

KNEE OSTEOARTHRITIS: A REVIEW

Dr Ajay Pant*

* Department of Medical,

Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, INDIA

Email id: drajay.pant@gmail.com

DOI: **10.5958/2249-7137.2021.02550.7**

ABSTRACT

Osteoarthritis of the knee is a common chronic joint condition that causes pain and impairment. Physiotherapy is a non-invasive treatment option for OA management that includes a variety of techniques. The evidence for widely used physiotherapy treatments is summarized in this study. Although the kind of exercise does not seem to affect treatment success, there is substantial evidence that exercise has short-term positive benefits on pain and function. Individual, group, and home exercise are all effective delivery modalities, but therapist interaction may enhance effects. To get the best long-term results, it is necessary to focus on increasing exercise adherence. Knee taping may help relieve discomfort by realigning the patella and unloading soft tissues. In individuals with knee OA, there is additional evidence to support the use of knee braces. Although biomechanical studies indicate that lateral wedge shoe insoles decrease knee stress, clinical trials have not shown that they help with symptoms. Individual shoe features have been shown to influence knee stress in recent research, and there is now a lot of interest in the impact of changed shoe designs. While manual therapy should not be utilized as a stand-alone treatment, it may be helpful. In conclusion, although the study is not conclusive, there is enough data to suggest that physiotherapy treatments may help people with knee OA decrease pain and enhance recovery.

KEYWORDS: Braces, Exercise, Knee, Osteoarthritis, Patellar Taping, Physiotherapy.

1. INTRODUCTION

Osteoarthritis is a kind of arthritis that mostly affects the knee. Pain, stiffness, edema, joint instability, and muscle weakness are all symptoms of OA, and they may all contribute to decreased physical productivity and a worse quality of life. Non-pharmacological therapies to alleviate symptoms are recommended, and physiotherapy treatments are increasingly recognized as essential in the multidisciplinary care of patients with knee OA(1–3). This article will summarize the evidence supporting the efficacy of various popular physiotherapy therapies in decreasing knee OA symptoms, including exercise, taping, bracing, insoles and shoes, and muscle relaxation. Even though some of the therapies may have the potential to delay the development of structural disease by affecting knee load, this is beyond the scope of this brief study.

1.1 Exercises:

Exercise treatment is considered as the cornerstone of conservative care and is recommended by clinical recommendations, given the vast body of data showing the positive therapeutic benefits of exercise in individuals with knee OA of different severity. Importantly, unlike medications and surgery, exercise has comparable effect sizes to basic analgesics and non-steroidal anti-inflammatory drugs, but with fewer contraindications and a wider range of benefits. Trials exploring a range of land-based therapeutic exercise regimens were found in a recent Cochrane review. A meta-analysis found that average treatment improvements for both knee pain and physical function were found(4–7). Although there is less solid evidence on the benefits of water exercise, another recent Cochrane review found a small-to-moderate impact on function and a small-to-moderate effect on quality of life. Muscle strength, neuromuscular control, functional mobility, joint stability, and fitness are all examples of physiological changes that may occur as a consequence of a good exercise program. Strengthening exercises are often advised. As a result of decreased physical activity and pain suppression, patients with knee OA have lower muscular strength. The quadriceps are the biggest set of muscles that span the knee joint and have the greatest ability to produce and absorb forces. In individuals with knee OA, several clinical trials have demonstrated consistent increases in knee extension strength as well as decreases in pain and physical impairment following training. However, no one strength-training technique has been shown to be better to others(8). Recent research has also emphasized the importance of hip muscle strengthening in the treatment of knee OA. The findings indicate that improving hip muscle strength may help with pain and function. This may be especially helpful if discomfort prevents you from doing certain knee workouts. Local mechanical factors such as knee malalignment may affect the symptomatic response to strength training, despite the fact that this has not been extensively researched. For individuals with knee OA, this emphasizes the need of individualized evaluation and treatment methods. Although a mix of strengthening, aerobic, and functional exercise is suggested, there is no evidence to support the efficacy of one kind of exercise over another at this time. Individualized therapies, supervised group courses, and at-home exercise are all options.

