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Role of Physiotherapy in Osteoarthritis of the Knee Joint: A Literature Review

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Abstract: **Knee Osteoarthritis (OA) is a degenerative joint disease seen most frequently in adults and characterized by pain and loss of function. Prevalence of OA increases with age and it is most frequently seen in individuals above 65. Osteoarthritis is defined as a non-inflammatory disease causing metabolic, structural, biochemical changes in articular cartilage and affecting subchondral bone, joint capsule, synovial membrane and muscle around joint. Consequently it causes pain limitation of joint movement, disability and a decrease in muscle strength which affects ability for sitting on the chair, standing, walking and climbing stairs. It can affect any joint in the body but involvement of the spine or weight bearing joint such as hip and knee may result in more disabling condition than in other parts of the body.**

Keywords**: Musculoskeletal, Maladaptive, Strengthening, Kinesio Tape, Therapeutic Ultrasound.**

1. INTRODUCTION

Knee Osteoarthritis (OA) is a degenerative and chronic disease of the knee joint resulting from damage to hyaline cartilage and is the most common type of arthritis. It is the most common musculoskeletal disease among individual older than 65 years[(1,2)]. It is highly prevalent in general population and is increasing in frequency with age[(4)]. Gender also influences the prevalence of OA. Isolated hand and knee OA are common in women, whereas the prevalence of hip is higher in men. It is characterized by pain, swelling, stiffness for less than 30 minutes, crepitus, bony enlargement, limitation of range of motion, instability and tenderness. The common physical impairment associated with knee OA are pain, decreased range of motion and quadriceps muscle weakness [(5)]. It can affect any joint in the body but involvement of the spine or weight bearing joint such as hip and knee may result in more disabling condition than in other parts of the body[(4)].

Two types of OA are recognized- primary and secondary.

- **Primary OA:** This occurs in a joint de novo. It occurs in old age, mainly in the weight bearing joints (knee and hip). In a generalized variety, the trapezio-metacarpal joint of the thumb and the distal inter-phalangeal joints of the fingers are also affected. Primary OA is commoner than secondary OA.
- **Secondary OA:** In this type, there is an underlying primary disease of the joint which leads to degeneration of the joint, often many years later. It may occur at any age after adolescence [(6)].

The Kellgren and Lawrence system is a common method of classifying the severity of Knee Osteoarthritis (OA) using five grades. This classification was proposed by Kellgren et al. in 1957 and later accepted by WHO in 1961.

In applying the system, the prevalence of chronic knee pain in a postal survey of 2000 Swedes aged 35-54 was 15%. Of these respondents, 1% showed radiographic knee OA, based on bilateral weight bearing plain films.

2. CLASSIFICATION

- **Grade 0**: no radiographic features of OA are present
- **Grade 1**: doubtful joint space narrowing (JSN) and possible osteophytic lipping

- **Grade 2**: definite osteophytes and possible JSN on anteroposterior weight-bearing radiograph
- **Grade 3**: multiple osteophytes, definite JSN, sclerosis, possible bony deformity
- **Grade 4**: large osteophytes, marked JSN, severe sclerosis and definite bony deformity [7]

3. MATERIAL AND METHODOLOGY

We searched on Google scholar, Pub-med for English language articles from 2009 to 2019 by using the searched terms Knee Osteoarthritis, Balance, Physiotherapy and Rehabilitation.

4. FINDINGS

The literature supports the effectiveness of Physiotherapy treatment on Osteoarthritis Knee. The finding suggests that various treatment techniques are available for the management of the Knee pain, muscle weakness and stiffness as well as improves gait pattern.

