investigate bone trabecular remodelling, subchondral cysts and bone sclerosis. It is more useful for detecting and quantifying associated tissue mineralization such as chondrocalcinosis [50].

Laboratory test

Synovial Fluid Examination: Arthrocentesis is the process by which synovial fluid collection occurs by penetrating the joint space through aspiration. This procedure should be done under sterile procedural conditions and performed by a physician with intimate knowledge of the involved anatomy. Sterility is essential not only to prevent transmission of infection but also to ensure accurate fluid analysis.

Inflammatory = gout, rheumatoid arthritis, rheumatic fever [19,52].

In the American college of rheumatology (ACR) Clinical/ Laboratory classification criteria, the presence of knee pain along with at least 5 of the following 9 items can classify the knee OA in the patients: age>50years, morning stiffness <30 minutes, crepitus

TYPE	WBC/mm^3	% Neutrophils	Viscosity	Appearance
Normal	<200	0	High	Transparent
O.A.	<5000	<25	High	Clear Yellow
Inflammatory	2,000- 50,000	50-80	Low	Cloudy Yellow

Table 1

on knee motion, bony tenderness, bony enlargement, no palpable warmth, ESR<40mm/hr, Rheumatoid arthritis<140 and synovial fluid compatible with Osteoarthritis [63].

Treatments available for managing osteoarthritis

Non-pharmacological measures, medication, and surgical procedures collectively are current conventional treatments. Apart from pharmacological treatment, non-pharmacologic interventions, manual therapy is widely used for osteoarthritis [40]

- Pharmacological Treatment: Osteoarthritis treatment has been mainly paused to steroidal or non steroidal anti-inflammatory drugs that provide symptomatic relief from pain and inflammation. Next-generation Osteoarthritis treatments, frequently called to as disease-modifying Osteoarthritis drugs (DMOADs), are processed to development and focus to modify the present Osteoarthritis pathophysiology and ease up the aimed to structural damage to prevent long-term disability. Although DMOADs are not yet available in the pharmaceutical market, several clinical trials are ongoing [7,20]
- Physiotherapeutic Management: According to the 2014 Osteoarthritis Research Society International (OARSI) recommendations, rehabilitation is even considered the core treatment of Osteoarthritis is recommended for all patients. Rehabilitation for Osteoarthritis widely contains land- and water-based exercise therapy, strength training, weight management, self-management and education, bio mechanical interventions, psychological counselling, diet plan, activity modification and participation in regular physical activities [40].

Electrotherapeutic treatment using modalities like-transcutaneous electrical nerve stimulation (TENS), Therapeutic ultrasound (UST), infrared radiation (IRR), and light amplification from stimulated emission of radiation (LASER) therapy are being used in conjunction with drug therapy and exercise therapy for improving symptoms clinically.

Along with electrotherapy treatment exercise therapy play an important role in supplementating pain free and unrestricted day to day activities. Strength or resistance training improvise muscles strength, physical function, and pain levels, various kinds of stretching like static dynamic or self assisted stretching like Jack Knife stretching helps to reduce stiffness level by modification of flexibility, to reduce joint tenderness while maintaining functional status and respiratory capacity aerobic training's are added. One study showed a reduction of 10–12% on the physical disability and the knee pain questionnaires by aerobic exercise. With prescribing proprioception and balance training there is marked decrease in unusual pressure on affected joints, incidence of injury and abnormal joint position sense and they stabilize joint and produce controlled and stable movement, normal loading response and evenly distribution of weight bearing for all joints. By exposing patient to activities that challenges affected joints stability and balance in a controlled manner during training or rehabilitation so that it can achieve adequate motor skills to protect joint from particularly harmful loads during functional activities also emphasize quick starting and stopping and direction changing movements this all done by prescribing agility and perturbation training in osteoarthritis rehabilitation protocol [1,2,16,18,22,30,32,36,39,45,46,49,51,57,58,60,62,67].

Conclusion

After reviewing many articles, the most recommendations centred to non-pharmacological treatment. The aim of rehabilitation is to emphasize the functional improvement and quality of life of patients. Prescribed exercise must follow a protocol tied with frequency, duration and intensity of given exercises which progress gradually with patient preference . It is interesting to conclude that light to moderate and/or some sort of impact full physical activity is set as cornerstone for improving arthritis, muscles strength, joint pain, disability, functional dependency in osteoarthritis patient.

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