Although all three modalities of exercise delivery seem to be helpful in decreasing symptoms^{7,18}, therapist interaction may enhance results. The frequency and length of a workout regimen are other factors to consider. Most exercise recommendations indicate that a physiological response may be achieved with as little as three exercise sessions per week, and exercise programs in people with knee OA have shown to alleviate symptoms in as little as three weeks. The ideal exercise dose, on the other hand, has yet to be established and should be tailored to each patient. Exercise adherence is typically excellent in the first few months after starting an exercise program, but it quickly decreases with time. Patient adherence is a critical element in deciding whether or not exercise treatment improves outcomes in individuals with knee OA(9). Patients who get attention from health experts, believe in the efficacy of the intervention, and understand the etiology of knee OA have better adherence. Self-efficacy, or one's confidence in one's own capacity to do tasks, has also been linked to improved adherence and results(10–13). As either an outcome, techniques also including educating patients more about disorder and the economic advantages of exercise, protracted monitoring by such a clinical exercise professional, regular follow-up or booster sessions, through use of pedometers or a self-reported diary, and help and support should indeed be implemented.

1.2 Taping:

Some therapeutic regulations suggest taping the knee, particularly the patella, as a physiotherapy treatment technique in the management of knee OA. Taping the patella and/or related soft tissue structures using adhesive stiff strapping tape is known as knee taping. The goal of taping is to realign the patella to decrease patellofemoral joint tension and unload uncomfortable soft tissues surrounding the knee joint, with the goal of decreasing knee discomfort. Several randomized controlled studies in individuals with knee OA, both with and without PFJ involvement, have shown immediate and short-term pain decreases. While it's natural to assume that the pain-relieving effects of tape are limited to the time it's worn, one research discovered that advantages were still there three weeks after the tape was removed(14). The method by which tape decreases pain is unknown, although it may include improvements in patellar alignment as well as improved muscle function and activation. The latter, on the other hand, has only been shown in individuals with patellofemoral pain and has yet to be validated in patients with OA. Knee taping has a number of practical issues that must be addressed(15). To reduce the danger of side effects, it's crucial to take care of your skin. Patients should be evaluated beforehand to verify they are suitable for taping, and hypoallergenic underwear should be worn to prevent skin from direct contact with the hard strapping tape used to straighten the patellar and unload soft tissues. The removal of tape on a regular basis causes the bulk of skin injury. As a result, tape should be removed and reapplied less often in older patients with knee OA than in younger individuals.

1.3 Bracing:

For knee OA, a number of commercial braces are available, each with its own price, construction, and design. A single-piece neoprene sleeve is the most basic of designs, yet there is evidence that it may decrease discomfort. In the case of uni-compartmental OA, a 'unloader knee brace' may be utilized. It's a semi-rigid brace composed of molded plastic and foam with metal side struts that's frequently custom-built(16). The brace's design attempts to alter the way force is distributed at the knee by shifting the weight away from the painful side, and biomechanical studies back up this load-shifting effect. Several clinical studies on these braces indicate that they provide symptomatic relief for individuals with unicompartmental OA, although the impact may vary according on the patient and brace. On obese patients, braces were shown to be less effective, and custom-made braces were found to be superior than off-the-shelf designs. Adherence is considered to be one of the main factors limiting the advantages of a brace for knee OA. After 6 months, 42–50% of patients stopped using the brace, according to two studies. Bulkiness, style, ease of application, fit, and comfort are all factors that may contribute to poor adherence. Because there is little data on the efficacy of knee braces in OA, they should not be used as a stand-alone therapy and should be chosen depending on the particular patient's reaction.