5. DISCUSSION

Knee Osteoarthritis is a degenerative disease and chronic disease of the knee joint resulting from the damage of the hyaline cartilage and the most common type of the arthritis and the most common musculoskeletal disease among individuals older than 65 years[1,2]. There are several interventions for the Osteoarthritis of the knee which are affective for the knee joint pain and stiffness. The benefits of regular and moderate exercise include reduced risks for some musculoskeletal disorders such as OA. Physical exercise can play a crucial role in the treatment of OA in optimizing both physical and mental health, enhancing energy, decreasing fatigue and improving sleep. OA include Knee kinesio taping, medial wedge insoles for the valgus knee OA, subtalar strapped lateral insoles for the varus knee OA, manual therapy, hydrokinesis therapy, walking aids, thermal agents and psychosocial interventions. Treatment of OA is based on a combination of treatment protocols, including physical therapy, medical therapy, exercise based therapy and even psychological counselling[8]. US therapy in knee OA both pain and joint function improved after 10 sessions of therapy spanning over 2 weeks with either the real US or the sham US. Patients receiving the actual US treatment showed statistically significant improvement in all pain measurements and 50 meter walking time. US therapy has been effective in the treatment of OA of the knee[9]. TENS to isokinetic exercise increases its effect on pain, disability, functional performance, muscle strength, QOL in patient with OA. Compared hyaluronic acid injection and TENS treatment in Knee OA and found them in effective in terms of QOL. TENS to hot pack and exercise treatment is superior to placebo in improving pain, disability and QOL in patients with knee OA[3]. Quadriceps muscle strengthening exercise is important for increasing of the muscles strengthening exercise improves the condition of the patient with OA knee significantly found in various studies. In a study, it was found that home based exercise program can be significantly reduce pain in OA knee joint. In our study, we also found that marked reduction of knee pain in exercise groups. Quadriceps weakness is common among patients with OA[10]. The results of meta-analysis revealed that the use of IFC can decrease pain in patients with knee OA after 4 weeks treatment. The use of IFC also led to a decrease in paracetamol intake when compared to sham IFC. Thus it can be recommended that the use of physical therapy agents in knee OA provided additional benefit in alleviating pain. In terms of physical function, IFC showed improvement of the WOMAC scores over a 4 week treatment in the studies of Atamaz (2012) and Gundog (2012). A systemic review of the physical interventions used in the treatment of knee OA done by Bjordal et al. done in 2007 concluded that for patients with X-ray grade 2-4 and pain intensity levels above 50mm on VAS, an intensive regimen of 2-4 weeks with TENS, electroacupunture and low level laser therapy seems to safely induce statistically significant and clinically relevant short-term pain relief. However, only 2 studies using IFC were included in the meta-analysis and were analyzed along with studied using with TENS[4]. We found that the anaerobic exercise protocol (6 exercises, stretching and strengthening the muscles around the knee joint) to other non-invasive techniques on knee OA relieves the pain and improves the function of the knee in short terms (3 months). The strengthening effect of exercises was significant. It should be considered because the exercise were continued during the first to third month while methods were no longer available. Also in the last follow up we observed that the effect of exercise lasted for a year. The lasting effect of 6 weeks strength training and electrical stimulation of the quadriceps are same after 14 weeks. The positive effect of quadriceps and hamstring muscles strengthening exercises to improve the symptoms in the short term in patients with knee OA[11]. Interferential therapy is widely used for pain control. Pain relief could be due to increased connective tissue permeability and non thermal effect, though less understood, it can cause increased cell membrane permeability thereby enhancing metabolic product transport. Also ultrasound is said to be increase tissue temperature by generating micro-massage and stimulating healing and provide extensibility of the sonated

tissue and repair of damaged tendons and soft tissues[12]. The strength of the hamstrings and quadriceps and the importance of strengthening exercises for both muscles in treatment of patients with knee OA. Subjects were divided into two groups. The first group received hot packs, TENS, strengthening exercise for the quadriceps and hamstring and stretching of hamstring. The second group received hot pack, TENS, strengthening exercises only for quadriceps muscle and stretching of the hamstring program of treatment lasted for 12weeks. OA knee affects the hamstring muscle more than the quadriceps muscle. The difference were more significant between pre and post intervention measures of WOMAC in the first group than in the second group, and there was also a more significant difference between pre and post intervention measures of muscle strength of the quadriceps first group than in the second group, due to muscle balance between the quadriceps and hamstring muscles[13]. In this review 17 articles are taken they gave the positive outcomes.

The results of the study showed that the some protocols well effective in reducing knee joint pain and joint stiffness in OA knee such as **Singh Sanjeev Kumar, et al. (2019)** showed that IFT with exercises has effective in treatment of OA knee in reducing pain and disability[14]. **Shahnawaz Anwer, et al. (2018)** showed that OMT provides short term benefits in reducing pain, improving function and physical performance in patients with knee OA[15]. **Pallab Das, Manas k Dan, (2017)** showed that IFT was superior to the other physical modality intervention in the treatment to reduce pain and to improve functional ability in knee OA[16]. **Paola Castrogiovanni, Angelo Di Giunta, et al. (2016)** showed that therapeutic knee Kinesio taping in association with a moderate adapted training is an effective method for the management of the pain and disability limitations in patients with knee Osteoarthritis[17]. **Parisa Nejati, Azizeh Fazinmehr, et al. (2015)** showed that adding exercise to other non invasive methods that routinely are used for the knee OA have boosting effect in relieving pain and improving knee function. A combination has the most effect on the knee OA. Exercise therapy can be recommended for patients with even severe arthritis as an effective method combined to other palliative methods in knee OA[18]. **Buenavente ML D, et al. (2014)** showed that IFC is effective in reducing pain and likewise decreasing paracetamol intake in patients with knee OA. It is best to combine IFC with exercise in managing pain, reducing intake of pain medication and improving function in patients with knee OA[4]. **Ahmed H AL-Johani, et al. (2014)** showed that strengthening of the hamstrings in addition to strengthening of the quadriceps was shown to be beneficial for improving subjective knee pain, range of motion and decreasing the limitation of patients with knee OA[19]. **Panel Michael A. et al. (2013)** showed that combines exercises and PCST can improve both physical and psychological outcomes in individuals with knee OA[20]. **Abul Kalam Azad, et al. (2011)** showed that muscle strengthening exercise is effective in treating the OA of the knee joints and thereby it reduces disability of the patients with OA knee[21]. **Md. A. Shakoor, et al. (2010)** showed that muscle strengthening exercise is found to have better effect when it is used in adjunct to NSAIDs in OA of the knee joint. Exercise may decrease the need of NSAIDs and thereby side effects of NSAIDs can be avoided[22]. **Firat Altay, et al. (2009)** showed that addition of TENS to hot pack and exercise program is more effective in decreasing knee pain and related disability and improve QOL in patients with knee OA[23]**. Ozgonenel L,et al. (2009)** showed that therapeutic US is a safe and effective treatment modality in pain relief and improvement of function in patients with knee OA[3].