1.4 Insoles and Shoes:

Insoles and footwear have a lot of promise as simple, low-cost therapy options for knee OA. Lateral wedge insoles for medial compartment OA and medial wedge insoles for lateral compartment disease have been recommended. Because of the high incidence of medial compartment OA, the majority of research has focused on lateral wedge insoles. In medial knee OA, biomechanical studies indicate that lateral wedges decrease the adduction moment while running by 4–12percent of total compared to walking barefoot or in shoes alone. As a result, the

load in the medial compartment is reduced. Wedge design characteristics such as length and inclination angle are thought to influence biomechanical benefits, with full-length insoles with a 50–100 tilt offering the greatest benefit, according to research(17–19). Despite evidence of lateral wedges' biomechanical benefits, randomized controlled studies have yet to demonstrate their efficacy in reducing symptoms of knee OA, such as discomfort, stiffness, and functionality. It's possible that certain subgroups react better than others, with advantages being more probable in individuals with less severe illness, lower lean mass, and who are younger⁵³ and less obese. Therapeutic outcomes may be influenced by variations in daily wedged insole use, with a nonrandomized study showing the highest clinical benefits from 5 to 10 hours of daily use.

1.5 Therapeutic manual treatment:

Joint mobilization and manipulation are the most frequent methods used in manual therapy. Manipulation is defined as forceful small amplitude, high-velocity movements of a joint performed at the end of the range, while mobilization is described as repeated passive movement of low velocity and changing amplitudes applied at various locations along a range. Manual therapy is widely utilized in clinical practice for OA, with studies showing that 96 percent of Irish physical therapists and 64% of UK physical therapists employ it in the treatment of patients with hip and knee OA, respectively. Despite its widespread use, little study has been done on the benefits of manual therapy in the treatment of knee OA, and few studies have looked at it in isolation from other treatments like exercise(20–23). In a randomized controlled study, the effectiveness of manual treatment and exercise in alleviating pain and decreasing physical impairment in knee arthritis patients was shown. The observed effect magnitude was similar to that found after complete knee arthroplasty. Two studies looking at the impact of manual therapy on pain in knee OA patients found a hyperalgesia effect, indicating that manual treatment may have a pain-relieving effect.

1.6 Management:

The present treatment for OA, which includes both non-pharmacologic and pharmacologic options, is mainly focused on pain relief and functional improvement.

i. Education on non-pharmacological therapies:

Patient education is a continuous and important component of patient care. Aspects of the illness process, as well as the advantages and dangers of treatment choices, should be discussed by the practitioner. Empowering patients by engaging them in joint decision-making and equipping them with positive skills aimed at lifestyle improvements may help guarantee treatment adherence.

ii. Reduction of negative mechanical influences:

Obesity increases the risk of developing and progressing OA in the knee and hip. Weight loss is an excellent primary and secondary disease prevention approach. It remains one of the greatest modifiable risk factors for OA. Weight reduction helps with pain and function in knee OA and, to a lesser degree, hip OA. It should be accomplished via a mix of proper food habits (eating properly, frequently, and in moderation) and exercise. Many people with OA also have chronic cardiac and metabolic problems, thus weight reduction may be quite beneficial. All patients with OA of the lower limbs should be counseled on proper footwear. It's best to wear a shoe with

thick, soft bottoms and no high heel. Patients with medial or lateral tibiofemoral OA may benefit from lateral or medial wedged insoles to relieve pain and enhance function.

iii. Assistive devices:

In individuals with hip or knee OA, using a cane, frame, or wheeled walker decreases mechanical stress and discomfort. The correct usage of canes should be taught to the patient. The cane or crutch should be held in the hand on the opposite side of the afflicted limb and moved with it. The height here between upper border of both the lateral epicondyle of the femur and the bottom of the heel of both the shoe should really be comparable to the entire length of the cane. Elbow flexion should occur as a consequence of this. Patients with OA with mild-to-moderate Varus or valgus malalignment may benefit from knee braces. Overuse and improper usage of braces may exacerbate joint instability by causing muscle atrophy. They should only be used when an inflammatory flare-up occurs, to protect the joint during unusual activity, and when all other therapeutic options have failed.

iv. Clinical Observations:

During the clinical examination, there are many symptoms of knee OA that may be detected. These include limping owing to joint discomfort, slowed walking pace, and shorter and more frequent strides. For a patient with knee OA, squatting may have become difficult. The presence of a deformity in the knee joint is generally indicative of advanced knee OA. Varus or valgus instability in the knee joint that may be clinically detected is considered a late indication of the illness. The lack of joint congruency is thought to be indicated by coarse crepitus. The tenderness of the knee joint may be detected by palpating it. Pain and point tenderness along the joint line indicate to an intra capsular origin. A per articular lesion is indicated by pain distant from the joint line. Physical disability is linked to a reduced range of motion, which may be assessed using a goniometer. Osteophytes, remodeling, and capsular thickening are the primary causes of reduced ROM, which may be exacerbated by soft tissue swelling. Muscle atrophy and weakening are difficult to detect in knee OA, although they may occur. Synovitis in knee OA is indicated by the typical symptoms of inflammation, such as heat, discomfort, and effusion. Although laboratory tests are not used to diagnose knee OA, they may aid in the differential diagnosis.

1.7 Outcomes from Radiological Exams:

The plain radiograph is the main study used to diagnose and evaluate the severity of knee OA. The benefits of radiography are obvious: it is inexpensive and reasonably safe, and it is widely available. The subjective discomfort and radiographic changes, on the other hand, are not always related. Joint space narrowing, osteophytes, subchondral bone sclerosis, cyst development, osteochondral bodies, and bone deformities are common radiographic findings of knee OA. The loss of cartilage is an early and crucial characteristic of OA, resulting in a narrowing of joint space on plain radiographs. Individuals and joint surfaces have different articular cartilage thicknesses. As a result, there are no reference values for joint gap thickness. Osteophytes are a characteristic of OA, and they are produced by endochondral ossification at the joint border. They suggest redistribution of aberrant joint loads and may be considered a repair effort. Cysts are another common radiographic finding in OA, and they tend to appear in regions of bony sclerosis where there is greater pressure transmission. Osteochondral fragments are formed when

the joint surface disintegrates due to OA. As these pieces are discharged into the joint area, they manifest with the other well-known symptoms of OA.

2. DISCUSSION

Knee osteoarthritis (OA) is a significant public health issue that affects people all over the globe and is one of the leading causes of persistent impairment in older people. Identification of risk factors for the development of incident knee OA is necessary for preventive treatment. The symptoms are often linked to severe cognitive disability, as well as inflammation-related signs and symptoms such as pain, stiffness, and loss of mobility. Exercise's efficacy in decreasing pain and impairment has been proven in conservative therapy. Stretching and strengthening exercises have been shown to reduce pain and increase physical strength, functional capacity, and psychological well-being. Exercise enhances muscular endurance, improves proprioceptive acuity, and reduces arthrogenic quadriceps muscle inhibition.

3. CONCLUSION

There is evidence that physiotherapy treatments may help people with knee OA decrease pain and improve function. Treatments aimed at dissipating knee joint stress, changing lower limb posture, improving range of motion, and restoring normal neuromuscular function are all part of physiotherapy. The reactions of patients vary, and more study is needed to figure out which subgroups are most likely to respond to particular therapies. No one physiotherapy intervention has been proven to be more successful than the others, therefore a mix of therapies is likely to be the most beneficial. There is some evidence that physiotherapy in conjunction with other treatment methods, such as weight reduction and psychological issues, may provide better results than any of these strategies alone. To identify which therapies are most suitable for each patient, a personalized approach to patient care is required.

REFERENCES:

1. Cahyo Is. Penatalaksanaan Fisioterapi Pada Kasus Osteoarthritis Genu Sinistra Di RSU Aisyiyah Ponorogo. libraryums. 2017;
2. Tripathi L, Kumar P, Singh R. A Review on Extraction, Synthesis and Anticancer Activity of Betulinic Acid. *Curr Bioact Compd.* 2009;
3. Bhardwaj S, Singhal N, Gupta N. Adaptive neurofuzzy system for brain tumor. In: *Proceedings of the International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Controls with Their Impact on Humanity, CIPECH 2014.* 2014.
4. Arshad A, Rashid R, Das Gupta E. A survey of the primary care management of osteoarthritis in Malaysia: A view from a rheumatologist's perspective. *Int J Rheum Dis.* 2008;
5. Saidi AHKS Al, Hussain SA, Hussain SM, Singh AV, Rana A. Smart Water Meter using Power Line Communication (PLC) Approach for measurements of Accurate Water Consumption and Billing Process. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions).* 2020.
6. Gupta P, Tyagi N. An approach towards big data - A review. In: *International Conference on*