TABLE 1.1: Studies conducted from 2009-2014

S.NO.	Author's Name	Year	Treatment of OA
1.	Ozgonenel L,et al.	2009	Ultrasound, A double blind trail of clinical effects of therapeutic ultrasound in knee osteoarthritis
2.	Gerald Gremion, MD,et al.	2009	Biomagnetic therapy vs Physiotherapy, effect of biomagnetic therapy versus Physiotherapy for treatment of knee osteoarthritis
3.	Firat Altay, et al.	2010	Transcutaneous electrical nerve stimulation, effect of TENS on pain, Disability, Quality of life and Depression in patients with knee osteoarthritis
4.	Md. A. Shakoor, et al.	2010	Quadriceps isometrics, effects of isometric quadriceps muscle strengthening exercise on chronic osteoarthritis of the knee
5.	Abul Kalam Azad, et al.	2011	Strengthening exercise, role of muscle strengthening exercise on osteoarthritis of the knee joint
6.	Robert A Bruce-Brand,et al.	2012	Resistance Training and Neuromuscular electrical stimulation, effects of home-based resistance training and neuromuscular electrical stimulation (NMES) in knee osteoarthritis

7.	Francis J Keefe, et al.	2013	Physical exercise and Pain coping skill training, Physiotherapist-delivered, combined exercise and pain coping skills training interventions for individuals with knee osteoarthritis; A pilot study
8.	ML D Buenavente, et al.	2014	Interferential current therapy, evidence on the effectiveness of interferential current therapy (IFC) in the treatment of knee osteoarthritis
9.	Ahmed H Al Johani, PT, et al.	2014	Strengthening exercise, comparative study on hamstring and quadriceps strengthening treatments in the management of knee osteoarthritis
10.	Ciobotaru Camelia, et al.	2014	Ozone therapy, the role of ozone therapy in maintaining the articular function and in relieving the pain for patients with knee osteoarthritis

TABLE 1.2: Studies conducted from 2015-2019

S.NO.	Author's Name	Year	Treatment of OA
1.	Parisa Nejati, et al.	2015	Non aerobic exercises, the effect of exercise therapy on knee osteoarthritis; A randomized clinical trial (RCT)
2.	Claudia Guglielmino, et al.	2016	Kinesiotaping, the effect of exercise and Kinesio Tape on physical limitations in patients with knee osteoarthritis
3.	Pooja Attrey, et al.	2017	Transcutaneous electrical nerve stimulation, the effect of high or low frequency TENS in patients with knee OA
4.	Pallab Das, et al	2017	Ultrasound & Interferential therapy, comparative study of the effectiveness of therapeutic ultrasound v/s interferential therapy to reduce pain and improve functional ability in osteoarthritis of knee
5.	Ahmad Alghadir, et al.	2018	Orthopedic manual therapy, the effect of the orthopaedic manual therapy (OMT) in knee osteoarthritis: a systemic review and-meta-analysis
6.	Paul Devita, et al.	2018	Quadriceps strengthening exercise, Quadriceps-strengthening exercise and quadriceps and knee biomechanics during walking in knee Osteoarthritis
7.	Singh Sanjeev Kumar, et al.	2019	High voltage pulsed current vs Interferential therapy, comparison of the effect of high voltage pulsed current v/s Interferential therapy on pain and WOMAC in patients with knee osteoarthritis

6. CONCLUSION

For narrative review of different treatment for reduce knee joint pain and stiffness articles are collected from 2009-2019. There are 17 studies conducted in which different Physiotherapy interventions given to reduce pain and stiffness of knee joint. Muscle strengthening exercise is effective in treating the osteoarthritis of the knee joints and thereby it reduces disability of the patients with OA knee. Strengthening of the hamstring in addition to strengthening of the quadriceps was shown to be beneficial for improving subjective knee pain, range of motion and decreasing the limitation of functional performance of patients with knee osteoarthritis. Addition of TENS to Hot pack and exercise program is more effective in decreasing knee pain and related disability and improving QoL in patients with knee OA. Interferential current (IFC) is effective in reducing pain and likewise decreasing paracetamol intake in patients with knee OA. It is the best to combine IFC with exercise in managing pain, reducing intake of pain medication and improving function in patients with knee. TENS could be used in the management of pain at rest and during the functional tasks in the patients with knee OA. Physiotherapist plays an important role in improving gait pattern and quality of life of the Osteoarthritic patients.

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