- Computing, Communication and Automation, ICCCA 2015. 2015.
7. Goyal AK, Singh R, Chauhan G, Rath G. Non-invasive systemic drug delivery through mucosal routes. *Artificial Cells, Nanomedicine and Biotechnology*. 2018.
 8. A. A, R. R, E. DG. A survey of the primary care management of osteoarthritis in Malaysia: A view from a rheumatologist's perspective. *Int J Rheum Dis*. 2008;
 9. Mora JC, Przkora R, Cruz-Almeida Y. Knee osteoarthritis: Pathophysiology and current treatment modalities. *Journal of Pain Research*. 2018.
 10. Øiestad BE, Juhl CB, Eitzen I, Thorlund JB. Knee extensor muscle weakness is a risk factor for development of knee osteoarthritis. A systematic review and meta-analysis. *Osteoarthritis and Cartilage*. 2015.
 11. Jain M, Preeti. Availability analysis of software rejuvenation in active/standby cluster system. *Int J Ind Syst Eng*. 2015;
 12. Sihag J, Prakash D, Yadav P. Evaluation of Soil Physical, Chemical Parameter and Enzyme Activities as Indicator of Soil Fertility with SFM Model in IA–AW Zone of Rajasthan. In: *Advances in Intelligent Systems and Computing*. 2020.
 13. Tripathi L, Kumar P, Singh R. Role of chelates in magnetic resonance imaging studies. *Journal of Cancer Research and Therapeutics*. 2009.
 14. McAlindon TE, Bannuru RR, Sullivan MC, Arden NK, Berenbaum F, Bierma-Zeinstra SM, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthritis Cartil*. 2014;
 15. Lespasio MJ, Piuze NS, Husni ME, Muschler GF, Guarino A, Mont MA. *Knee Osteoarthritis: A Primer*. The Permanente journal. 2017.
 16. Carmona-Terés V, Moix-Queraltó J, Pujol-Ribera E, Lumillo-Gutiérrez I, Mas X, Batlle-Gualda E, et al. Understanding knee osteoarthritis from the patients' perspective: A qualitative study. *BMC Musculoskelet Disord*. 2017;
 17. Huang G, Hua S, Yang T, Ma J, Yu W, Chen X. Platelet-rich plasma shows beneficial effects for patients with knee osteoarthritis by suppressing inflammatory factors. *Exp Ther Med*. 2018;
 18. Sadioura AS, Singh R, Singh H. Machinability index evaluation: A case study of carbide inserts. In: *Applied Mechanics and Materials*. 2013.
 19. Ratra S, Naseer A, Kumar U. Design, Docking, ADMET and PASS Prediction Studies of Novel Chromen-4-one Derivatives for Prospective Anti-Cancer Agent. *J Pharm Res Int*. 2021;
 20. Kendzerska T, King LK, Lipscombe L, Croxford R, Stanaitis I, Hawker GA. The impact of hip and knee osteoarthritis on the subsequent risk of incident diabetes: a population-based cohort study. *Diabetologia*. 2018;
 21. Jain UK, Bhatia RK, Rao AR, Singh R, Saxena AK, Sehar I. Design and development of halogenated chalcone derivatives as potential anticancer agents. *Trop J Pharm Res*. 2014;
-

22. Goyal MK, Rai D V., Kehwar TS, Manjhi J, Heintz BH, Shide KL, et al. Anatomy-based definition of point A utilizing three-dimensional volumetric imaging approach for high-dose-rate (HDR) intracavitary brachytherapy dose prescription when treating cervical cancer using limited resources. *J Appl Clin Med Phys.* 2016;
23. Sharma PK, Srivastava R, Munshi A, Chomal M, Saini G, Garg M, et al. Comparison of the gross tumor volume in end-expiration/end-inspiration (2 Phase) and summated all phase volume captured in four-dimensional computed tomography in carcinoma lung patients. *J Cancer Res Ther.* 2016;